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WHAT WE KNOW AND WHAT WE NEED TO KNOW ABOUT THE EFFECTS OF COURTROOM TECHNOLOGY

Elizabeth C. Wiggins*

INTRODUCTION

This Article describes the extent to which technology is available in the United States federal court system, and reviews some of the major claims and concerns raised in response to the use of certain technologies. In doing so, it sets forth a framework for identifying and empirically addressing the pressing policy issues surrounding the use of technology. The Article concludes by making the case that what is needed is a better understanding of the effects of technology on human information processing, and how these effects interact with the underlying principles of our legal system. This greater understanding may help ensure that appropriate policy decisions are made and that appropriate technologies are developed and implemented. This understanding should come from productive partnerships among judges, attorneys, social science researchers, technology developers, legal scholars, and others who understand the functioning and organization of the courts.

I. USE OF TECHNOLOGY IN FEDERAL COURTS

The Judicial Conference of the United States¹ has taken several actions to encourage the use of technology in the federal court system. Most notably, in March 1999, the Judicial Conference approved the recommendation of its Committee on Automation and Technology to endorse the use of certain technologies in the courtroom and:

subject to the availability of funds and priorities set by the Committee, urge that (a) courtroom technologies [including video evidence

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¹ The Judicial Conference of the United States was established by 28 U.S.C. § 331 as the governing body of the federal courts. The Chief Justice of the United States presides over the conference, whose membership consists of the chief judge of each judicial circuit, the Chief Judge of the Court of International Trade, and a district judge from each regional judicial circuit. The fundamental purpose of the Judicial Conference is to make policy with regard to the administration of the U.S. courts, with its principal duties set out in 28 U.S.C. §§ 331, 604(a).

presentation systems, videoconferencing systems, and electronic methods of taking the record] be considered as necessary and integral parts of courtrooms undergoing construction or major renovation; and (b) the same courtroom technologies be retrofitted into existing courtrooms or those undergoing tenant alterations as appropriate.²

Previously, the Judicial Conference "endorsed the use of realtime reporting technologies by official court reporters in the district courts to the extent that funding [was] available"³ and videoconferencing as "a viable optional case management tool in prisoner civil rights pretrial proceedings."⁴ Subsequently, spurred in part by the Prison Litigation Reform Act,⁵ the Committee on Court Administration and Case Management and the Committee on Automation and Technology established the Prisoner Civil Rights Conferencing Project. Since 1996, the Prisoner Civil Rights Conferencing Project has funded more than fifty-eight videoconferencing sites in the district courts.⁶

In part because of these initiatives, the use of technology in the federal court system has been rapidly growing over the past ten years. Recognizing that courts have procured and funded technology in ways that have made it difficult to track which courts have what technology, in June 2002 the Federal Judicial Center surveyed all federal district courts about the use of technology in their district and magistrate judge courtrooms. The Center sent an e-mail message to all district clerks of court requesting that they or their designees complete an online questionnaire. The questionnaire sought information about a wide range of technologies, including those used in the courtroom during trials and evidentiary hearings, those designed to assist people with hearing, language or other impairments, those provided in ancillary spaces (areas of the courthouse other than courtrooms), and those available during jury deliberations.⁷ The questionnaire

² ADMIN. OFF. OF THE U.S. CTS., REP. OF THE PROCEEDINGS OF THE U.S. JUD. CONF. 8 (Mar. 1999).

³ *Id.* at 49 (Sept. 1994).

⁴ *Id.* at 14 (Mar. 1996).

⁵ 42 U.S.C. §1997e.

⁶ See FEDERAL JUDICIAL CENTER AND THE NATIONAL INSTITUTE FOR TRIAL ADVOCACY, EFFECTIVE USE OF COURTROOM TECHNOLOGY: A JUDGE'S GUIDE TO PRETRIAL AND TRIAL 288-90 (2001) (listing those district courts with videoconferencing technology).

⁷ The questionnaire is available by contacting the author. The Center collaborated with the Administrative Office (AO) of the U.S. Courts on the content of the survey and included questions several AO offices said would be useful in managing the Courtroom Technology Program. The Center also included some questions proposed by the Courtroom 21 Project of the William and Mary School of Law and the National Center for State Courts. The Courtroom 21 Project, supported by a grant from the State Justice Institute, was evaluating the effect of jury room technologies and deliberations in traditional nontechnological trials and high technology trials in both state and federal courts.

asked about permanently installed technologies, as well as technologies that may be shared between courtrooms or brought into courtrooms by attorneys, and the extent to which these technologies were used. Other questions addressed training programs provided by the courts with regard to courtroom technology and the funding and procurement of the technology and its maintenance.

Ninety of the ninety-four districts responded to the survey.⁸ The major findings of the survey are reported below.⁹ These reported numbers and percentages should be used with caution, in part because the technology currently available in some districts may differ from what they reported in the questionnaire. Furthermore, each district completed the questionnaire at a different time, some districts did not answer every question, and four districts did not respond at all. Although we use the present tense below — for example, “courts have access” — the statement is only accurate as of the dates of the survey submission. Unless otherwise noted, the term “districts” refers to responding districts or courts, which terms are interchangeable.

From the survey, we learned that a large percentage of district courts have access to primary forms of advanced technology — through permanently installed equipment in one or more courtrooms or equipment that is shared among courtrooms. The survey produced the following results: 94% of district courts have access to an evidence camera; 66% to a digital projector and projection screen; 93% to wiring to connect laptop computers; 57% to monitors built into the jury box; 77% to monitors located outside the jury box; 89% to a monitor at the bench; 88% to a monitor at the witness stand, at counsel table or at the lectern; 77% to monitors or screens targeted at the audience; 80% to a color video printer; 91% to annotation equipment; 95% to a sound reinforcement system; 92% to a telephone or infrared interpreting system; 92% to a kill switch and control system; 81% to an integrated lectern; 93% to audio-conferencing equipment; 85% to videoconferencing equipment; 81% to real-time software for use by court reporters; 74% to a real-time transcript viewer annotation system; and 66% to digital audio recording.¹⁰

A large percentage of the courts have permanently installed these technologies in at least one courtroom. However, most have not permanently installed the equipment in the majority of their courtrooms. For example, only 21% of reporting courtrooms have an evidence camera permanently installed; 10% of courtrooms have a digital projector and projection screen permanently installed; 27% have

⁸ Thirty districts responded to the survey by the initial due date and forty-one more responded after e-mail reminders were sent in July and September 2002. We attempted to obtain responses from the remaining districts by sending another e-mail reminder in 2003, and heard from the last responding district in July of 2003. Four districts did not respond.

⁹ The following report sets out the survey's major findings: ELIZABETH C. WIGGINS ET AL., FED. JUD. CTR., FED. JUD. CTR. SURVEY ON COURTROOM TECHNOLOGY (2003) (unpublished report, on file with author).

¹⁰ *Id.* at 6–7.

wiring to connect laptop computers; 12% have monitors built into the jury box; 18% have monitors outside the jury box; 33% have a monitor at the bench; 24% have a monitor at the witness stand; 25% have monitors at counsel table or lectern; 12% have a monitor or screen targeted at the audience; 16% have a color video printer; 24% have annotation equipment; 2% have a kill switch and control system; 16% have an integrated lectern; 53% have audio-conferencing equipment; 12% have videoconferencing equipment; 31% have real-time software for use by court reporters; 26% have a real-time transcript viewer annotation system; and 18% have digital audio recording.¹¹ Ninety-five percent of the courtrooms have a sound reinforcement system, and about two-thirds have either a telephone or infrared interpreting system.¹² Courts continue to provide access to more traditional technologies such as analog audiotape and videotape players, overhead projectors, and television sets.¹³

Most of the courts reported that they have basic orientation programs to familiarize court staff and attorneys with the equipment and how it can be used during a court proceeding. Furthermore, the courts reported having more advanced hands-on training to prepare court staff and attorneys to operate and maintain systems they themselves will be using during court proceedings.¹⁴ Such training is generally hands on after the orientation program and/or practice before court proceedings.¹⁵ The training is provided most often by the courtroom deputy but is also commonly provided by a full-time employee who is responsible for assisting with courtroom technology or by another automation or information technology employee.¹⁶

Many districts appear to have planned for situations in which videoconferencing equipment might be needed in several ancillary courthouse spaces, including judges' conference rooms, other conference rooms, and training rooms. Although the equipment is generally not permanently installed in these areas, about 40% of the districts reported that it could be available on a shared basis.¹⁷ Also, about one-fifth of the districts reported that videoconferencing equipment could be available on a shared basis in overflow areas for the courtroom.¹⁸

Similarly, many districts seem to have anticipated the possible need for evidence presentation equipment in certain ancillary spaces. About 40–45% of the districts reported that evidence presentation equipment could be made available on

¹¹ WIGGINS ET AL., *supra* note 9, at 8–9.

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.* at 20–21.

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.* at 17–18.

¹⁸ *Id.*

a shared basis in jury deliberation rooms and training rooms.¹⁹ Many districts also reported having it available in the jury assembly room, either on a permanent (35%) or shared basis (29%).²⁰

It appears that most districts do not make high-end technology available for jury room use and that traditional equipment is more common. The most common equipment available in jury rooms are pencil and paper (78 of 79 districts providing information), paper flip charts (68 of 75 districts) and calculators (59 of 69 districts). Many districts also make analog videotape and audiotape players available as needed (54 of 71 or 72 districts).²¹

However, some districts reportedly are prepared to make high-end technology available as needed for deliberations, including evidence cameras (20 of 70 districts providing related information), laptop or desktop computer for evidence retrieval and viewing (16 of 71 districts), individual juror monitors (9 of 74 districts), digital monitors for group use (21 of 75 districts), digital projectors and projection screens (20 of 75 districts), real-time transcripts (28 of 75 districts), and digital audio recording (16 of 66 districts).²² Thus, the potential exists in some districts for high technology jury deliberations.

From the results of the survey, it appears that the landscape of the courthouse will continue to change, as courts and attorneys increasingly take advantage of technologies, such as videoconferencing, digital presentation of inanimate objects, documents, and photographs, and real-time court reporting. Claims about the benefits of such technologies have, however, accompanied their increasing popularity, as have concerns about their use.

II. EVALUATING CONCERNS ABOUT THE USE OF TECHNOLOGY

Users and providers of courtroom technology have made many claims about the benefits of its use. They argue that technology enhances the ability of attorneys to explain complex evidence, and thus, the ability of jurors and judges to understand that evidence.²³ For example, animations can demonstrate the workings of machinery in a way that could not be accomplished via words and still diagrams, and simulations can show the unraveling of the circumstances leading up to and immediately following an accident. Moreover, they claim technology reduces travel time and costs.²⁴ For example, remote participation by counsel in appellate

¹⁹ WIGGINS ET AL., *supra* note 9, at 17–18.

²⁰ *Id.*

²¹ *Id.* at 28.

²² *Id.*

²³ Fredric I. Lederer, *The Road to the Virtual Courtroom? A Consideration of Today's — and Tomorrow's — High-Technology Courtrooms*, 50 S.C. L. REV. 799, 815–16, nn.46–48 (1999).

²⁴ *Id.* at 822, n.74.

arguments reduces attorney travel time and client costs; remote appearances by criminal defendants for arraignment and similar proceedings saves the costs of transporting prisoners to court and decreases security risks. Similarly, technology is thought to reduce the length of trials in some types of cases.²⁵ Presentation of documents digitally reduces the time it takes to locate documents during trial and to draw the attention of trial participants to the relevant portions.

Undoubtedly, all of these claims, and other similar ones, are true — at least *some* of the time. Undoubtedly, the effects of technology are much more subtle and complicated than these claims indicate. What is needed is a better understanding of the effects of technology on human information processing, and how these effects interact with the underlying principles of the U.S. court system. We demonstrate this point with three examples: (1) the use of videoconferencing in certain criminal proceedings, (2) the use of videoconferencing to conduct appellate argument, and (3) the use of animations and simulations.

A. Videoconferencing in Certain Criminal Proceedings

The use of videoconferencing in state criminal proceedings was systematically studied about ten years ago.²⁶ That study and other informal reports indicate that in some courts defendants routinely appear by videoconferencing for first appearances and arraignments, and sometimes appear remotely for sentencing as well.²⁷ Moreover, prisoners have occasionally appeared via videoconferencing as witnesses in criminal trials, and some courts are inclined to allow noninmate witnesses to appear remotely under limited circumstances.²⁸

Recently, Federal Rules of Criminal Procedure 5, 10, and 43 were amended to explicitly permit the defendant's initial appearance and arraignment to be conducted by videoconferencing, with the defendant's consent.²⁹ During the public comment

²⁵ *Id.* at 816, n.49.

²⁶ Gerald G. Ashdown & Michael A. Menzel, *The Convenience of the Guillotine?: Video Proceedings in Federal Prosecutions*, 80 DENV. U. L. REV. 63, 78, n.107 (2002).

²⁷ *Id.* at 65 n.5–6, 78 n.107, 84–87 nn.145–75.

²⁸ See Lederer, *supra* note 23, at 821 nn.67–69.

²⁹ The Advisory Committee of Criminal Rules also recently recommended amendments to Federal Rule of Criminal Procedure 26, which would have permitted the court to use remote transmission of live testimony at trial if: (1) the requesting party establishes exceptional circumstances for its use; (2) appropriate safeguards are used; and (3) the witness is unavailable within the meaning of Federal Rule of Evidence 804(a)(4)–(5). The Judicial Conference voted to approve this amendment at its September 2001 meeting, but the Supreme Court subsequently voted to reject it because of concerns related to the Confrontation Clause. To access Supreme Court documents regarding the proposed amendments to Rule 26, go to the Supreme Court Web site (www.supremecourtus.gov). Select "opinions," then "2001 Term Opinions Relating to Orders," and finally, select "Federal Rules of Criminal Procedure."

period on the proposed rule changes, defense attorneys and others raised the following issues. First, does videoconferencing interfere with the right to due process and adequate representation by counsel?³⁰ When defendants appear via videoconference from prisons for their arraignments, sentencing hearings, or other matters, defense lawyers believe they need to be with the client to ensure effective attorney-client communication. Defense attorneys also think they need to be in the courtroom if the prosecutor is appearing in person; otherwise, their communication with the court is at a relative disadvantage. Whatever choice the defense attorney makes, therefore, may interfere with the defendant's right to adequate representation.

Second, does videoconferencing interfere with the right to due process and a fair trial?³¹ Defense attorneys are also concerned about the possible "dehumanizing" effect of having defendants appear by videoconference from the prison facility and the resulting effect on the fairness of the proceedings and trials.

Empirical study may help policymakers evaluate these concerns. For example, with respect to the second issue, empirical study could help determine whether judges and attorneys evaluate a defendant's culpability and credibility differently when the defendant appears remotely than when the defendant appears in person, and if so, whether the difference is prejudicial. Both visual and auditory aspects of the technology could be evaluated.

The program of research by Daniel Lassiter and his colleagues on videotaped confessions describes some of the visual effects that merit consideration.³² Their research has found that evaluations of videotaped confessions can be significantly altered by seemingly inconsequential changes in the camera perspective taken when the confessions are initially recorded.³³ Videotaped confessions recorded with the camera focused on the suspect — compared to other camera points of view (e.g., focused equally on the suspect and interrogator) or to more traditional presentation formats (i.e., transcripts and audiotapes) — lead mock jurors to believe that the confessions were more voluntary and, most importantly, that the suspects were more likely to be guilty.³⁴ The effect is extremely robust. Deliberations among mock jurors did not obviate this effect, nor did warnings or judicial instructions about the possible biasing effect of camera angle.³⁵ The effect was maintained when participants' attention was focused on the content of the confession, when their

³⁰ Advisory Committee on the Federal Rules of Criminal Procedure, Summary of Comments to Proposed Amendments to Rule 43 and to Rule 26 (on file with author).

³¹ *Id.*

³² See G. Daniel Lassiter et al., *Videotaped Confessions: Is Guilt in the Eye of the Camera?*, in 33 *ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY* 189 (M.P. Zanna ed., 2001) (reviewing the results of this seventeen year program of research).

³³ *Id.* at. 241–42.

³⁴ *Id.* at. 202–05.

³⁵ *Id.* at. 205–09, 223–26.

sense of accountability was heightened, and in studies using simple stimulus materials as well as within the context of a fully simulated trial.³⁶ Student and nonstudent jury-eligible research participants, and even judges, who are experienced with confession evidence, were found to be susceptible to the effect.³⁷

Regarding auditory information, when voice is transmitted through phone lines as with videoconferencing, a middle bandwidth filter is used. This means that low and high frequencies of the voice are cut off. Thus, the content of the voice message is heard and understood, but some information about the emotional state of the speaker, which is carried in the higher frequencies, may be partly excluded.³⁸ It is precisely this information that may be critical to judgments of the defendant's remorse and credibility.

B. Videoconferencing in Appellate Courts

Videoconferencing is also used in the appellate court system to hear oral arguments. During the videoconference, either the attorneys or one of the judges appear remotely. The instructions regarding videoconferenced oral arguments provided by the Tenth Circuit Court of Appeals foreshadow one problem attorneys and judges may have with this practice. Those instructions provide:

During your argument, you may detect a fractional second delay between the time words are spoken and the time they are heard at the remote conference site. This could cause you to continue speaking, thereby missing the first word or two of a question posed by a panel judge. The court is exploring enhanced technology which will eliminate this transmission delay. In the meantime, the problem can be minimized by some simple protocols. Judges will preface their questions by a warning remark, such as "counsel, I have a question," whereupon you should immediately stop speaking and listen for the question. Thus you will hear the entire question and be able to formulate your response.³⁹

³⁶ *Id.* at 209–10, 213–16, 218–30.

³⁷ *Id.* at 223–30; see also G. DANIEL LASSITER & ANDREW L. GEERS, BIAS AND ACCURACY IN THE EVALUATION OF CONFESSION EVIDENCE IN INTERROGATIONS, CONFESSIONS, AND ENTRAPMENT (G.D. Lassiter ed., forthcoming 2004) (reviewing studies involving student and nonstudent jury-eligible research participants, and judges).

³⁸ See Klaus R. Scherer, *Vocal Affect Expression: A Review and a Model for Future Research*, 99 PSYCHOLOGICAL BULLETIN 143 (1986).

³⁹ U.S. CIR. CT. OF APP. FOR THE TENTH CIR., INFORMATION AND INSTRUCTIONS FOR THE PRESENTATION OF ORAL ARGUMENTS BY VIDEOCONFERENCE, available at <http://www.ca10.uscourts.gov/info.cfm?part=6> (last visited Apr. 12, 2004).

Each side is normally given only a short time — usually from fifteen to twenty minutes — to present its case during oral argument in the U.S. Courts of Appeals.⁴⁰ Thus, the ability to quickly get to the crux of the matter is crucial. If videoconferencing impedes the “give and take” of communication and hinders the ability of the court and parties to air key issues, the use of the technology may need to be adjusted to accommodate these problems.

Again, an empirical study could help evaluate this concern. Psychologists and communication scholars have long studied the nature of different communication patterns.⁴¹ Following in this tradition, a researchable question is whether videoconferencing imparts unique characteristics to interpersonal communication which interfere with the goals of oral argument and if so, to what degree. The method of this research, which often systematically codes verbal and nonverbal qualities of communication, is easily transportable to the courtroom setting.

C. Presenting Evidence Digitally with Animations and Simulations

The effects of digitally presenting evidence on juror comprehension of complex evidence should be considered against the backdrop of the neverending debate about the competency of the jury to decide cases involving scientific and technical evidence, or indeed, even to decide more routine cases.⁴² One way this concern is being met is to adjust the suboptimal circumstances under which jurors have traditionally operated in the United States.⁴³ Among other things, some jurisdictions and judges allow, or are beginning to allow, jurors to take notes, ask questions of witnesses, discuss the evidence among themselves as a trial proceeds, and present jurors with instructions at the beginning of the evidence rather than at the end, and in written form.⁴⁴ These procedures are all focused on making jurors

⁴⁰ See generally JUDITH A. MCKENNA ET AL., CASE MANAGEMENT PROCEDURES IN THE FEDERAL COURTS OF APPEALS 45 (2000) (outlining the time allotted for oral argument in several courts of appeal).

⁴¹ See generally Robert M. Krauss & Chi-Yue Chiu, *Language and Social Behavior*, in 2 THE HANDBOOK OF SOCIAL PSYCHOLOGY 41–88 (Daniel T. Gilbert et al. eds., 4th ed. 1998).

⁴² See Elizabeth C. Wiggins & Steven J. Breckler, *Management of Complex Civil Litigation*, in HANDBOOK OF PSYCHOLOGY AND LAW 77–94 (D.K. Kagehiro & W.S. Laufer eds., 1991); Richard O. Lempert, *Civil Juries and Complex Cases: Let's Not Rush to Judgment*, 80 MICH. L. REV. 68 (1981).

⁴³ See Molly Treadway Johnson & Elizabeth C. Wiggins, *Drawing on the Experiences of Alternative Decision-Makers: Can We Preserve the Jury in Complex Civil Litigation?*, 12 BEHAV. SCI. & L. 161 (1994); Nancy S. Marder, *Juries and Technology: Equipping Jurors for the Twenty-First Century*, 66 BROOK. L. REV. 1257 (2001) (discussing procedural changes that might improve the performance of jurors).

⁴⁴ See generally JURY TRIAL INNOVATIONS (G. Thomas Muntersman, et al. eds., 1997) (suggesting improvements to the jury trial procedure); Johnson & Wiggins, *supra* note 43; Marder, *supra* note 43.

more active participants in the trial, and thus better decision makers. The questions in evaluating digital technologies are to what extent, and in what way, can technology further the objective of engaging jurors in the decision-making process, increasing their comprehension of evidence and thereby enhancing the quality of their decision making? Moreover, can the use of technology unduly interfere with jurors' sense of objectivity in evaluating the facts?

Let us first consider these questions in the context of animations and simulations. Computer animations and simulations are computer-generated productions that purport to represent the operation of some scientific principle or the recreation of events at issue in a case. They are increasingly being offered as substantive and demonstrative evidence in courtrooms around the country. Animations can make difficult concepts or mechanical events easier to visualize and understand, and can allow jurors to see things that would otherwise be impossible to illustrate. They also may provide a concise, accurate and comprehensive summary of all the expert testimony that the jury has heard.

Anyone who has seen a well-done animation of, for example, a complex piece of machinery in operation would not argue with the point that a good animation can provide a better explanation than a verbal description or a still rendition. Animations can show the machinery's design from all angles, inside to outside, and demonstrate how all its parts interconnect during operation. Is it always true, however, as the old adage suggests, that "a picture is worth a thousand words"?

The extant research on the effects of animations and simulations has yielded mixed results, but suggests that the persuasiveness of animations depends on the factual issues it is used to illustrate. In one of the first experimental studies of computer animation, researchers showed that animations can both help clarify the physical evidence and bias verdicts in the direction of the animation.⁴⁵ In the study, mock jurors were asked to determine whether a man accidentally fell to his death, or had jumped in a suicide. When an animation depicted the event in a neutral way, the judgments of mock jurors were consistent with the physical evidence; but when the animation was partisan, not surprisingly mock jurors were more likely to make judgments at odds with the physical evidence and in line with the animation.⁴⁶ A subsequent study, however, found that animations in a car accident trial had no effect on mock jurors' damage awards or judgments of fault assigned to the plaintiff and defendants.⁴⁷ The authors of this study suggested that animations might be more influential if the case concerned matters more likely to be outside the

⁴⁵ See Saul M. Kassir & Meghan A. Dunn, *Computer-Animated Displays and the Jury: Facilitative and Prejudicial Effects*, 21 LAW & HUM. BEHAV. 269 (1997).

⁴⁶ *Id.* at 278-79.

⁴⁷ Robert B. Bennett et al., *Seeing Is Believing: Or Is It? An Empirical Study of Computer Simulations as Evidence*, 34 WAKE FOREST L. REV. 257, 277-79, 283-85 (1999).

experience of jurors.⁴⁸ A third study sought to identify the situations under which animations are persuasive and helps to reconcile the seemingly contradictory findings of the earlier studies.⁴⁹ This study assessed the possible effects of animations in two mock-jury experiments — one involving a plane crash case and one involving a car accident case. It found that animation influenced the verdicts of mock jurors in the plane crash trial, with jurors being more likely to render a verdict in favor of the side presenting the animation, but did not affect the verdicts of mock jurors in the car accident trial.⁵⁰ The researchers reasoned that animations tend to be persuasive because they present the facts in a more vivid fashion,⁵¹ but that if an animation depicts a scenario with which people are familiar, it may not have any effect on their decision making.⁵² If, however, the animation depicts an unfamiliar scenario, it may affect their decision making.⁵³

Clearly, these studies contribute to the understanding of the effects of animations and simulations about jurors' comprehension and judgments, but they are only the beginning of the research needed in this area. A more reliable understanding of the effects of technology could assist policy-makers in evaluating whether additional evidentiary rules regarding this method of communication are needed, as well as assist judges in determining in individual cases the likely probative or prejudicial effects of such evidence. Subsequent studies could further consider questions such as:

- All things equal, do jurors accord evidence presented via animation or simulation more or less weight than evidence presented via other means in rendering their verdicts?
- What emotional impact do animations and simulations have on jurors? Under what circumstances does their emotional impact render them unduly prejudicial?

⁴⁸ *Id.* at 286.

⁴⁹ Meghan Dunn, Technology in the Courtroom: An Examination of the Effects of Computer Examination, paper presented at the Law and Society Association Conference (June 2002) (on file with author).

⁵⁰ *Id.* at 10.

⁵¹ For a review of the social psychological research regarding the effect of vividness on people's perception and judgments, see Brad E. Bell & Elizabeth F. Loftus, *Vivid Persuasion in the Courtroom*, 49 J. OF PERSONALITY ASSESSMENT 659–64 (1985). This article contends that vivid information may be more persuasive than pallid information, even when the pallid information is more probative, because it is more easily remembered (i.e., it is more efficiently encoded into memory or more easily retrieved from memory), it enhances the credibility of the person communicating the message, and it leads to more emotional responses. *Id.*; see also Jonathan Shedler & Melvin Manis, *Can the Availability Heuristic Explain Vividness Effects?*, 51 J. OF PERSONALITY AND SOCIAL PSYCHOLOGY 26 (1986).

⁵² Dunn, *supra* note 49, at 10.

⁵³ *Id.*

- Do judicial admonitions reduce the potentially prejudicial effects of these technologies? What other factors might moderate their effects?

Another policy-based question is whether the use of digital technologies such as animations and simulations alter the role of the jury, and the basic tenet that the person or persons who judge the facts are not those who have experienced the wrong. If jurors are submersed into the factual issues they are asked to decide, do they lose their sense of objectivity? Arguably, jurors viewing animations and simulations are still quite detached from the facts, but will this remain true as other similar, emerging technologies make their way into the courtroom?

Immersive virtual environment technology (also commonly referred to as virtual reality)⁵⁴ would allow the judge, jurors, and witnesses to experience a recreation as if he or she were really *there*. For example, it could be used to allow jurors to “virtually” walk through a crime scene to demonstrate what could be seen from different vantage points or how threatening a given person or situation might have been to a defendant claiming self-defense. It could be used to provide a first hand sense to jurors of the fear or other emotional distress experienced by a plaintiff or to let jurors experience “first-hand” environmental pollution allegedly caused by a defendant. In the current system, the witness is the mediator between the subject of testimony and the factfinder. Virtual reality could come close to replacing the factfinder’s somewhat detached objectiveness with subjective experience. This technology will no doubt make its way to the courtroom door in the relatively near future, but clearly research about its effects on jurors’ perceptions and judgments is needed before such technology is allowed to enter the courtroom.

III. A FRAMEWORK FOR STUDYING COURTROOM TECHNOLOGY

The excitement surrounding the adoption of technologies encourages policy makers and researchers to focus on how much better the technologies can make things. Clearly, technology has its benefits and a place in the court system, but a better sense of how technology interacts with the underlying principles of our system is needed. The legal principles that technology potentially affects are incredibly important — and almost certainly not fully understood by the technology developers. By the same token, courtroom technologies are complex and many individuals outside the technology field do not fully comprehend their potential and their limitations. What is needed to develop a full understanding of the impact of courtroom technology is a productive partnership between judges, attorneys, social

⁵⁴ For a general description of immersive virtual environment technology, see James Blascovich et al., *Immersive Virtual Environment Technology as a Methodological Tool for Social Psychology*, 13 PSYCHOL. INQUIRY 103 (2002).

science researchers, technology developers, legal scholars, and others who understand the functioning and organization of the courts.

These kinds of partnerships will surely raise numerous questions about technology and offer direction for future research. Indeed, in July 2001, the Federal Judicial Center hosted a research conference on courtroom technology. The goal of the conference was to identify the most pressing empirical issues related to the use of courtroom technology and to determine how the Federal Judicial Center and other researchers might go about studying them. Participants included social and behavioral scientists, legal scholars, attorneys, court staff and creators of the technology. As expected, the conference discussions identified many questions about the workings and impact of technology. It was clear that considerable work is needed to prioritize these questions for study. Perhaps the analysis offered in this Article, which focuses on how technology affects fundamental aspects of the court system, will help to do that.