

Digital Content Service Design with Storytelling Applications

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Abstract

The goal of this study is to guide storytelling theories into digital content service (DCS) development, discussing storytelling concept application in DCS design through cognitive theories that focus on affects at the user level (emotional reaction and behavior). The purpose of this research is to investigate the relevance between DCS and the storytelling concept, and its inspiration for application in the interaction design field. On the basis of practice of interdisciplinary teamwork, a storytelling involved DCS design process is proposed, and design strategies are addressed for application in each phase of the development process.

Keywords: Storytelling, Digital content service, Interdisciplinary collaboration, Design model.

Introduction

Storytelling is a method of creating imagery, emotions, and understanding of events through an interaction between a storyteller and an audience (Lidwell, Holden, & Butler, 2003). The concept is commonly applied in motion pictures and animation productions, allowing the audience to be immersed in the plot. The storytelling concept and spirit are also applied with significant effect in various other fields such as digital games, product design, branding, education, exhibition, and performance. However, in the digital media design field, although designers continuously discuss guiding the storytelling concept into their design processes, the concept remains fuzzy, and its illustration is abstract. There are various causes for this: there are no storytelling theories based on interaction design aspects for designers to reference; there has not been an explicit storytelling involved design model proposed that interaction designers can follow; additionally, storytelling involved design strategies for the development process are not well presented. Based on these three shortfalls, this study raises two research questions:

- (1) Storytelling remains a simplistic concept for most interaction designers. Their concept is to apply

images and plots of old stories to design work or to assist users in sharing their stories with others. Most images and promotions from local governments and activities are inspired from ancient tales that relate to the locations, but only take advantage of the graphics. The level of application is still superficial because designers lack deeper understanding of the storytelling concept. They have not been given the vision that storytelling can be applied via a variety of methods, as is evidenced by its use in other fields.

- (2) The reason the concept of storytelling application in design remains abstract though it is often discussed is lack of an explicit development model that focuses on storytelling involvement in the development process in the interaction design field, as well as nonexistent guidelines for developers.

Theoretical concept

As a guide, a theoretical concept map is illustrated (Figure 1) in order to understand the relationship between the theories, and to depict the scope of the study.

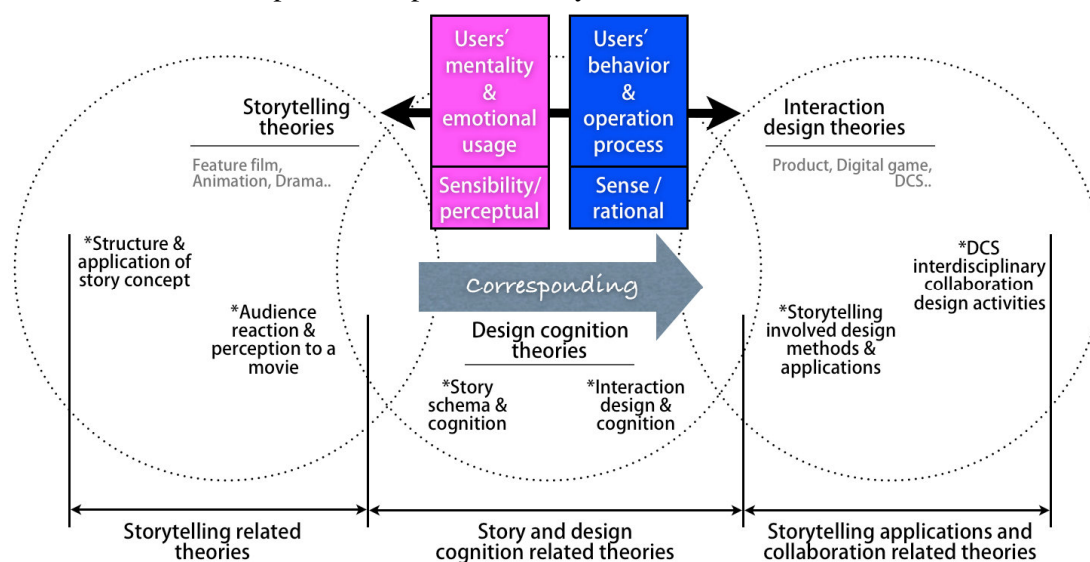


Figure 1. The theoretical conceptual map of the research

Current DCS design theories are based in interaction design focusing on user behavior and operation processes. They tend to the rational level of thinking. Sometimes when a user decides to accept (or buy) a product or service, the perceptual level of thinking, such as brand preference and emotion, gains importance. Storytelling is effectively leading the audience's emotional reactions (Hicks, 2004), such as in watching a movie; therefore, the theoretical framework of this research is to study storytelling related theories, and through understanding of story and design cognition processes, the results can be applied to current interaction design theories. The purposes of this research are:

- (1) Describe the statement of the relation between DCS design and the storytelling concept.
- (2) Present the distinct storytelling involved DCS design model.

Literature review

This chapter consists of three parts. The relationship between the three parts is depicted in figure 1. Section of Story concept seeks to deeply comprehend the ideas of storytelling and discover possible connections to interaction design. Section of design cognition and story looks at literature concerning cognition theories of story and design. Knowing the cognitive process of story telling and listening will aid in understanding

storytelling application in design activities. Literature review of design cognition provides insight into cognitive connections between storytelling and interaction design. Section of Storytelling involved design reviews previous research design methods and applications involving storytelling ideas in different fields in order to discover various possible design methods for DCS.

Story concepts

A story is a convincing experience of empathy for people. It makes them imagine the pictures, and it influences their lives, points of view, perceptions, and judgments (Loebbert, 2008). The power of a story happens after it has been told. As it echoes and ferments in the mind of the audience, its significance takes hold, and it becomes a permanent part of one's experience (Simmons, 2002).

Hopkinson & Hogarth-Scott (2001) identify three major types of stories: a factual report of events, a myth, and a narrative. Whereas a factual report is real, a myth and a narrative are not completely true. Storytellers give truth to myth. Narrative is a means of coming to understand events and constructing their reality. In his *Poetics*, Aristotle said a story should include a plot. The plot is composed of three parts: a beginning, a middle, and an ending. In story structure, the concept is situation, complication, and resolution (Vincent, 2002). Fog, Budtz, Munch, and Blanchette (2005) extend the concept to include four elements: meaning, conflict, characters, and plot. Lidwell, Holden, and Butler (2003) describe the details of storytelling elements: Setting, Characters, Plot, Invisibility, Mood, and Movement.

Escalas (1998) argues that the two major factors of narrative structure are chronology and causality. Characters, actions, and scenes appear as the story progresses. At same time, their causality is gradually derived. He also introduces two major functions of the story narrative: assisting people in remembering, and aiding people in experiencing, evaluating, and dealing with emotions. According to previous research, storytelling is not just simply saying a story to audience; it includes story structure and shared cognitive levels between the storyteller and the listeners.

Storytelling is not about actions, but about the reasons for the actions. Stories have been used to transfer not only historic knowledge among generations, but also cultural and social values, as well as to provoke emotions (Spierling, 2002). Therefore, story concept, also referred to as story development, is a major course at most animation and film making departments in art schools. The concept seems to be abstract and indescribable, but in fact, it can be comprehended and made practically applicable to the story developer.

The 3-act structure of a story (Pramaggiore & Wallis, 2011) is an essential concept for learning story plot development. The components of the 3-act structure, a foundational concept for story development, are *lure-in*, *climax*, and *resolution*, similar to the ancient Chinese storytelling concept: *ch'i*, *ch'eng*, *chuan*, and *ho*. *Lure-in* is the initial stage of a story. The major tasks are to introduce the main characters and their interrelationships, the story environment, and the story background. The key point in this period is to trigger the audience's interest. *Climax* is the tension in a story. A common technique for creating climax is to build conflicts between characters, a character and the environment, or inside a character's mind. Early in this period is the location of *ch'eng*, a point at which something happens to the characters that changes their lives or causes some contradiction. *Resolution* is providing a reasonable and satisfying ending to the movie. The difficulty is in generating a creative and unpredictable idea that not only allows the characters' to reach their goals, but also satisfies audience expectations. These four parts directly correspond to Kristin Thompson's four-part structure (Pramaggiore & Wallis, 2011): (1) *ch'i* - exposition leads to a turning point; (2) *ch'eng* - complicated action leads to a major turning point at the halfway mark; (3) *chuan* - development: struggle toward a goal leads to the climax; (4) *ho* - epilogue.

A classic screenwriting principle, similar to the 3-act structure, but more complex, is called the 3-act

paradigm, which was developed by Syd Field (2005). The paradigm is best suited for live-action film, normally about 120 minutes in length. The paradigm is a conceptual scheme. This paradigm is the structure that holds screenplays together. According to Field, screenplays follow a three-act structure, meaning the standard screenplay can be divided into three parts: *Setup*, *Confrontation*, and *Resolution*. In the *Setup*, major characters and the story background are introduced, and an incident changes their lives. Just before the second part, plot point #1 occurs. The plot point, often called a reversal, is an event that thrusts the plot in a new direction, leading to a new act in the screenplay. In the *Confrontation* section, the characters encounter an obstacle that was established in the *Setup*. Before the midpoint of the film, the main character reaches his/her lowest point and seems farthest from achieving a dramatic premise. At the end of this section, plot point #2 leads the character away from the low point to confront the conflict, usually inspired, of course, by someone or something special. In the *Resolution*, the climax is the point at which the plot reaches its maximum tension, and the forces in opposition confront each other at a peak of physical or emotional action. Although the conceptual points of the paradigm differ slightly from the 3-act structure, both share similar basic ideas.

When viewing a well-done film, the audience undergoes several changes of emotion. Hicks (2004) identifies three stages of audience reaction: *Attraction*, *Anticipation*, and *Satisfaction*, which can be seen to correspond to the 3-act structure, the 3-act paradigm, and the Chinese fable.

In the beginning of the story, the audience must be *attracted* by characters and story setup to entice them to want to keep watching. Hence the label *Lure-in* in animation. In the middle of the story, the audience starts to *anticipate* the actions the characters will take to confront the obstacles, especially in transforming from the low-point to the positive fight. The audience should experience the maximum tension of the story at this point. In the final section, the *resolution* should be where the characters overcome the obstacles and achieve their goals, delivering a feeling of *satisfaction* to the audience.

The three-act structure concept is the basis for story development. It is revealed in analysis of most Hollywood blockbusters. It evokes consideration and emotional response from the audience. Applied skillfully, it results in a good movie that can unconsciously influence people's thoughts and behaviors.

Longer dramas, such as a TV series, require a multi-plot story structure in order to maintain audience attention. The new TV series uses the multi-plotting technique to advance enough information to satisfy the viewer during one episode, to avoid the necessity for closure and to leave open clues for plots of the next episodes (Zagalo & Barker, 2006). A multi-plot structure applies two or more plots to generate an *intersect point*, though there are usually no more than three intersect points in one episode. The intersect point is the point at which the audience re-thinks the subject of the story. It may be a contrast or contradiction that makes the audience re-think a situation from the different perspectives of the various characters.

Several ideas from the story concept can be applied to design, especially in the time-based interaction design field. The *3-act structure* reflects different strategies for each time stage. Understanding of the environment, introductions of functions and purpose of the system, and interesting and attractive design are vitally important in the initial stage. Once a system has started to be used, the learning process, assisting mechanics, frustration reduction, and achievement fulfillment are important in the middle stage, whereas in the final stage, results presentation, satisfaction, and solving the problem correctly are important. Transformation of the *emotional reactions of the audience* follows the stage change: attraction, anticipation, and satisfaction. Just as a story concept changes, interaction designers can consider methods for guiding changes in user emotions in the design process.

Design cognition and story

Cognition is the process of thought, usually referring to an information processing view of an individual's conscious or unconscious psychological functions. The cognitive process (Sharp, Rogers, & Preece, 2006) occurs in the brain while doing routine things such as thinking, remembering, and learning. Cognition is described as a particular program, which includes: (1) Attention; (2) Perception; (3) Memory; (4) Learning; (5) Reading, Speaking, and Writing; (6) Problem solving, Planning, Reasoning, and Decision-making activities: use of different tools including paper, pen, or map to think and discuss with others. Reasoning varies based on what the scenario calls for in order to find the best solution.

The cognitive process helps to deal with things in life. Story helps comprehend the connectedness of things. Narrative psychologists think humans have a natural inclination to construct, annotate, and share experiences through story concepts in the mind. Shankar, Elliott & Goulding (2001) argue that narration assists people in cognizing, memorizing, and formatting the self-concept. Escalas (1998) identifies two major functions of narration: sense making and emotional appraisal. The former assists people in remembering, while the latter aids in experiencing, evaluating, and dealing with emotions. Herman (2003) postulates that story is a tool for thinking, simplifying the cognitive process. Rumelhart (1975) reflects that story has a structure of rule, and humans have story structural knowledge in their minds. Knowledge becomes cognitive schema. In other words, people understand articles or deal with things through the schema. The schema is generated from knowledge of stories learned. The success of stories being passed down through generations relies on people's memories (Mandler & Johnson, 1977), and memory relies on story schema. That the schema is understandable is dependent on the sequence setup of story, such as the beginning-end or problem-resolution relation and the story structures discussed above. Children learn story-reading skills from parents and teachers, in essence training them in story structure prediction skills, which are drawn on throughout life for processing various types of information. Thus it may be seen that story schema influences people's cognition ability imperceptibly in life. In other words, it is easier to interpret and absorb an idea involving story concept. Storytelling is an effective tool for communication.

Cognition researchers in the education field refer to the term "story grammar". Stein and Glenn (1979) state a story is composed of *setting* and one or more *episodes*. *Setting* is to introduce the characters, as well as the time and location of an event occurrence. *Episode* is made up of several components: (1) *Initiating event*: Cause and background of event occurrence; (2) *Internal response*: Emotional reactions of characters to the initiating event; (3) *Internal plan*: Cognition and goal of characters to the initiating event; (4) *Attempt*: The actions to achieve the goal; (5) *Consequence*: events, actions, and result; (6) *Reaction*: The characters' response to the result.

Previous research tells us people think of things based on their understanding of story structure, an important concept for designers, especially in dealing with design projects involving user interactions. Current significant theories of design cognition such as the seven stages of action (Norman, 1998), and GOMS - Goals, Operators, Methods, and Selection rule (Card, Moran, & Newell, 1983) focus on the rational level of the cognitive process of interaction design. The storytelling-concept-involved design could bring the perceptual level of interaction design to users. The connection between design and story structure can be shown by simplifying design cognition theories into four phases: *needs*, *understanding*, *actions*, and *satisfaction*.

Needs phase: people start to use a product primarily because they need it at some level. Sometimes the product just interests them, so they try it. In this phase, users are forming a goal for use of the product, i.e. what they expect to accomplish with it. *Understanding* phase: users begin to recognize the functions of a product and learn its operation. *Actions* phase: users execute the job with the product and receive a response from the process. Users may adjust the process in order to achieve the goal. In the understanding and actions

phases, users need to learn. They may face difficulties or feel frustrated, but once they have learned and make good use of the product, they will accept and adopt it. *Satisfaction* phase: the level of user satisfaction comes from the degree of the outcome in reaching the goal or being rewarded with pleasure during the process. When these four phases are compared to story concept theories, parallels can be observed.

Previous research has shown that the storytelling concept is applicable in constructing the product image and the brand value (Huang, 2006; Vincent, 2002). Storytelling allows users to associate products with stories, be they cultural or personal stories. Recalling the story is distinct, and it not only intensifies the memorizing, but also triggers the level of sensibility. Certainly, the appearance design, graphics, and shape should support the concept simultaneously. As mentioned before, story schema allows a user to understand things easily, meaning that information linked to story structure is effortlessly recognized by the user.

According to design theories and cognitive process, there are four important stages consumers process through when contemplating adoption of new design products: *Needs*, *Use*, *Adoption*, and *Needs solved & Satisfaction*. In the *Needs* stage, a user finds that something is needed to solve a problem, or that there is something of interest. During the *Use* stage, a user starts using and learning how the product operates as well as understanding the system concept. At the *Adoption* stage, a user has learned the product well and makes good use of it. Moreover, the product concept is adopted and a mental system concept model is constructed. It is in the *Satisfaction* stage that the needs of a user are met and satisfaction with the results of process occurs. A user will evaluate the causality of the process and any positive or negative usage experiences in the end.

A similar process occurs in the creation of interactive art. Bilda, Edmonds and Candy, in developing the Creative Engagement Model (2008) for the relationship between user experience and creativity of interaction artwork, note that a good interaction design interests the user and generates expectations. A user will play it, learn it, and eventually adopt it. Through deep understanding and practice, the end result is creative behavior by the user. Table 1 incorporates the concepts discussed in this section into the comparison.

Table 1. Comparison of story concept, design cognitive, and user behavior aspects

	Beginning	Middle	Ending
3-act Structure of story concept	Lure-in	Climax	Resolution
paradigm of the screenplay	Setup	Confrontation	Resolution
audiences' views	Attraction	Anticipation	Satisfaction
cognition aspect	Needs	understanding, actions	Satisfaction
user experience with new products	Needs	use, adoption	Needs solved & Satisfaction
Interactive art experience	Interest, expectation	Playing, learning, adoption, deep understanding	Generate creativity

By considering table 1, which depicts how story concept, design cognition, and user behavior correspond, designers can develop ideas for consideration of users' emotional reactions when applying story concept in interaction design projects. Each phase requires a different design strategy.

Storytelling involved design

Many good products involved with storytelling are already market successes. For example, Ma-la-sun millet wine calls to mind the movie Cape No. 7. A rabbit-themed lantern recalls memories of the 12 animals symbolic of years in the lunar calendar, Lantern Festival, or the Rabbit in the Moon story and images.

Obviously, memories remain in people's minds because of the stories associated with them, stories that help people memorize things.

Research dealing with storytelling application covers various fields, including branding, education, exhibition, digital technology, digital game, and product design, demonstrating the wide applicability and significance of the storytelling concept.

Huang (2006), arguing that storytelling can facilitate and benefit branding, presents a clear analysis framework that covers three dimensions: the kinds of stories that should be used for branding, who the speakers and listeners are in the process, along with the viewpoints that should be imbedded in a brand narrative, and how brand narratives should be constructed and given. A brand is to play into a user's self-identity, and the promotion of a brand is to recall its images and associations for the user. Storytelling can certainly be a strategy for the purpose of connecting the brand and a consumer's experiences with the product, generating emotional approval and cultural resonance.

Jih and Tsai (2003) propose a teaching design model for interactive digital storybooks, applying the story concept into digital learning technology. The reader is given the opportunity to interact with the storyteller and the book via multi-media presentation of text, pictures, animations, and audio. Interaction induces the reader to be more deeply immersed in the storytelling process. Because of the interaction non-linear feature, the reader is able to see the viewpoints of various characters and is able to explore and select different endings. This can encourage the readers to become tellers and share their ideas with others. Bran (2010) makes use of digital storytelling to train students in English writing and computer skills. In the course, the students are asked to become a storyteller and adopt computer-based tools, images, audio narration, video clips and/or music to describe a sequence of news photos, resulting in more dynamic stories that captivate learners and enhance creativity, as well as improve their English-language skills.

Dean (1996) uses the story concept as a presentational technique for communicating exhibition information to museum visitors. He proposes the annotative loop of storyline theory. The storyline is the combination of exhibition events and design, providing an educational structure, and it is a blueprint of the exhibition. A successful annotative loop of the storyline includes five phases: (1) Communicators: museum, science center, exhibition hall, or zoo; (2) Messages: history, anthropology, esthetics, or science; (3) Channels: display, volunteer, presentational equipment, performance, or speech; (4) Receivers: visitors; and finally (5) Response of the visitors: through interview, observation, questionnaire, or discussion. The visitors are story listeners at the exhibition. Another storytelling concept applied in the museum is the Virtual Museum of the Collective Memory of Lombardia (Giaccardi, 2006). The website was developed in conjunction with the local community through their contributions of stories and images as a cultural project. It was produced to create an innovative digital museum as a result of the interplay between memory as a cultural resource, multimedia presentation as actual interpretation, and storytelling as a resource for further potential interpretation. The collection and preservation by digitization of images and stories connected to these archives has not only a cultural goal, but also a social purpose. The local community participated in the development of the project, contributing memories as stories. Thus, features were innovatively developed for the museum.

Balabanovic, Chu, and Wolff (2000) apply the preference for storytelling behavior in developing a digital album device: StoryTrack. Users tell their stories through a series of photos they have taken. The listeners, usually friends or relatives, can easily follow the story and share in the experience of the users. The authors coined the term *Story-driven concept*, explaining the subject has a particular story in mind, and then gathers the appropriate photos and recounts the story. The purpose of the device is to assist the users in initiating and sharing their stories. Amitani, Bilda, and Edmonds (2008) developed an algorithm that arranges online multi-media materials into a sequence for a story-like presentation. The generated sequence

is more structured and gives the stories better understanding, although there is room for improving the quality of the sequence as a story.

A study by Yee (2005) shows the storyline and characters are two of components of game development, especially in role-play games. Digital games allow players to explore the story environment and fantasy in a way that goes beyond simply listening to the story. Some researchers believe storyline is narrative and linear, and is controlled by storyteller, but interactive digital games, just the opposite, are non-linear and controlled by story listeners (players). Jenkins (2004) argues that not all games tell stories. Games may be an abstract, expressive, and experiential form. If some games tell stories, they are unlikely to tell them in the same ways that other media tell stories. Digital games create spatial stories and environmental storytelling: game designers don't simply tell stories; they design worlds and sculpt spaces. Environmental storytelling creates the preconditions for an immersive narrative experience. Story of game is an experience controllable by the player, who is able to craft the process, choosing certain events in a certain order so as to create a story with maximum impact. Narrative can also enter games on the level of localized incident, or what Jenkins called micro-narratives. For example, *Gran Turismo 5 (GT5)*, a famous Play Station 3 video game from Polyphony and SCE, is a realistic car-racing simulation game. There is a mode called GT that allows players to race at any level from amateur to professional. Players need to anticipate different selectable competitions to win points in order to go the next level. They are free to decide to become a professional racer, or to win money to buy the cars they like. Each competition is like a micro-narrative, and all narratives compose a complete storyline. "Freedom, power, and self-expression" are associated with interactivity. The tension between performance (or game play) and exposition (or story) is far from unique to games (Jenkins, 2004).

Lin (2007) introduces the cultural product design model that transforms cultural stories into product design. The design features can be categorized into three levels: (1) the inner level, containing special content, such as stories, emotions, and cultural features, (2) the mid level, dealing with function, operational concerns, usability, and safety, and (3) the outer level, dealing with color, texture, form, decoration, surface pattern, line quality, and detail. The three levels of the cultural product design model parallel Norman's (2005) three levels of design features: visceral design, behavioral design, and reflective design. Six types of storytelling application have been introduced in the previously mentioned studies:

- (1) Create a new story to promote a certain image and spirit: usually seen in branding activities designed to communicate a certain image.
- (2) Transform an image from an old story or tale to a new product: commonly used in culture-related product design that seeks to associate the product with the image in the consumer's mind.
- (3) Adopt a story structure concept into a new technological product or service: new interactive multimedia technological features allow for various styles of vivid storytelling, such as in e-learning courses and e-books.
- (4) Assist user in telling a story: develop a device or the necessary mechanics to help both speaker and listener understand easily, such as seen in StoryTrack and many user-generated content (UGC) websites.
- (5) Use the story concept to improve comprehension and cognition: visitors better understand the works in an exhibition through a display that is set up as a story sequence.
- (6) Develop a story environment to let the user explore freely: the environment allows users to search more and arrange their own storyline, as commonly seen in digital games.

Methods

The research design of this study has its foundation in the development of two projects: MAPMARK (Author & Hsu, Author) and Open Space 2.0 (Hsu & Author, Author). It is the synthesis of practical experience in the development of the projects to generate theories of the storytelling involved design concept and appropriate research methods. Figure 2 illustrates the structure of the research design.

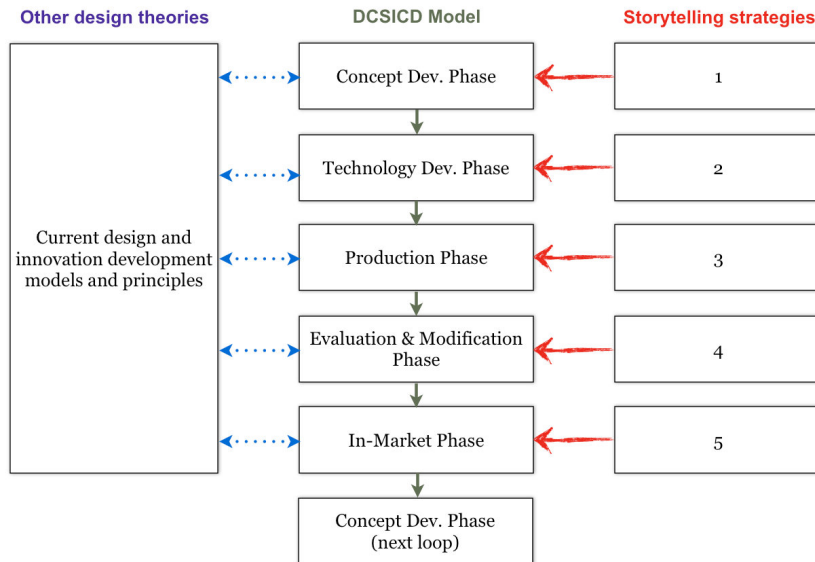


Figure 2. The structure of the research design

The structure is composed of three parts. The *DCSICD model*, at the center of the structure, was constructed in a previous study by Author, et al. (Author). DCS design is the five phases of interdisciplinary collaboration development. *Storytelling strategies*, on the right side of the structure, focus on methods to induct storytelling concepts into each phase as the projects are under development. *Other design theories*, on the left side of the structure, are used for comparing the research results to previously established theories and principles, such as the design development cycle (Lidwell et al., 2003), the Delft Innovation Model (Buijs, 2007), and the four design activities of interaction design (Sharp et al., 2006). The comparison will improve understanding of the features of DCS interdisciplinary collaboration development activity.

The primary research method used in the current research is case study (Chang, 2004), focused on two cases: MAPMARK and Open Space 2.0, Observation (Chang, 2004) is a technique the author adopted participant observation, observing and collecting data at same time as being an integral part of the project development process, Interview (Chen, 2005) is a technique three key team members were interviewed in order to gather multi-aspect primary-source data, Content analysis (Guan, 2006), also referred to as literature analysis or information analysis, is a method for investigating and studying existing related concepts.

The research action loop (Figure 3) shows how the research has been processed. In each development phase of DCSICD, the author executed a sequence action of the loop in order to gather both research data and ideas for the projects from the engagement process.

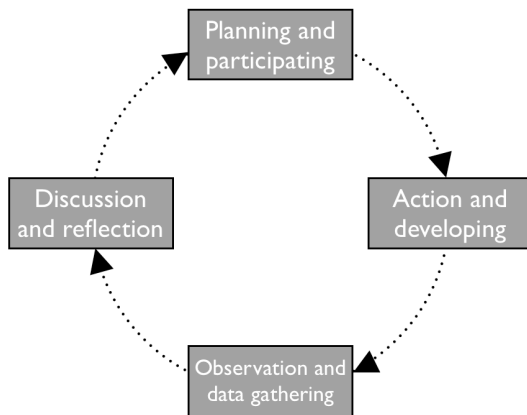


Figure 3. The research action loop

The idea of the research action loop is referenced from the action research concept. The action research method (Guan, 2006) emphasizes the combination of practical action and research. The goal is to investigate practical issues and participant decision-making and strategies in real situations. The researcher also provides suitable solutions to improve work quality or solve problems.

MAPMARK and Open Space 2.0

A search engine that provides location-centered search would be much more useful than a text-based search for knowing a certain area well. Another important technique to gain wider and deeper knowledge is to avail user-generated content, known as Web 2.0. The project MAPMARK (Figure 10) combines those two features in an open source public-use service. The system automatically attaches geo-notes for all input information from users, and it is easy to make bookmarks on the e-map in order to link to web pages. Moreover, users can use the system to share thoughts on an area, and other users can join in on the discussion. The Open Space 2.0 (Figure 4) project expanded the idea of MAPMARK to mobile devices. A user is able to upload and retrieve photos and other media data through a smart-phone with Wireless Internet connection or PC synchronization. Meanwhile, the recorded paths of users provide a great resource for urban researchers and architects to analyze the area for better spatial design.



Figure 4. Interface design of MAPMARK

With a cell phone equipped with GPS, a camera, WIFI, and the Open Space 2.0 program, users take pictures. The photos are tagged with geographical data and sent to the server through the Internet to create a shared platform of photos. Others in the area can be located by the system and receive the photos from their immediate vicinity. The shared platform of photos can also be accessed through the webpage. Once a user connects his/her mobile phone to the computer, he/she is able to see his/her data on the e-map, and also see more data related to the area from other users. There are two main functions and goals for the project:

- (1) Leave a Photo in a Place: It is imaginative to see the photos according to the location where they were taken. Users can experience the open space of a different time and possibly different appearance, and also experience other people's circumstances and photos from that particular physical environment to imagine their stories. The system links people from different times but at the same location. Users' photos become a part of the story.
- (2) Leave a Path in a Place: It is different from the traditional top-down method of analyzing an open space, creating a new bottom-up direction that can analyze the users' detailed movements through the space. With this kind of diagram, urban planning and architecture researchers can better understand space usage of a certain area.

Results

Relationship between Storytelling and DCS design

Story development structures like the 3-act structure and paradigm were applied to the projects, and then consideration of audience emotional reaction to a story was introduced. Guiding the audience and introducing changes in the minds of the audience are two essential elements of storytelling that can also be used for cognition and design. From the design cognition aspect, need, which can sometimes be simply the result of interest or beauty, triggers user desire to seek for or look at an object. The user starts to understand the object, and then takes action upon the object to address the need. The user is satisfied if the need is completely met, and the object becomes a daily necessity.

Once a new concept product or service is released into the market, it must be determined if target users will accept it. A similar concept occurs in design cognition in that needs and interest initiate interest in a product or service, and then it must be determined if the user is willing to try it and use it. If the product or service seems right, it will be learned and then adopted in order to solve the felt need, bringing a sense of immediate satisfaction as well as future reliability. This same idea can be seen in an interactive art experience. The subject of the exhibition interests a visitor, who then generates a mental expectation about the exhibition before experiencing it. The visitor engages in and learns during the experience. If the exhibition continues to attract the visitor, he/she will adopt a deep understanding of the artwork; therefore, the visitor can generate creative behavior or ideas through the artwork. Storytelling strategies in the DCS design process becomes a three-step process that corresponds to the 3-act structure, as seen in the bottom line of figure 14. The MAPMARK experience provides some ideas:

- (1) Curiosity and desire of needs: Storytelling starts with luring in users' interests by pricking their curiosity in the service, and then triggering their desire, or needs, to continue using the service. The operational environment is suggested to be clean and concise, so that the users can concentrate on their desired behaviors.
- (2) Playing, using, learning, and dealing with difficulties: When users decide to make use of the service to achieve some purpose, they are willing to spend time on learning. Normally, users will confront difficulties learning the operations, so that the system must anticipate what they might be and provide solutions to help users.
- (3) Satisfying and sharing: how results presented in the end of operation directly influence users'

satisfaction with the service. A great experience and result encourage users to share their contents, and also stimulate their creativity for the next operation. Web 2.0/UGC type of DCS requires heavy user-contributed contents. The user experience directly influences the service.

There are many types of DCS applications in our lives. It is difficult to define a single design strategy that is suitable for every type of DCS. The storytelling involved design transition model (Figure 5) illustrates a guideline that depends on usage time to decide what storytelling conceptual structure is appropriate. Three levels of transition are presented:

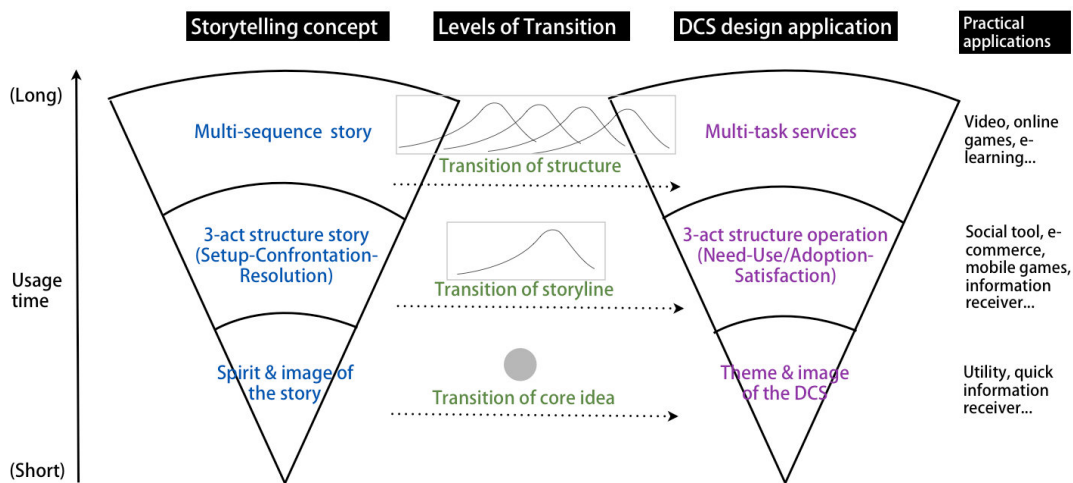


Figure 5. Storytelling involved design transition model

- (1) *Transition of core idea*: employed when time is limited and for quickly receiving data. Because of time constraint, only images and the spirit of the story can be delivered. The images and spirit require mapping to the theme and images of the DCS service. Users can receive the images immediately.
- (2) *Transition of storyline*: employed when time is less constrained. The DCS design is able to guide the complete 3-act structure. The user experience process directly influences user emotional responses to the service.
- (3) *Transition of structure*: employed in extended-use service. The DCS is one that a user often returns to. The multi-sequence story concept provides a method by which users repeatedly use and maintain interest. Over-intensive or lengthy plot setups may cause users to become frustrated with the service.

Storytelling involved DCS design model and design methods

According to the research process and results, a storytelling involved DCS design model is induced and proposed (Figure 6). The model is presented as three concentric circles. The middle circle is the five-phase development process referenced from the DCSICD model (Author et al., Author). The outer circle is the DCS design process, and the inner circle is the process of guiding the storytelling concept into the design. All circles complement each other in multiple ways.

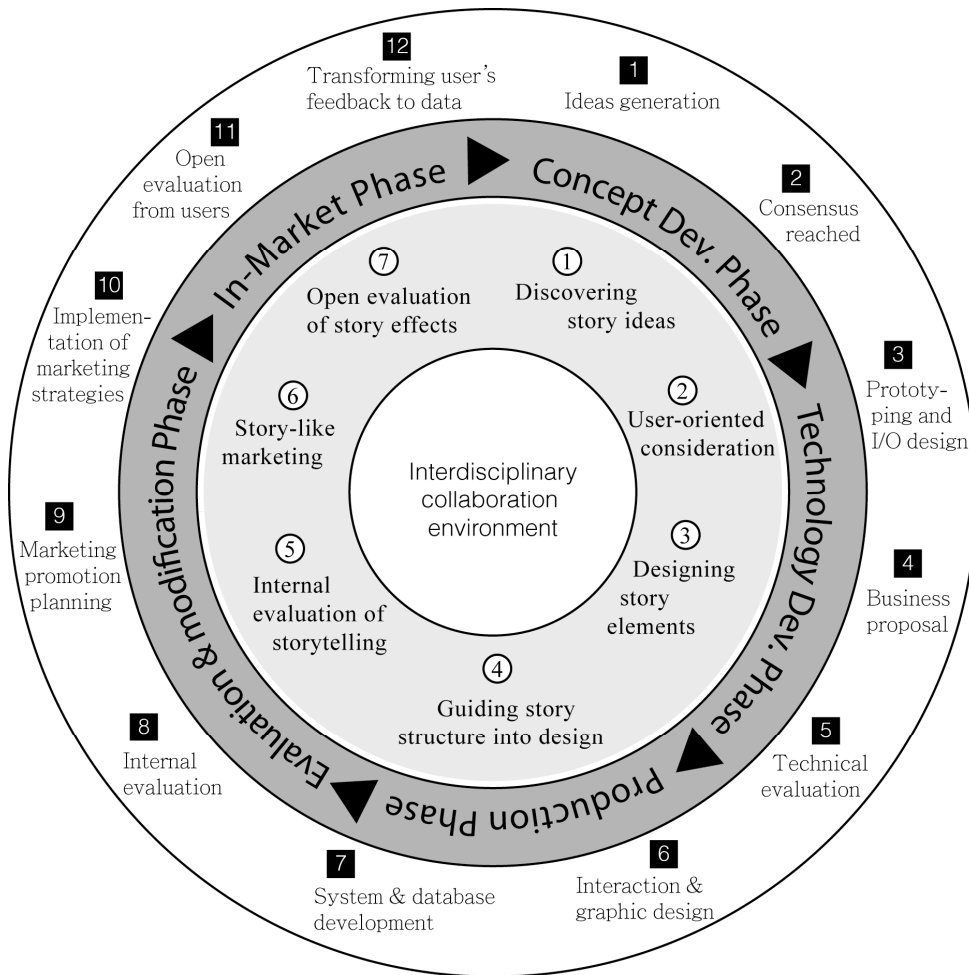


Figure 6. Storytelling involved DCS design model

The outer circle is the DCS design process, which involves 12 activities: generating ideas, reaching a consensus, prototyping and design the I/O, creating the business proposal, evaluating the technical potential, designing the interaction & graphics, developing the system & database, evaluating the design internally, planning the marketing promotion, implementing the marketing strategies, receiving user evaluation, and transforming user feedback into data. The feature of this design process is concentrating on a cross-disciplinary collaboration environment that is in line with current industry status.

The inner circle is the process of guiding the storytelling concept into the design, which includes 7 activities. The activities need to coordinate with the DCS design process (Outer circle) closely.

- (1) *Discovering story ideas*: Once the ideas of the project are confirmed, the developers can start to discover opportunities for story concept applications for the project. From the findings of this study, several methods can be referenced: (1) create a new story to promote a certain image and spirit, (2) transform an image from an old story or tale to a new product, (3) adopt a story structure concept into a new technological product or service, (4) assist users in telling a story, (5) use the story concept to improve comprehension and cognition, and (6) develop a story environment that the user can freely explore.
- (2) *User-oriented consideration*: An important idea for initial DCS design is setting up a scenario to understand possible user behaviors. Every HCI design must be people-oriented; otherwise the design will be abandoned. The storytelling involved design process cannot rule out consideration of users.

Several ideas that relate to story concept are: (1) How does the design lure people to use the service? Is it fun or interesting enough when users begin knowing about and using it? (2) How does the design create a meaning of story that can be related to the project? Is the meaning suitable for the target users? (3) Why would people want to use the service? What situation or scenario makes them do so? What is the practical purpose? (4) How will the story make users want to gradually explore more and contribute passionately? (5) What do users receive at the end of usage? Does the sequence of actions provide a great storytelling experience for users?

- (3) *Designing story elements*: This is a task for the interaction and graphic designers. Briefly, the process is to identify story meaning, break down the story elements, and then transform them to design elements such as images, symbols, icons, motions, colors, time, and metaphors.
- (4) *Guiding story structure into design*: The developers adopt different design strategies for different periods of time usage. The basic concept is discovered via the 3-act story concept and paradigm of film screenwriting. The storytelling involved design transition model (Figure 5) could be a reference to take into consideration the design process in order to deliver a better storytelling experience with the service.
- (5) *Internal evaluation of storytelling*: Coordinate with the internal evaluation activity in the DCS design process to ensure the storytelling subject has been effectively and completely delivered to the users via helping with the cognitive process.
- (6) *Story-like marketing*: Part of the promotion plan strategies in the DCS design process that use the storytelling form to advertise the project in the public media.
- (7) *Open evaluation of story effects*: Coordinate with the open evaluation activity in the DCS design process that focuses on monitoring the perception level of storytelling to target users and market response. The feedback will be studied and analyzed for improvement in future versions.

Storytelling is considered as a design method that can be systematically understood and applied. The concept and theories are also beneficial for other creative industry design tasks that consider guiding storytelling into the development process. Furthermore, this study illustrates explicit descriptions and applications of the storytelling concept in design that can be a good reference for industry and an academic foundation for future research.

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A Short bio of the author

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References

- Amitani, S., Bilda, Z., & Edmonds, E. (2008). Our Content: generative montage methods for multimedia data. *Design Studies*, 29(6), 572-586.
- Author, Chen, C. H., Jeng, T., & Hsu, H.-L. (Author). Author. *Author, Author*(Author), Author. Author, & Hsu, H. L. (Author). Author. In T. Jeng (Ed.), *Author* (pp. Author). Author: Author.

- Balabanovic, M., Chu, L. L., & Wolff, G. J. (2000). *Storytelling with Digital Photographs*. Paper presented at the CHI 2000 Conference on Human Factors in Computing Systems, Hague, Netherlands.
- Bilda, Z., Edmonds, E., & Candy, L. (2008). Designing for creative engagement. *Design Studies*, 29(6), 525-540.
- Bran, R. (2010). Message in a bottle Telling stories in a digital world. *Procedia Social and Behavioral Sciences*, 2, 1790-1793.
- Buijs, J. (2007). Innovation Leaders Should be Controlled Schizophrenics. *Creativity and Innovation Management*, 16(2), 203-210.
- Card, S. K., Moran, T. P., & Newell, A. (1983). *The Psychology of Human-Computer Interaction*: Lawrence Erlbaum Associates.
- Chang, S. S. (2004). *Research Method*. Taichung: Tsang Hai Book Publishing Co.
- Chen, C. (2005). *Research of Tourist*. Taipei: Wu-Nan Book Inc.
- Dean, D. (1996). *Museum Exhibition Theory and Practice*: Routledge.
- Escalas, J. E. (1998). Advertising narratives: What are they and how do they work. In B. Stern (Ed.), *Representing Consumers: Voices, Views and Visions*: Routledge.
- Field, S. (2005). *Screenplay: The Foundations of Screenwriting*. New York: Delta; Revised edition.
- Fog, K., Budtz, C., Munch, P., & Blanchette, S. (2005). *Storytelling: Branding in Practice*. Berlin: Springer.
- Giaccardi, E. (2006). Collective Storytelling and Social Creativity in the Virtual Museum: A Case Study. *Design Issues*, 22(3), 29-41.
- Guan, S. s. (2006). *Design Research Method*. Taipei: Chuan Hwa Book CO., LTD.
- Herman, D. (2003). Stories as a tool for thinking. In D. Herman (Ed.), *Narrative Theory and the Cognitive Sciences* (pp. 163-192): Center for the Study of Language and Information.
- Hicks, N. D. (2004). *Screenwriting 101: The Essential Craft of Feature Film Writing*: Michael Wiese Productions.
- Hopkinson, G. C., & Hogarth-Scott, S. (2001). "What happened was ..." Broadening the Agenda for Storied Research. *Journal of Marketing Management*, 17(1-2), 27-47.
- Hsu, H. L., & Author. (Author). Author. In T. Jeng (Ed.), *Author* (pp. Author). Author: Author.
- Huang, K.-y. S. (2006). Story branding: an analytic framework. *The journal of advertising & public relations*, 26, 1-26.
- Jenkins, H. (2004). Game Design as Narrative Architecture. In N. Wardrip-Fruin & P. Harrigan (Eds.), *First Person: New Media as Story, Performance, Game* Cambridge: MIT Press.
- Jih, H., & Tsai, P. (2003). *Teching design model of interactive digital storybooks*. Paper presented at the ICICE 2003, Taipei.
- Lidwell, W., Holden, K., & Butler, J. (2003). *Universal Principles of Design*. Gloucester, Massachusetts, U.S.A: Rockport Publishers.
- Lin, R.-T. (2007). Transforming Taiwan Aboriginal Cultural Features into Modern Product Design: A Case Study of a Cross-cultural Product Design Model. *International Journal of Design*, 1(2), 45-53.
- Loebbert, M. (2008). *Story management*. Germany: Poeschel Verlag.
- Mandler, J. M., & Johnson, N. S. (1977). Remembrance of things parsed: Story structure and recall. *Cognitive Psychology*, 9(1), 111-151.
- Norman, D. A. (1998). *The design of everyday things*. New York: Basic Books.
- Norman, D. A. (2005). *Emotional Design: Why We Love (or Hate) Everyday Things*. New York: Basic Books.
- Pramaggiore, M. T., & Wallis, T. (2011). *Film: A Critical Introduction* (3rd ed.): Allyn & Bacon.

- Rumelhart, D. E. (1975). Notes on a schema for stories. In D. G. Bobrow & A. Collins (Eds.), *Representation and Understanding: Studies in Cognitive Science*. New York, NY: Academic Press.
- Shankar, A., Elliott, R., & Goulding, C. (2001). Understanding Consumption: Contributions from a Narrative Perspective. *Journal of Marketing Management*, 17, 429-453.
- Sharp, H., Rogers, Y., & Preece, J. (2006). *Interaction Design: Beyond Human-Computer Interaction*. New York: John Wiley & Sons, Inc.
- Simmons, A. (2002). *The Story Factor: Inspiration, Influence, and Persuasion Through the Art of Storytelling*: Basic Books.
- Spielring, U. (2002). Digital storytelling. *Computers & Graphics*, 26, 1-2.
- Stein, N. L., & Glenn, C. G. (1979). An Analysis of Story Comprehension in Elementary School Children: A Test of a Schema. In R. O. Freedle (Ed.), *Discourse processes: Advances in research and theory* (Vol. 2, pp. 53-120). Norwood, NJ: Ablex Publishing.
- Vincent, L. (2002). *Legendary brands: unleashing the power of storytelling to create a winning marketing strategy*. Chicago: Dearborn Trade Publishing.
- Yee, N. (2005). *Motivations of Play in MMORPGs*. Paper presented at the Proceedings of DiGRA 2005 Conference.
- Zagalo, N., & Barker, A. (2006). *Television Drama Series' Incorporation Of Film Narrative Innovation: The Case Of 24*: Cambridge Scholars Press.