Case studies

A better workflow for Comedy Central: How a cloud-based asset management system was built from scratch using open-source tools

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has spent two decades in the creative departments of some of the top names in television entertainment, where he has worked in hands-on and managerial roles in the production and delivery of diverse print products and web advertising. At Comedy Central he has pushed the frontiers of content management by developing two generations of a cloud-based workflow system. The system has streamlined creative output and improved communication within the company and also with outside marketing and creative partners.

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Abstract   Comedy Central is the television network known for satirical commentary on politics and current events, potty-mouth cartoon characters, sketch comedy shows, web redemptions and stand-up comedy. The network's promotional efforts span print, web, social media and video. Each piece of creative content begins its life in digital form. During the development process, these video clips, graphics and web adverts require approval from a variety of internal teams and are updated in rapid-fire iterations in response to feedback. To arrive at the final edit of even a 15-second promo or a ten-second web banner advert takes days or even weeks. To streamline the process, a web-based creative review and approval system was built. The system is designed to handle routing, approval and distribution of a full range of digital file formats. In a centralised workspace, users can upload their work and view the work of others. This real-time collaboration unites three creative and production teams and improves the speed, efficiency and transparency of their collective output. The finished system achieves the main objectives that were outlined at the beginning of the project. Its usefulness will increase over time as it grows into a searchable library of all Comedy Central work — both past and present.

KEYWORDS: open source, workflow system, cloud-based, creative approvals

INTRODUCTION

Comedy Central's creative review and approval system stands on the shoulders of two legacy systems: one from the Advertising team (designed for Flash banner ads), the other from On–Air Promos (designed primarily for video). Both systems were in desperate need of upgrades

to address security and stability issues. Meanwhile, the teams had recently merged and the idea of a single system made lots of sense. The timing was perfect. The best features could be improved — starting from the ground up with something new that would be modern, secure, feature-rich and standards compliant.

But why would anyone build a second-generation system themselves? There were easier routes that could have been taken. After all, a wide variety of existing commercial services exist, each with their strengths and weaknesses. From Comedy Central's perspective, however, these were either one-size-fits-all applications, complicated beasts with a mind-boggling array of options, proprietary or simply too costly.

Generic out-of-the-box solutions force users to conform their workflow and processes to the path of least resistance, in other words, to the lowest common denominator that will please most of the vendor's customers most of the time. The assumptions that are baked into the solution are rarely the same ones anyone would make if they were starting with a blank piece of paper. So, while it might be possible to hit the ground running with a solution that might — optimistically — be an 80 per cent fit, getting the last 20 per cent right can take an overwhelming amount of effort, re-engineering and duct tape. The result would still be a compromised version of the precision tool that is really needed. It is in that last 20 per cent where the magic happens, where it all comes together to achieve a better workflow. The team knew they needed to start with a clean slate — their own clean slate.

By choosing the hard path, the user experience could be completely tailored and a collaborative work environment could be created that fit the unique workflow perfectly. The team understood their own needs and processes better than

anyone. Costly annual contracts and service agreements would be avoided and the system's growth and upgrade path was in the team's hands. They would be the masters of its fate.

The development road map followed the classic consulting model: needs analysis; strategy; design and implementation. Once committed, everyone was in. The goal was success.

THE HARD THINKING: NEEDS ANALYSIS

Up front, everyone needed a grasp on the important factors and a sense of the scope of the undertaking. At the same time, no attempt was made to pre-visualise every solution. The development would flow naturally from the early stages of research and needs analysis.

Inspiration was taken from the two legacy systems. From the Advertising team's approvals workflow came version control and comments (see Figure 1). From the Promos side came simple on-the-fly file and project sharing, plus the idea that it was necessary to be able to handle a wide range of digital media.

Comedy Central has an energetic and engaged community of employees, who over the years voiced their ideas and thoughts and frustrations about the existing systems. The baseline was that the new system had to be better than what it replaced. The two existing systems had served well and represented the broad features that users would expect in anything new. That provided good material for the concept and design decisions.

New research started with one-on-one interviews with power users from the various teams and across disciplines and observing them work. Everyone listened and asked questions. It was discovered that project managers wanted to keep things organised — all the related projects grouped together — and to have a
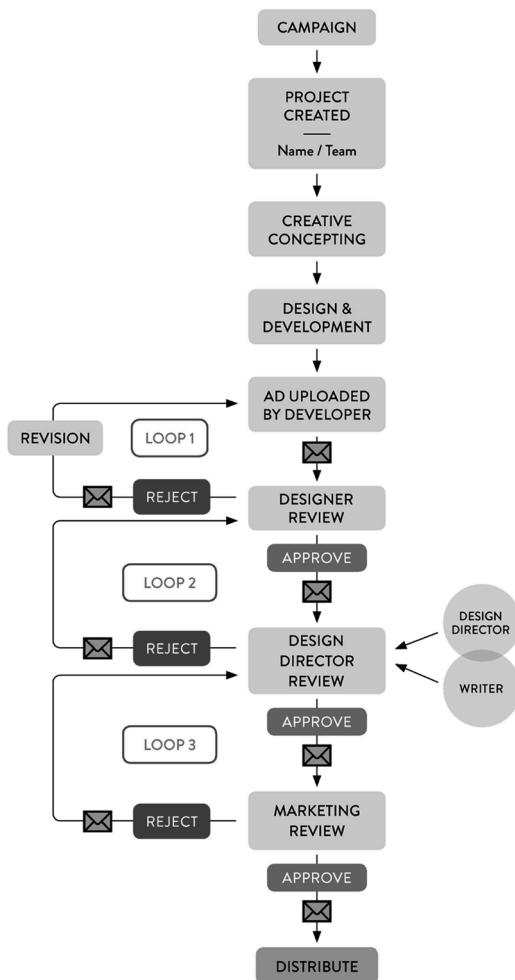
Figure 1: Comedy Central's new ads workflow

- upload multiple files in one step;
- metadata should be optional, not mandatory;
- approvals should be optional, not mandatory;
- a way to create arbitrary collections of assets, and share them (solution: Lightboxes); and
- group revisions of a file so the newest was on top (solution: version stacks).

Nearly all the important feature requests were achieved in the application layer and did not derail the scope of the project. Everyone relied on experience and talking to users to identify the main features, instead of trying to gain consensus. When seemingly opposite requests were encountered, ways were often found to meet both needs. The solution lay in doing good design. In cases where the differences could not be reconciled, the choice made was what would benefit the most users.

As the merger of the Advertising and Promos departments took hold, it was realised how crucial it was to design a system that would bring the teams together and reinforce the notion of a combined department. Some unexpected resistance was encountered. Some users were wary that their workflow would be shoehorned into an unwieldy system. Others worried that their team would lose its identity and their projects would get lost in the noise. There was one more consideration: to plan for the unknown. A third group — multi-platform (designers for social media and Comedy Central's website) — had not yet officially come under the banner. Virtually nothing was known about how they operated.

After surveying the team and aggregating the results, there were a few great ideas. The list included the following:

- trackable workflow;
- organised and searchable;
- approvals;

birds–eye view of where things stood in terms of approvals. Video editors had specific needs regarding transcoding, media formats and the display of metadata. Producers wanted easy ways to show off their work. Creative directors needed to track the development of a particular graphic or video clip through its iterations to the finished piece, while keeping all the versions together. Users wanted to find their project quickly and upload their files as fast as possible so they could get back to work.

Top requests included:

- get things done with the fewest possible mouse clicks;

- file sending;
- notes and commenting;
- sharing projects and files;
- user roles;
- custom metadata fields;
- automatic metadata collection;
- communication tools; and
- presentation tools.

CHOOSING THE TECHNOLOGY

Once committed to the idea of developing the system internally, it was a natural next step to also think outside the box in regard to the underpinning technology.

Comedy Central did not follow the traditional route of sending out a request for proposal. Contractors and freelancers are frequently hired to help with specialised projects, and the creative review and approval system was approached in the same way. This unique vision required collaboration with a unique developer who understood the goals and who would be a partner in the process of achieving them.

The philosophy was: hire the right developer and work from a relationship based on mutual respect and trust. Back when the first generation of the ad system had been built, the selection process for finding a developer yielded an excellent candidate with a great track record developing web applications with Ruby on Rails. At the time, the assurance was given that the platform was well suited for everything that needed to be accomplished. Everyone was very pleased with the development process and solution, so when the time came to build the second generation he was contacted again. He was more enthusiastic than ever about what could be done using Ruby on Rails.

OPEN SOURCE: STRENGTH IN NUMBERS

Open-source applications have a number of benefits, including a much wider

technical and critical review than most commercial products. Ruby on Rails is a great example of that. It has a vibrant developer community that has invested hundreds of person-years of effort. With so many developers committed to its constant improvement, security issues get patched faster than one can say 'Jon Stewart is a genius'.

Ruby on Rails is a powerful framework that grows stronger every day. Developed by the brainiacs behind 37signals, Ruby on Rails powers hundreds of thousands of web applications around the world. The platform had seen a major version release since the first-generation system, gaining many improvements that could benefit Comedy Central. Ruby on Rails also has many pre-built components and tested methods to accomplish a dizzying array of tasks. The developer's strength was in weaving it all together and writing the code to create a large application, without having to reinvent every single wheel.

Another benefit of open source is economic. The underlying code that drives the work is free for anyone to use. (Of course, the expertise to deploy and tune these applications is decidedly not free.) Finally, open-source applications are more easily maintained because their contents and application programming interfaces are public knowledge. If it ever became necessary, the team could migrate to a different development team with a minimal learning curve.

Comedy Central drew a line in the sand when it came to web standards compliance. The workflow system is distinctly future-looking. The system sits underneath an HTML5 front end and adaptive design principles were used for a great user experience on both mobile and desktop devices. Not much time was wasted supporting older browsers. The browser compatibility list included Firefox, Chrome, Safari and Internet Explorer 9 and later.

There are many choices when it comes to deploying a cloud-based server. AWS was selected, combining EC2 and S3 to host the application, the database and assets.

THE HARD WORK: DESIGN THE SYSTEM

After sorting through everything and prioritising, work was started on the user interface (UI).

The goals for the UI included the following:

- it should be natural and easy to use;
- the most frequent tasks should be accomplished with the fewest clicks possible; and
- users should be able to find what they are looking for and effortlessly pick up working where they left off.

Lists were made and sketches and flowcharts were drawn. Early drafts took a tabbed approach, with a distinct work area for each team. This paradigm mirrored the old separate-but-equal departmental silos. The team struggled with how to cross-link shared projects, but everything that was sketched out felt forced. It was necessary to break down the walls between teams. Transparency was needed. It was essential for users to see what everyone else was up to — especially for the big, all-hands-on-deck campaigns.

Then, a light blinked on: why not just get rid of the silos? The tabbed concept was thrown out. In that moment, structural problems were solved. All work is now organised under grand campaigns, within which each team can have one or more projects to house their work. It is within projects where the action happens — where files are uploaded, commented, revised and shared (see Figure 2).

Comedy Central intentionally avoided giving its users a lot of rules on how use the system. The basic structures that were created mirrored the existing ways of working. It was designed to be as open as possible and Comedy Central waited to see what its users would do with it. Even valuable features like version control, commenting and approvals were designed to be useful and obvious, but non-intrusive. The system needed to do its job, but stay out of the way.

The following question was also asked: what actions might colleagues and managers want to take on these files (share, delete, copy, etc), and how would those options be displayed? How can users be enabled to view collections of files?

The UI was designed to make sense to anyone with basic literacy in computers and web applications like Facebook or Flickr. It would have a rational and coherent structure. Basic tasks should be easy to figure out. But this is an irrational world and what would a project like this be without indulging a few quirks?

The quirkiest area — and most challenging to achieve — was the approval system. Approvers would operate on a project-by-project basis. It was also necessary to be able to delegate approvers by proxy. This would enable users to approve something on behalf of their manager. The solution was to enhance the existing project setup panel so approvers and sub-approvers could be assigned on a per-project basis.

This added another step to the process of creating a project. Users are always in a rush and they would resent having to check a few boxes and pick the names of individual approvers from drop-down menus. There had to be a better way and so the idea of templates was considered.

Projects do tend to fall along team lines, with the same players working together over and over again. Identifiable patterns were used to create pre-set groups of approvers, which can be assigned to a
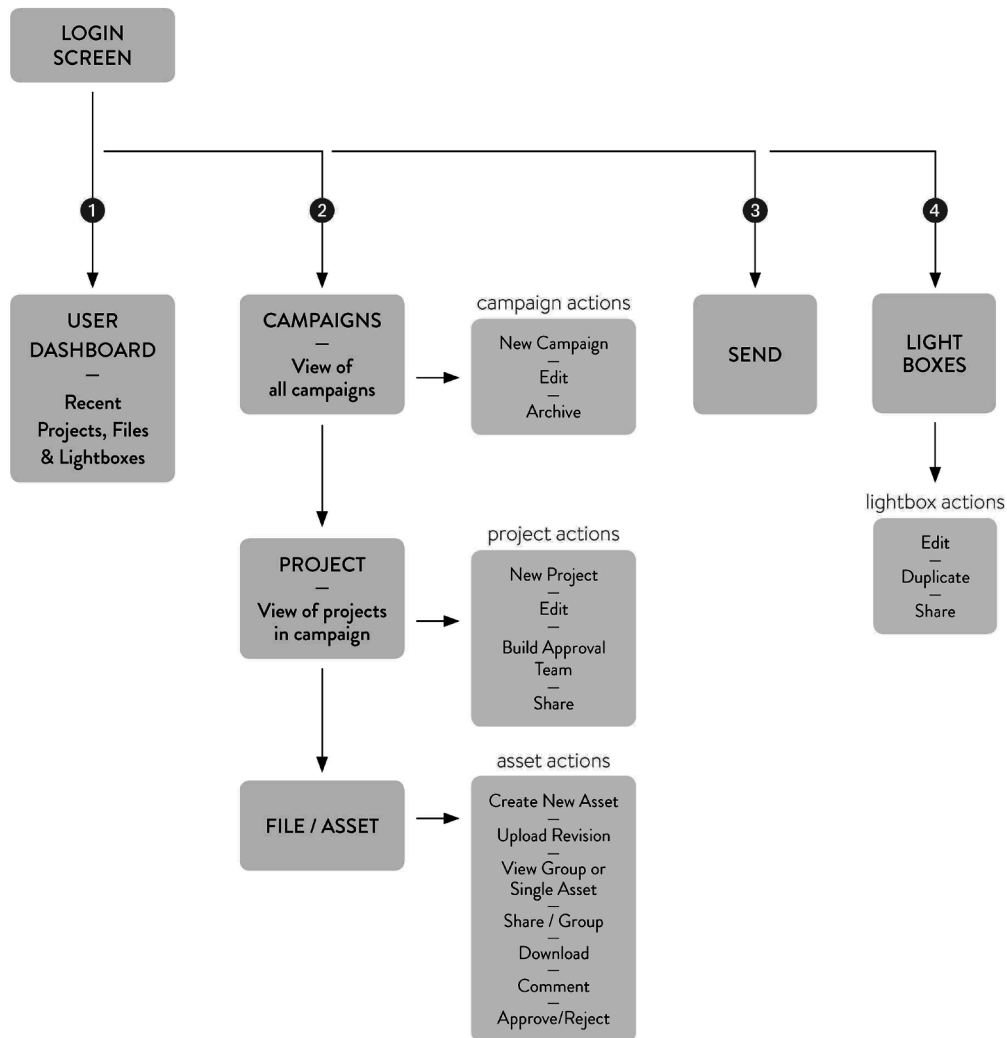
Figure 2: Schematic of Comedy Central's new site

project with one click. Approvers can be easily added or removed from the project at any time. The goal of achieving flexibility was reached and users were not locked to a pre-established way of working.

Once the project team panel was finalised, it was put to further use. This involved how freelancers or project-based employees were handled. Comedy Central uses outside editors and designers on a regular basis and there are many reasons why they should not have unfettered access to all projects. Enter the zero-access account.

When a zero-access user logs in to the system, they see only the projects to which they have been specifically assigned. All regular users are given the power to invite a new freelancer into the system (who will receive a default zero-access role) and then add that person into a specific project on the spot. This procedure turns an ostensibly administrative task into something anyone can do — without them having to ask permission or wait for someone from the Admin department to get around to it.

The notion of roles comes into play across the system. Roles are how users are
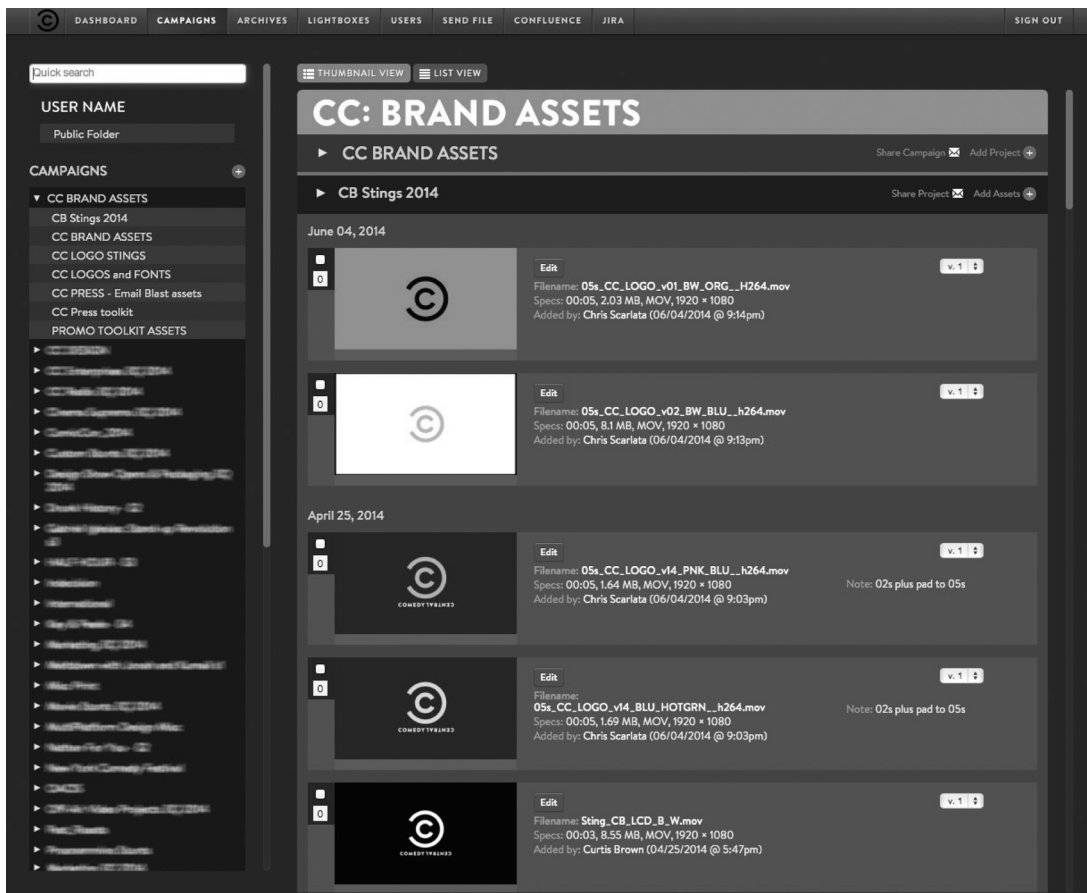
Figure 3: Screenshot of Comedy Central's main campaigns and projects page

granted the appropriate level of access to get their work done — not too much and not too little. Roles range from the all-powerful administrators on one end to zero-access accounts at the other, with publishers, editors and viewers in between with ranging rights with respect to creating campaigns or projects, uploading assets, leaving notes, sharing assets and what they are able to see — whether it be all versions of an asset or only the newest version (see Figure 3).

But by design, a normal 'trusted' user can see everything and perform the most frequent and useful actions. They should be able to jump into any project associated with any team and just start contributing. There are understandable limits, of course,

like 'cannot delete everything in one click'. Users are trusted to exercise common sense, but only up to a point.

MORE HARD WORK: TRANSCODING AND OTHER BEASTS

So far, this paper has described the parts of the system that exist above the waterline — the stuff that users see and experience. But beneath the surface are many moving parts and layer upon layer of design and programming.

The design teams at Comedy Central generate and upload a wide range of digital media formats that the system must ingest and process. Online adverts may be in Flash, HTML5 or static image formats.

On-air promotions are naturally in video. Assets that go into the production of these adverts may be the native formats for Photoshop, Illustrator or PDF. The system was designed to be liberal in the formats that it accepts and to create representational proxies for anything that cannot be reliably shown on the web. In extreme cases, like zip files, a static 'No Preview' image is shown instead.

For video, the system uses the transcoding module FFmpeg to generate a thumbnail poster frame and create a browser and mobile device-friendly versions of original videos and the ImageMagick engine to convert static image formats. The viewer's experience should be be as optimised as possible.

The system transcodes all the major filetypes, including:

- *Static:* PSD, JPEG, PDF, TIFF, PNG (into a JPEG);
- *Video:* MOV, AVCHD, MP4, AVI, FLV, WMV, AVI (into an MP4);
- *Audio:* WAV, WMA, MP3, AIFF, M4A, FLAC (into an MP3).

Transcoding is the magic behind the curtain that allows users to upload practically any kind of digital file and it 'just works'. Most systems stop at that. But Comedy Central had some specific needs that required a more granular approach. Its users needed speed and they regarded the wait for transcoding to occur as lost time that they would never get back. Some great feedback was received about this. So, an override was offered that enabled power users to skip transcoding altogether. If they upload an MP4/M4V, the system creates a poster frame image and skips the transcoding completely. At playback time, it passes through the original video file. This requires some discipline among the ranks. Uploaders have to follow best-practice guidelines for dimensions, bitrate and compression.

For video files that do require transcoding, uploaders are aware that processing takes a little time. End-users' experience needed to be fast and to achieve that it was necessary to sacrifice a little performance up front.

A second exemption from encoding applies to SWF files. It is very important that the thing seen on the screen is the thing that ultimately gets released. These files are imported and displayed as-is. A unique control was added that allows the user to replay a Flash from the beginning. In addition, a typical Flash file is embedded with date-sensitive content, such as a unique tune-in message appearing on the days leading up to, and after, a show launch. A little calendar widget was built into the web page that allows the user to adjust the date and proof the advert content.

Some intelligence was designed into the system — capturing certain types of information as users interacted with it and displaying that information wherever it might improve the system's usefulness. Each project keeps a dynamic list of the users who contribute in any way, whether by uploading a file or leaving a comment. Every user can see at a glance who else is working alongside them and know where to go for answers. The system shows metadata, such as who uploaded the file, and when, and the file's size, duration (if it was a video clip), pixel dimensions and file type alongside the file's thumbnail.

Each appearance of a person's name also became a launching pad for communication. The name is a clickable link for sending an e-mail using the system's internal messaging engine. It all happens from within the system and it eliminates the user having to switch to an e-mail client, compose their message and then return to the system to pick up where they left off. When all the seconds and minutes saved are added up, it saves a lot of time.

Every message also benefits from the system's intelligence. The subject and body of the message are pre-filled with the sender's name, the project in question and a link back to the asset or project in question. Users can add a witty comment before sending the message on its way.

Sharing large files is a notorious problem due to the limitation of e-mail. Users had been employing various commercial file-sending solutions on an *ad hoc* basis. But it was an insecure, disorganised and every-man-for-himself situation. Here was another ripe opportunity for making a difference. It was decided to include a bare-bones but extremely efficient file-sending system. Uploaded files live right in the user's dashboard and can be sent again with a single click. As Comedy Central was free to establish its own file-retention policy, it was left wide open. To users' surprise and delight, files can live forever. As an extra treat, the system can accommodate files up to 4 GB in size.

A final bonus to users was some great presentation features. None of them had requested these because they did not realise how useful they could be. But the ability to play a set of assets in an overlay type of slideshow turned out to be a huge hit. Natural collections of assets, such as the contents of an entire project, can be played by clicking on the project's title. For those who wanted to create their own collections, lightboxes were developed to hold any type of asset from any project. The contents of a lightbox can be reorganised by dragging a thumbnail and lightboxes can be shared with the outside world.

IN THE END: MEASURES OF SUCCESS

There was a moment early on in the research phase when one of the video editors said: 'Up until now, I don't feel
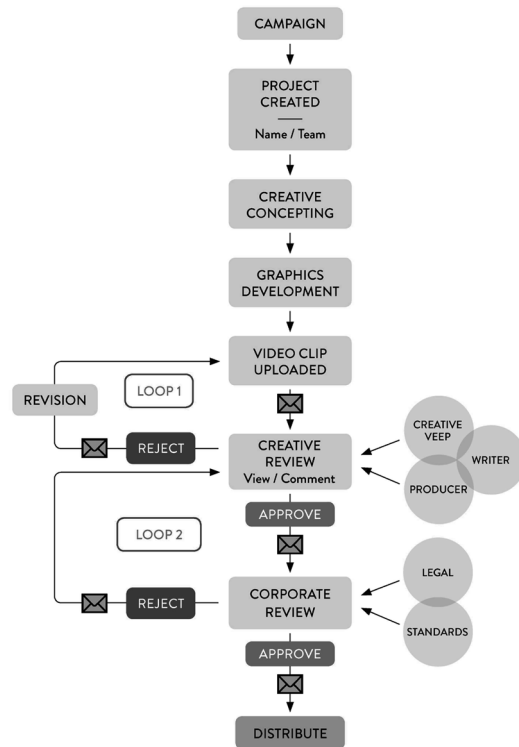

Figure 4: Comedy Central's new video workflow

like anybody has ever understood how we work'. He was floored to be taken so seriously and excited to see what was in store. The fact that a system was tailored to his specific needs and work style and others like him is what makes the solution so successful in ways that no off-the-shelf system could come close. Comedy Central understood the needs, challenges and even the hopes and dreams of its team. As a result, a toolset was designed that works to make them more effective and gives them an intuitive and vastly better workflow (see Figure 4).

As an added benefit, renewed teamwork and collaboration was engendered. The system has really brought the three design teams together. Upon logging in, the user can immediately see their part in a workplace community that promotes the sharing of ideas. The walls have gone down and they are working side by side

with other groups on the same projects. It is impossible to miss the point that all are part of a larger organism.

Another measure of success is the adoption rate of new features. Within six weeks, lightboxes — which had never before existed in the workflow — had entrenched themselves as the tool of choice for making presentations both internal and external. The author knew it was a hit when colleagues began stopping by his office with ideas about how to make it better.

Many of the ways that this system has improved work life are hard to measure. Yet it is easy to see how it has reduced miscommunication and human error and eliminated frustrations and overlap. Past work is now easy to find — each user has a personal console, where recent projects, lightboxes and sent files are all available. Everything is in one place. Tasks that once were hard or impossible are now easy — like picking up where one left off, finding projects and assets, sharing, downloading, comparing versions or creating lightboxes. Even something like requesting approval can be done with a couple of clicks. Finding out who else is working on the campaign is a snap and sending them a message is just as easy.

LESSONS LEARNED

- Expect feature creep.
- The project may take more time and effort than expected.
- Colleagues will need persuasion and patience.
- Keep the vision manageable — do not put everything into version 1 of the application (there will be a version 2.0, and beyond).
- When implementing features with the developer, focus on the goal rather than clinging to a pre-conceived solution or prescribed path to the goal.

WHAT NEXT?

Comedy Central has developed an organic, growing system that is expected to serve its needs for a long time to come. New file formats will come along. Continued development is a given. Thanks to the modularity of Ruby on Rails, the system's components (or core) can be updated as needed and Comedy Central can keep current with security releases.

The users are enthusiastic and actively involved in suggesting features large and small to make their working lives even better. Word has spread within the company. It is not alone in wanting a better workflow. This presents an opportunity to make a difference on an even greater level. There is an incredible need for solutions such as this and the sister networks are eager to jump on the bandwagon and help invest in the system's continued development and growth. The future of the creative review and approval system is bright.

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