# Exploring the Association between Current State and Future State Technology-Mediated Collaborative Workflow

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*Abstract*— **Advances in technology, coupled with continuous process improvement, have provided opportunities for expanded information exchange between key participants in the graphic communications value chain. The promise of more effective collaboration between all parties using enhanced workflow solutions is often compromised due to a variety of barriers that minimize the value of an integrated workflow. Understanding barriers that impact effective collaboration is critical to improving graphic communications workflow. This paper will explore a method to qualify and quantify the "collaboration space" between creators and producers in the graphic communications workflow.**

## I. Introduction

The graphic communications industry is in constant flux as new technologies are incorporated into the workflow and processes are introduced to orchestrate increasingly complex workflows that are built to deliver a variety of cross-media solutions. Service providers have become systems integrators, judicially acquiring a wide range of equipment and software to configure unique workflows that deliver differentiated services. The interpretation of market requirements, the deciphering of best-in-class systems, and the integration of these elements into an optimized workflow is a high-stakes business concern for service providers.

Making a good decision on the acquisition of equipment or a software solution does not guarantee that the value proposition of each will ultimately resonate with the market or contribute to the bottom line. The burden of technology selection and seamless integration into an optimized workflow falls largely on the shoulders of service providers. For service providers, as the complexity and diversity of technology required to deliver graphic commination services increases, so does the risk for realizing the value of their workflow investments.

Graphic communications workflows are typically built over time with two primary objectives, (1) the optimization of work processes (cost reduction), and (2) the introduction of new services (revenue growth). Optimizing workflow provides cycle-time benefit to both creators and service providers (producers), ultimately presented as a time-saving benefit to creators and a cost-saving benefit to producers. Integrating new services provides expanded capability and features for creators and new revenue streams for producers.

The graphic communications industry has a rich history of workflow integration along these two precepts of workflow optimization and feature enhancement. Each technological revolution has enabled a new wave of capability that needs to be interpreted by producers and ultimately to be synthesized into their operation for creators to realize the value of these new innovations. Producers with expertise in monitoring emerging technology and incorporating new technologies into prototype and production workflows have a competitive advantage. To successfully keep pace with the complexity of new technologies introduced in this digital era, graphic communications service providers need the ability to integrate new technology into their workflows.

Those service providers are balancing scarce resources, both in time and capital; thus, they seldom commit the resources or the process regimen to step through a major technology integration with a systematic approach in order to validate the contribution of workflow investments. This paper introduces the Collaborative Space–Analysis Framework (CS-AF), a method for evaluating the association between current state and future state workflow from both a qualitative and quantitative perspective.

Initial work for this research began in the Health Information Technology (HIT) arena with specific research in doctor-patient collaboration within a high-blood pressure

(hypertension) outpatient workflow. The HIT arena has similar workflow integration issues as has the graphic communications industry; thus, it has been a catalyst for the extension of research into a more generalizable model that can be adapted for any collaborative workflow.

The patient-centered healthcare workflow is similar to the creator-producer workflow. Both approaches assume expanded participation and collaboration by all parties, yet each approach is riddled with gaps in the processes, technology, and human computer interaction (HCI) necessary for optimum workflow. Understanding the collaborative barriers by comparing current state and future state workflow can pave the way for system designers and developers to address the gaps necessary to deliver effective workflow solutions.

This research leverages the Collaboration Space Model [5] as a means to better qualify and quantify specific barriers to effective collaboration. The Collaborative Space Model (CSM), developed by Eikey, et al. [2015], was formed as a theoretical model incorporating a 25-year system-wide review of collaboration research in HIT. The primary elements of the model remain sound, yet the model had not been adapted for formal field implementation and analysis.

CSM [5] provides a structure to further investigate the critical dynamics of collaboration in any workflow. These four collaborative components are Context, Process, Technology, and Outcomes. Each of these components, when fully integrated, provide a comprehensive view of collaboration that can be used to evaluate workflows and to direct better collaboration from all parties.

This research has extended the CSM for field deployment with the introduction of the CS-AF (Figure 1), which will integrate components from the Technology Acceptance Model (External Variable, Perceived Usefulness, and Perceived Ease of Use) [4], in conjunction with Value Stream Mapping (VSM) [6]. This session will explain how the CS–AF will be used for field research to explore the association between current state and future state workflow, and the derivation of meaningful qualitative and quantitative data from the process.

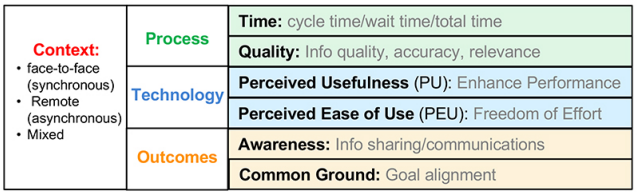


Figure 1: Collaborative Space - Analysis Framework [1]
(Adapted from the TAM [2] and CSM [3])

This research builds off of prior research focused on the analysis and modeling of current state graphic communications workflows. Excerpts from this work led to development and issuance of a workflow process and solutions engagement patent [3]. The research provides a foundational reference model (taxonomy) and seven use case workflow models that describe and catalog graphic printing/communications workflow. These graphic communications workflows were evaluated:

- Static Offset Printing
- Hybrid Digital-Offset Printing
- Print-on-Demand
- Variable Data Printing
- Transactional Printing
- Web-to-Print
- Photo Services Printing

Establishing a current state workflow baseline is an essential step of the Collaborative Space–Analysis Framework. This includes identification of the key stages in the workflow, and determining the cycle time and information requirements of each stage for primary parties in the collaborative workflow. The integration of industrial engineering disciplines, such as value-stream mapping coupled with the use of the Technology Acceptance Model (TAM), provide quantitative and qualitative data.

Other aspects of the CS–AF provide the Context or setting for the workflow—whether face-to-face, remote, or mixed. Finally, the Outcomes component of the CS–AF establishes the goals and information requirements for each of the primary parties in the workflow to ensure that each is aware of the other and that common ground is shared with respect to goals. The CS–AF provides a comprehensive assessment of the current state workflow and a foundational reference point from which to compare any future state workflow enhancements.

Context for transformation in the printing and graphic communications industry and the mandate for continuous improvement to the workflows that enable change is derived from *UnSquaring the Wheel: Comprehensive and Scalable Transformation* [2]. This book devotes an entire section to the technologies and processes associated with transformation in printing and graphic communications workflows. Change in the graphic communications industry is a given, and most change involves the incorporation of new technology and workflows that integrate the value of the technology into operations. Incorporating the Collaborative Space – Analysis Framework into the planning and implementation of major workflow transformation efforts can ensure that goals and key performance indicators that justify an acceptable return on investment are attained.

This session will introduce the CS–AF and provide insights on the practical application of the model in printing and graphic communications workflows.

## II. References


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