

How Did You Manage to Do That? An Instructional Multimedia Production Management Process

by S. Todd Stubbs

ABSTRACT—Discusses a process developed at Brigham Young University's Center for Instructional Design for increasing the efficiency of instructional multimedia production without sacrificing quality and imagination. The process draws on the work of Disney Imagineering, Clement Mok's DADI process, software engineering, and project management, among many others. The resulting eight-step process is described in detail.

In the beginning...

About four years ago, I was working for a small institution at Brigham Young University called the Instructional Technology Center (ITC). The ITC had two reputations on campus: One, we were doing some of the most creative and innovative work on campus; and, two, we *often* over-spent our budgets and missed our deadlines. I knew there had to be a way to do what we were doing that would maintain the level of creativity and innovation, and thus be fun for us as developers, and yet would get things finished on time and under budget. I began looking for people and institutions that did very creative work, while at the same time getting things done.

Using the models we discovered, we put together a process to guide the work of BYU's ITC so that it would be more effective and efficient. Unfortunately, the following spring, before we were able to implement the new process, the ITC was absorbed into a larger organization called the Center for Instructional Design (CID), which had different goals, a different product line, different funding sources, and different management. While my original process was never used quite the way I had envisioned, it became one foundation for later efforts.

I am still ranging around for processes and ideas that could inform ours to make

us more efficient without sacrificing quality and imagination. I wish I could say that my search has scientifically considered all the possibilities and come up with the very best, but what really happened was that I would run into something and have a sudden insight about how our process could be improved by incorporating some piece of it into our process. This paper is a result of that haphazard process.

Steps, phases, tasks

This process has borrowed liberally from all kinds of places. Several of these are alternate processes. I will provide a brief description of each process's origin; a discussion of its parts' show you roughly how each process maps onto the other process descriptions we will have already covered; and identify particularly impressive parts that we have borrowed. You should then be able to make sense of what we've done, not only from a descriptive basis, but also from a philosophical one as well.

CID process. The first process I'd like to discuss is a great-grand-nephew of my original efforts. I start with this process because it is a relatively complete process and forms a good baseline. Developed by the Center for Instructional Design (1999), it is a seven-phase process for producing instructional multimedia: (a) origination, (b) manuscript, (c) pre-production, (d) production, (e) testing, (f) implementation, and (g) evaluation.

Phase I, origination, is primarily concerned with paperwork. There is in this process a presumption of knowledge about what is needed, so the CID process begins with setting up contracts and letters of agreement to proceed with the work.

Because a large number of projects handled by CID involve acquiring content from professors and placing this content in a stable "templated" format, the manu-

script phase actually has to do with content development. For such projects, this is acquisition of the course manuscript, hence the name of the phase. For content less adaptable to a template, it is development work.

Pre-production, the third phase, assumes much of what we would traditionally call design, including organizing the content; determining the level interaction, functionality, and usability; and detailing the visual, aesthetic aspects of the project. This information is used to determine the budget and timeline.

Once this pre-production design work has been completed, the project is put into production. Production primarily consists of getting the artists and programmers, in our case, talented students, to produce the work. In the fifth phase, a project that has been finished is tested by a number of student software testers to insure the appropriate functionality and usability of the multimedia software, including accessibility.

CID does very little to implement the resulting product. If the project is an independent study course, it is turned over to BYU's Independent Study department whose job it is to administer and market these courses. If it is a special project for a professor, it is turned over to the professor to use.

The final phase in our process is, strictly speaking, not part of a production process; my instructional designer training taught me that evaluation is essential for continued growth, so we have an evaluation phase.

Disney Imagineering. You'd probably be surprised to learn how very difficult it is to find detailed information about the process Disney uses to create theme-park rides. This secret, but sort of obvious process, is one of Disney's crown jewels. The process, when implemented by the very creative team of Disney Imagineers, is what allows Disney to do large, never-before-attempted projects. *The Disney Way* by a business writer by the name of Capodagli (1999) contains one chapter about the process, and I have also found a similar outline of the process on the Internet (Kunz and Issa, 1999). The two differ slightly, but I have reconciled them here for the sake of

discussion. (I should also mention here that Walt Disney Imagineering uses an internally-published book called *WDI Project Process Handbook* by Addeman (1992) that contains details of this process but is not publicly available.)

The steps in Disney's Imagineering process are (a) "Blue Sky," which is pre-project planning, (b) concept development, (c) assessing financial feasibility, (d) developing design, (e) developing construction documents, (f) bidding & constructing, and (g) O & M, which means transferring the responsibility for the produced project over to Disney Operations and Maintenance.

The places where Disney Imagineering have the greatest impact on our thinking is at the very beginning and at the end. The first step in the Disney Imagineering process, "Blue Sky," involves asking "What if?" and then imagining an answer. Capodagli (1999) notes that at this phase it is important to live with the discomfort of not knowing for sure what the project will look like at the end, and not being in control. We like adding these notions to our process to improve innovation. In the final step, efforts are made to smooth the transition of the project from development to operations and maintenance. This is more than just a sign off; ride documentation is produced, training on the new ride may be developed, etc. Our efforts are far too lackadaisical in this area, with the result that great materials sometimes go unused.

Because Disney is developing very large, theme-park-construction-type projects with multi-million dollar costs, financial risk occurs later in the process than in the CID process. In other words, the presumption is that you know what the project is, absent from the Disney Imagineering process until later on. The idea here, according to Capodagli, is to allow for risk early on, and then increasingly manage the risk as one goes along. By moving the major money questions later in the process, Disney controls risk, clearing the way for innovation. Bureaucratically, I'm not certain how our organization would handle having money dealt with so late. We deal with money first, but if your organization can tolerate it, move it as close to production as you can, like Disney.

Interactivity by Design. Another important contribution to our process is from a little book published by Adobe Press called *Interactivity by Design* by Kristof and Satran (1995). Their process is simple; it only covers the design of multimedia, not its conception on the one end, nor its production and implementation the other. It is, simply, and in this order: (a) information design, (b) interaction design, and (c) presentation design.

Information design is the closest to what we would call instructional design: determine objectives, identify your audience, decide which tools you'll use, plan, and organize the information. This analysis and organization results in a flowchart to show how information is organized.

Interaction design covers decisions about how much interactivity the user will have, as well as navigation, usability, and functionality. The authors recommend a storyboard as an appropriate tool for documenting these things.

The final phase is presentation design, which is another term for visual design. The problem with a lot of multimedia development that I've seen is that they start here rather than back at information (or instructional) design, so you have something that looks great, but is aimed at the wrong target.

Clement Mok's *Designing Business*. Clement Mok (1996) is the creator of several "corporate identities" that you'd recognize. He calls the process DADI after the initials at the beginning of each: (a) definition, (b) architecture, (c) design, and (d) implementation.

Phase 1, which Mok calls definition, maps pretty closely onto Kristof and Satran's information and interaction design. Mok's phase two, architecture, is a recycling of information and interaction design, but with more detail and rigor. The design phase is where the artwork, production, and testing are performed. In Mok's case, the design is the product, so he stops there; there is no production phase that follows. We've incorporated into our revised process Mok's idea of going through a design cycle twice. Mok's implementation echoes Disney Imagineering: it prepared the material for turning over to operations and maintenance,

or in Mok's case, the business for which he has created a new identity.

ESSG Project Management. On the BYU campus we have recently had access to some training developed in cooperation with Stanford University and IPS Associates (2001) regarding project management. This training is being spearheaded by BYU's Engineering Solutions Software Group (ESSG), part of information technology services. While the five-phase process seems too light on its design process, it details a subject that is vital to the success of multimedia projects, but which is often overlooked: work breakdown.

Work breakdown is a process that Hollywood has down cold. (There it is part of a "script breakdown.") It is essentially the process of taking the design that you have created, and making educated guesses about how much it will cost, how long it will take, and what process one should use to get it done.

Here are the steps in work breakdown: (a) Identify all tasks needed to complete a project, often by brainstorming with your team; (b) assign an owner to each task; (c) determine completion criteria for each task; (d) assign a rough duration to each task. After you've done these things, you'll be ready to (e) determine dependencies between tasks and (f) create a preliminary schedule. Then, using a flexibility matrix (which we'll talk about later) and some risk management, you will (g) refine task durations, (h) determine workloads, and (i) firm up the work schedule. This detail in the breakdown is something that our process lacked.

The ESSG Project Management process, like Disney Imagineering and Clement Mok's DADI, also adds specific details to transitioning the project to whoever is going to implement it.

Other guiding principles

The following are not processes, but ideas that have an impact on the way the process should work. These were also considered in our final process.

Bran Ferren: *Big Ideas vs. requirements*. A concept from Bran Ferren (1997 and 2002), former head of research for Disney Imagineering, distinguishes between "re-

quirements" people and organizations and "Big Idea" people and organizations. He says:

"I think there really are two different kinds of sensibilities. The first sensibility, for lack of a better word is the engineering, technologist's perspective which is that of "requirements." And you hear the word "requirements" a lot. We've heard it today – "just tell me what the requirements are and I will deliver to you an engineered solution".... The other way of looking at it, which is really from the storyteller's side, is called "the Big Idea." What [Big Idea people] want is the Big Idea, something that is really cool, and will basically change the way everybody thinks about things."

Our problem at CID is that we do both. Clearly our system must allow for both kinds of thinking.

Balancing/negotiating flexibility Strauss (1997) identifies three well-known factors that need to be balanced. He calls these resources, time, and scope. You can only control any two of them; the third is always a function of the other two. IPS Associates' (2001) model goes even further with this concept. IPS Associates' "Flexibility matrix" (which uses schedule instead of time) is a kind of checklist where you identify the degree of flexibility of the three factors, from least to most flexible. The matrix simplifies long-range management. When a project is running over schedule, you can simply look at your decisions as identified in the matrix to decide which of the three factors to change.

The rule of thirds. Strauss (1997) also includes a lesson learned from software design that is too often overlooked: that production of software, including instructional software, divides roughly into thirds: one third for design, one third for programming or production, and one third for testing. What happens when you shortchange one of those? You pay for it with a missed schedule.

For example, suppose we're doing a little project that is due in six months. Typical to such products, we estimate a month

and a half for design on the front end and a month and a half for testing on the back end. That gives us three full months for development, right? Wrong, the rule of thirds will predict that the project will take nine months – three months longer. Where did the three extra months come from? It's easy, really. If the programming is planned to take three months, and that is one third the effort, the project will actually take nine months. Where does the extra time happen? Usually it is hidden in production. This happens because you don't have a clear or complete design, you need to go back to the "drawing board" while in production. In addition, testing will take longer for a poorly designed product. This is not to say you can't build multimedia that way, just plan for it. You can see how correctly estimating the amount of time immediately helps "scope" a project.

Balancing constituencies. In another Disney-inspired look at success, Mike Powell reflected on some training he received at Disney about what makes for a quality experience. He notes that the Disney formula for success involves a "Quality Cast [employee] Experience," a "Quality Guest [customer] Experience," and "Quality Business Practices." Our adaptation of that divides the guest/customer into two parts: clients, the people who provide content and understand the need, and consumers, the students who actually use our productions. Therefore, in any given project, there are four principal constituencies whose needs need to be considered: the business, the clients, the consumers, and the creators. The names and representations of these will vary, but the stake they hold does not. Balancing these four constituencies means insuring that none of their needs are slighted.

If you fail to meet the needs of the business, soon you'll fail to have an enterprise that can produce. This is true even in a "protected" or non-profit environment like a government agency or a university; the failure just takes longer. What are the needs of the business? To provide adequate return on investment. Even a non-profit entity needs to know that the money used for development is having the intended effect.

Clients serve two roles: They are professionals in their own right, and they are guardians of the content. As professionals,

clients need recognition. For example, most of our clients are professors who need to have their ideas acknowledged for both personal and professional reasons. As content specialists, they insure that the content is accurate and complete. The result of ignoring the client may be poor content. It will also usually result in poor client relations, which can seriously affect on-going quality as well as long-term viability of the enterprise.

The consumers are the people who will actually use the product when completed. This constituency is most concerned about functionality, reliability, and usability of the resulting product. The consumer is often the least represented in the process. Clearly, early testing and prototyping is one way to introduce the consumer to the process. By-passing the consumer may result in poor quality product, or in products that are not used because they don't fill the need correctly.

My experience has been that the constituency that usually gets slighted is the creators—programmers, artists, and other “creatives.” I suspect that it's easier to neglect this group than the other two. But, what are the needs of the creative types? Usually it's as simple as creative freedom and recognition; to pay attention to their needs gives them some slack and it is important to praise their efforts. If creatives are not happy, quality suffers, especially in those ways that are hard to measure. Again, long-term viability may also be questionable as well.

Managing uncertainty. Laufer (1997) identifies two different types of uncertainty: “Ends uncertainty,” that is, not knowing something about the end product, and “means uncertainty,” that is, not knowing how you're going to do it. Traditional project management would impose a complete conquering of ends uncertainty before addressing means uncertainty. Unfortunately, almost no projects have that luxury. Therefore, the process should accommodate both flexibility in allowing for some effort to proceed in spite of end uncertainty, but the process should control for that uncertainty.

There are two ways to control for uncertainty. The first is to separate out parts of the project based on the level of uncertain-

ty. In other words, make sub-projects of the most uncertain parts of the project and cut off their dependencies from more certain parts. In this way, those that have more certainty can proceed apace. Second, follow Ideo's advice to prototype early and often. Prototyping is a way to test the waters repetitively.

Prototyping early and often. Ideo, a company renowned for forward thinking in product design, calls prototyping “the shorthand of innovation” (see Kelley, 2001). Many of us shy away from prototypes because we believe they are too much like building the real thing. This misperception probably comes from the aircraft test piloting where a prototype is a real, live functioning airplane. In multimedia, the prototype need not be fully functioning. It can be a low fidelity prototype made from paper, or even a verbal description.

What constitutes a prototype? Look at the word: *proto* means “beginning or giving rise to;” *type* means something that foreshadows some other thing. Disney's storyboard is a kind of prototype: it allowed Disney to see the whole cartoon before the costly effort needed to animate it begins. One prototyping method we have experimented with is the use of the *speaker's notes* view in Microsoft PowerPoint. PowerPoint provides some simple drawing tools that allow you to quickly mock up a screen, with room in the lecture notes mode for descriptions and explanations. Don't be frozen out of the idea of prototypes by thinking that they are more than they are: They are just a way to test the waters. Test the waters early and often with prototypes of appropriate fidelity.

CID Bucks. One very valuable thing that I'd like to share is the concept of *CID Bucks* developed by John Uibel (1998) from our organization. CID Bucks involves a chart that helps even novice planners identify and place a dollar value on various multimedia development efforts. (A CID Buck is the amount of work a student programmer or artist can get done in one four-hour shift.) The chart has an additive effect to account for the complexity of a media object within pre-defined constraints. For each media object type, you select a level of complexity from simple to complex with varying values (bucks) assigned to each place in the

continuum. These are then supplemented with auxiliary numbers for things that will require additional effort, such as interactivity. For example if you were doing a Macromedia® Flash® object with a high level of originality (which translates, roughly, into complexity), it will cost you 6 points. If that object will have low interactivity, it will only cost you an additional 2 points, so your total budgeted for that object would be 8 CID bucks. Once we have feature breakdown, The CID Bucks chart is a quick way to estimate the budget for production.

The proposed ITC process

The process we have developed for use at ITC involves eight steps, and borrows ideas from all the sources noted in this paper. Figure 1 summarizes the eight steps. Here are some details about the process.

Concept. In concept we create a one- to

four-page concept and proposal document. This can be done either by the brainstorming method or a needs analysis. The document is prepared by the instructional designer and the subject matter expert, along with anyone else we want to invite who can contribute good ideas.

Planning. The plan comes directly from the ESSG methodology and includes a detailed project definition document (PDD), which includes a definition of the project, determination of success criteria, and a flexibility matrix among other things. This is also where we divide the project into sub-projects on the basis of either deliverables or uncertainty or both. If the project is subdivided, we need to identify dependencies between the sub-projects, if any, as well as decide who will own the responsibility for each. A core design team performs this work.

Resourcing. Once an overall definition

Phase	Deals with	Results/Deliverable
1 Concept	Generalities—for “idea-based”) blue sky, concept development, feasibility & refinement; (for “requirements-based”) needs assessment, information architecture, interaction design, and presentation design at the general level	Concept and proposal (1-2 pages)
2. Planning	Planning at the generalities level. Identify projects; separate projects by deliverable or uncertainty.	Program plan
3. Resourcing	Negotiations, permissions, money, paperwork	Resources & permissions to proceed
4. Design	Specifics—do information design, interaction design, and presentation design for each of the specifics for each project	I ³ document (includes information design, interaction design, and instructional design; may also include a high-fidelity prototype)
5. Pre-production	Phase breakdown, work breakdown, CID Bucks per project	Work plan
6. Production	Work carry out the project plan	Beta version
7. Post-production	Installers, testing, metadata, documentation, training development	Final version
8. Close out	Transfer project, materials, training, summative evaluation, and get operations to sign off (us off the hook, them on it)	Transfer of responsibility

Figure 1 shows the multimedia development process used at ITC. Steps 4, 5, and 6 are set off from the rest to indicate they may be repeated several times during development on sub-projects with high uncertainty.

and plan has been laid out, it is time to fund at least the design portion of this project or projects. We have a committee called the Portfolio Management Team that determines this first level of funding and gives permission to proceed. This financial phase could happen at any one of several times. This is just when we chose to do it. A kind of mini-resourcing takes place again later on.

Design. This is where the fun begins. At this stage we create the so-called I³ document: instructional, informational, and interaction design. This document includes several other parts, but these are the most important. The content must be complete enough to determine budgets and timelines for completing the entire project. We've internally had some debates about just how detailed that is exactly, and we haven't come up with a solution, particularly when some projects involve content development. The core design team performs the design work.

Pre-production. Pre-production is a euphemism for a couple of very hard tasks. First we identify all the tasks required to build the product, assign owners, and determine dependencies, etc. When we are done, we have a plan that we can execute. The core production team is assembled at this point and it does this work.

Note that sometimes we don't have a plan. This happens when we're trying something new, that is, when the sub-project has high uncertainty. When that is the case, we have to prototype early and often, and recycle through phases 4, 5, and 6 as needed. Phases 4, 5, and 6 are set off in Figure 1 to indicate they may be repeated on sub-projects.

Production. If we've planned correctly, the core production team merely executes the plan.

Post-production. Many finishing production steps are accomplished here, such as the building of installers, accommodation for plug-ins, product testing, and documentation and training plans, if needed.

Close out. Finally, we close the project out and celebrate. This phase's purpose is to transfer responsibility to the user or implementer (or marketer) of the product.

Conclusion

We have not absolutely settled on this new process, but it seems to cover all the bases. We feel we have found a place for all the principles and ideas that made sense to us. In this process we have tried to find where all the pieces of good product management fit together without compromising any of them.

References

- Addeman, Frank. (1992). *WDI Project process handbook*. Privately published by Walt Disney Imagineering.
- Capodogli, Bill and Jackson, Lynn. (1999). *The Disney way: harnessing the management secrets of Disney in your company*. New York: McGraw-Hill.
- Center for Instructional Design. (1999). *CID production process*. Unpublished chart.
- Ferren, Bran. (1997). The future of storytelling, *Association for Computing Machinery, 1997*. [Web-based audio-video files]. Redmond, Washington: Microsoft. (<http://research.microsoft.com/acm97/bf/index.htm>)
- Ferren, Bran. (2002). The human connections: art, design and technology. *Training 2002*. [Audio file]. San Diego: Sound of Knowledge.
- IPS Associates. (2001). *Project management mastery*. Stanford, California: Stanford Advanced Project Management.
- Kelley, Tom. (2001). *The art of innovation*. New York: Doubleday.
- Kristof, Ray and Satran, Amy, (1995). *Interactivity by design: Creating & communicating with new media*. Mountain View, California: Adobe Press.
- Kunz, John and Issa, Ray. (1999). Wall of deliverables. *Berkeley-Stanford CE&M workshop: Defining a research agenda for AEC process/product development in 2000 and beyond*. Berkeley, California: University of California. (<http://www.ce.berkeley.edu/~tommelein/CEMworkshop/Kunz&Issa-Disney.pdf>)
- Laufer, Alexander. (1997). *Simultaneous management: Managing projects in a dynamic environment*. New York: American Management Association.

- Mok, Clement. (1996). *Designing business: Multiple media, multiple disciplines*. Mountain View, California: Adobe Press.
- Powell, Mike. (unknown). *Success the Disney way*. <http://www.radiouniversity.co.uk/disney.htm>
- Strauss, Roy. (1997). *Managing multimedia projects*. Boston: Focal Press.
- Uibel, John. (1998). *CID bucks*. Unpublished chart.

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