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**The DI Bridge: How Did We Get Here  
and What Do We Do Now?**

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## The DI Bridge: How Did We Get Here and What Do We Do Now?

The craft of color correction has been through a number of major changes since the early days. As the name suggests, “color correction” was originally developed as a corrective process to fix things that were wrong – namely, color problems that arose in images when transferring them between various mediums and formats (i.e., film to tape, tape to tape, etc). One of the more recent revolutionary milestones in this industry was the development of technology and tools that refined the process to the point where “color correction” became “color enhancement”— instead of just correcting problems, the operator became a colorist — adding new elements, in a sense, moving from craftsman to artist.

Today we are at another milestone, and one with a bridge to cross – that is, should you choose to go in such a direction. The question we’re frequently asked now, or that people are asking themselves, is about the latest buzz, the digital intermediate (DI) process: “I want to work in DI,” they say, “So what do I need to do?” This question cascades into a number of additional questions, most of which really relate to the nature of any given individual business. Such as, are the deliverables full-length features, or commercials, or episodic? The answer to the bigger question can vary considerably, and one possible answer is that this might not be a bridge everyone is ready to cross just yet. Not every facility is ready for DI – they may not have an infrastructure that can easily accommodate it, or even more simply, they may not have a business model that would ever even require it -- so jumping right in to a DI workflow may not only not be possible, it might not be advisable or desirable.

But let’s have a look and consider the various possibilities of when and how.

In the traditional “linear” color correction workflow, the source device (typically a telecine or tape machine) must move or shuttle between desired scenes in a linear fashion, sometimes having to move through quite a bit of footage to get to the next required scene, and many times necessitating reel or tape change to get to the next scene. While shuttling time and changing reels steals time from the project, the upside is all corrections are made in real-time with no need to generate proxies or wait for rendering. When speed is of the essence, this workflow is very good for short material like commercials or short form content, and can fulfill much of the requirements for film-based dailies.

Many of positive points in favor of DI come from having all the material digitally (and centrally) stored, resulting in the elimination of film and tape handling, and allowing rapid, non-linear access to specific material. Also, with the use of a central repository there are no limitations on the tools that can interact with the material and there are no restrictions on resolution, as one is no longer limited to specific input formats. While this “lifts the resolution lid” so to speak, there are some fundamental issues regarding resolution sizes and the files they create that can have a limiting effect in supporting larger resolution formats.

On the downside, moving everything to storage requires a new paradigm in managing content. Where reels and tapes were easy to see and handle as tangible assets, there are now bits and bytes all stored in magnetic media on disk. This change requires properly handling all the data and different versions that are created along the processing chain. Without proper management of this function, chaos will ensue.

To summarize, DI can be a boon or a bust depending on the management of the data and the application.

### **Technologies Enabling a DI Workflow**

The disk storage requirement is the first and foremost consideration when implementing a DI workflow. Since *EVERYTHING* will be digitized, copious amounts of storage will be required to contain the material. A SAN is most appropriate and the preferred method for storing the data as other processes are able to access material immediately without having to spend time moving the data between disparate storage systems. Plan on 1 TB for each hour of 2K resolution material you need to store. Even more importantly, a critical data management system must be in place.

Next you’ll need a sufficiently large and fast network structure –some big network pipes – to move the data around to the processing stages. Too small a pipe and the delays quickly add up, taking more time to copy files then to process them. And if customers are looking to work in real-time the network has to supply data in real time. Plan on 300 MB/s (that’s Mega Bytes, not bits!) for a single stream of 2K resolution material. And of course, in and out streams are required, so you can basically double that amount – which means a very large pipe indeed.

Finally, you’ll need a device that can work on image files stored in the system. Many times these file- or server-based grading systems have been inappropriately referred to as “software-based” color correctors. This is a misnomer, as software needs some kind of hardware to run. Notwithstanding the naming error, the system should be resolution independent and work with image files stored on the disks.

So you have to have a big SAN, a fast network, and a file-based grading system. Great if you can afford it. But we're talking about building a bridge – that is, starting with an already existing workflow and gaining the benefits of non-linear operation through leveraging existing infrastructure and equipment.

### **Enter Splice – The “virtual telecine”**

Moving to a non-linear workflow, DI's most notable attribute, can be accomplished by simply adding a disk-based source device, which allows the color correction system to quickly access material in a non-linear manner. Devices such as Digital Disk Recorders (DDR) are quite common and adept at handling these types of sourcing and, as long as loading time is not spent with the client in the room and can be done with less expensive labor during off-peak hours, there can be significant time savings. Again for speed, the corrections are made in real-time with no need to generate proxies, or wait for correction rendering time. Drawbacks are that resolutions don't extend beyond that of the input device and you are limited to the amount of storage on the server. This is usually very good for short form material and less supportable with large, long-form projects. A less apparent downside of a standard DDR is dealing with repositioning or rotations that are normally done optically on the telecine. Once in the DDR there are restrictions on the ability to pan, tilt, and zoom without decaying the image, and rotation is difficult if not impossible. For this reason da Vinci created Splice – a new product that acts as a “virtual telecine,” which allows standard color correctors to operate as if connected to a non-linear device with controls that mimic a telecine.

This summarizes the different workflows.

- Traditional linear color correction remains a vital piece in many of today's workflows
  - Many times it's the fastest way to delivery
- Adding non-linear devices (e.g. disk servers) provide many DI advantages
  - In-context grading for fast scene-to-scene work
  - No need for a facility/room or workflow change
  - Recoup or extend life of existing capital
- Full DI systems provide:
  - In-context grading
  - Multiple and highest resolutions
  - Collaborative workflows

DI is the latest rage in the post production industry, especially seeing so much high-end, high-profile work going that way. And there is no question that great things can be and are being done in DI, and we've

helped many of our customers get to that point. And so the question now is, shouldn't you be on that bandwagon too? The answer, which I think I have shown here, yes, if it is right for your particular business. Analyze the type of business you do now, how moving to DI will improve or hinder that business, and what the investment would be to build a new DI infrastructure from scratch, versus adapting an existing infrastructure to a new workflow. Of the three main routes to take (1. no DI for now, 2. the bridge to DI, and 3. the big leap into it), the best fit for you depends on what you are doing with your business and where you intend to take it.