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# The Rise of Courtroom Technology and its Effect on the Federal Rules of Evidence and the Federal Rules of Civil Procedure

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**THE RISE OF COURTROOM TECHNOLOGY  
AND ITS EFFECT ON THE FEDERAL RULES OF  
EVIDENCE & THE FEDERAL RULES OF CIVIL PROCEDURE**  
by  
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## INTRODUCTION

Fifteen years ago, academics, lawyers, and judges alike pondered the question “[e]xactly what beast is this computer? Can it exist in a court of law?”<sup>1</sup> The courtroom, long a bastion of decorum, resistant, if not immune to the extremes of change, found itself in the midst of a technological revolution.<sup>2</sup> However, the use of electronic evidence and computer generated exhibits in the courtroom has glided through its first wave of novelty with less roar and with less fear than many predicted, and with increasingly more acceptance from those who have actually used or presided over the use of technology at trial.<sup>3</sup> In fact, our federal judicial system is, in large part, embracing the use of technology in the courtroom. A survey conducted by the Federal Judicial Center in 2002-2003 shows that a large percentage of federal district courts have access to primary forms of advanced technology used to present such evidence – either through permanent installation in one or more courtrooms or through equipment that is shared among courtrooms.<sup>4</sup> More specifically, the survey showed that 94% of federal district courts have access to an evidence camera; 66% have access 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 outside the jury box; 88% to monitors at counsel table or lectern; 77% to monitors or screens targeted at the audience; 80% to a color video printer; 91% 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 reporter; 74% to a real time transcript viewer annotation system; and 66% to digital audio recording.<sup>5</sup>

It makes sense that trial technology has successfully made its way into our courtrooms. The invention of television has inexorably altered the manner in which society receives

information.<sup>6</sup> Generations have grown to adulthood accompanied by this medium, making it a familiar and trusted presence by those who partake in its monologue. Add to this the advent of computer technology and one can see how these interactive tools are capable of incomprehensible power. In so many aspects of life, society has become dependent upon the power and facility of the computer. It makes sense then, that the newest frontier upon which the computer has staked its claim is the courtroom.<sup>7</sup> Additionally, much of our evidence now begins as computer data. Indeed, one study found that 93 percent of all information created in 1999 was generated in digital form.<sup>8</sup> The very nature of trial evidence is pushing us in the direction of electronic evidence presentation - at the same time that our population is becoming increasingly computer literate and technologically dependent. Jurors, in fact, are surprised by the fact that technology is new to the courtroom. Jurors expect the use of technology during trials.<sup>9</sup>

Despite the rapid advance in courtroom technology and its many advantages in practice, there is still some lingering resistance to the complete incorporation of computerization, especially in the courtroom. Some of this resistance can be attributed to the normal and perhaps unavoidable implementation time lags associated with change, fear of technology, and a social and psychological fear of change in general.<sup>10</sup> Attorneys have been practicing with paper and photo enlargements in court for years – without computer images – and therefore many lawyers adhere to the old adage that “if it ain’t broke, don’t fix it.”<sup>11</sup> But there is also resistance to using computer technology to its fullest potential in the courtroom at its institutional level. The Federal Rules of Evidence and the Federal Rules of Civil Procedure can stand as barriers to the admissibility of electronic evidence and computer generated exhibits, especially when coupled with a judge’s fear or unfamiliarity with trial technology. That barrier should not be surprising when one considers that most of the current Federal Rules of Evidence were written well before

computer technology proliferated, and therefore are not as computer friendly as they could and perhaps should be.<sup>12</sup>

Instead of operating as outdated barriers, our federal evidentiary and procedural rules should catch up with the rest of society in adapting to the changing realities wrought by the proliferation of computer technology throughout society.<sup>13</sup> Both the Federal Rules of Evidence and the Federal Rules of Civil Procedure should be amended to acknowledge the use of trial technology. The Federal Rules should be augmented in order to define “computer-generated evidence” so that courts and practitioners have clear guidelines to follow. Additionally, the Federal Rules of Civil Procedure should be amended to require pre-trial disclosure of computer generated evidence. This rule would work to the advantage of the parties, the court and the jury. The Federal Rules should, at the least, catch up with the trial technology that is pounding down the doors of our federal courtrooms.

## **THE TECHNOLOGY**

Technology, including courtroom technology, does not exist in a vacuum. A discussion of the potential value of courtroom technology requires consideration of the technology itself. The following is intended to provide a brief description of some of the trial technology currently being applied in American courtrooms, as well as technology that will likely become an integral part of the courtroom and trials in the near future. This section does not attempt to be a comprehensive or detailed discussion of legal or courtroom technologies.

### **First and Second Level Technologies<sup>14</sup>**

#### **Static Images or Still Illustrations**

The first, and easiest type of technology, is static images or still illustrations.<sup>15</sup> This technology consists of static images that are projected onto a large screen or computer panel or to

individual monitors by a computer display system. The projection can be of a chart, graph, colored diagram, two or three dimensional object, photograph, etc. These are non-moving images that are created and/or displayed on a computer as opposed to using a writing utensil and paper. The images are not manipulated in any way.<sup>16</sup> This type of technology is non-controversial and does not present any special evidentiary issues. It is generally used as “demonstrative” or “illustrative” evidence<sup>17</sup> and is presented in the same way as an enlarged picture enhanced on poster-board.

### **Manipulated Static Images**

The second group consists of static images (a letter, contract, chart, photograph, map, etc, stored and projected by a computer), with special computer software annotation capabilities. For example, a paragraph in a contract may be enlarged in proportion to the rest of the contract and a particular sentence in that paragraph may be highlighted in color. Furthermore, the computer software program can add arrows to acknowledge important information, or use circles, check marks, etc., in various ways for emphasis or persuasive effect. The static image is manipulated in order to call attention to important aspects of an exhibit. Manipulated static images are not a great departure from what has been traditionally used in courtrooms throughout the centuries. It is no different than having an attorney enlarge a contract on poster-board and then highlight or draw arrows to important portions. However, with computer technology, these functions are done easier, quicker and are more legible, thereby making it easier for a jury to comprehend. The graphic presentation of the evidence through a computer program is more impressive, articulate, and convincing to a jury than the same presentation done on a chalkboard or poster-board exhibit. However, manipulated static images, like static images, are used as demonstrative evidence and pose no special evidentiary issues.

## **Full Motion Computer Generated Evidence**

The third category, and perhaps the most powerful and therefore most controversial of the currently used technologies, consist of “animations,” “recreations,” and “simulations,” each of which presents actual movement through images.<sup>18</sup> These images are not filmed or videotaped captures of actual events that transpired in the past. Rather, they are dynamic representations of those events.

### **Animations**

An animation is merely a sequence of illustrations that, when filmed, videotaped, or computer generated, creates the illusion that the illustrated objects are in motion.<sup>19</sup> With an animation, there is no intent to recreate or simulate an event. The animation merely demonstratively depicts witness testimony. Although one cannot cross examine the animation itself, one can still cross-examine the witness upon whose testimony the animation was created. Thus, it is required that a witness (1) has personal knowledge of the scene depicted in the animation; and (2) witnessed the event depicted in the animation as it actually transpired.<sup>20</sup> The reliability of the animation depends completely on the witness’s testimony and credibility. The witness can be fully cross-examined regarding the animation which, again, is simply the graphic depiction of the witness’s testimony.

This type of computer-generated evidence generally does not present special admissibility problems. Demonstrative evidence is not normally used during jury deliberations, and courts should apply a less rigorous standard in allowing their use in the courtroom.<sup>21</sup> Some courts have, however, distinguished between animations used to illustrate lay versus expert testimony.<sup>22</sup> The distinctions, however, have only been made because courts have not used uniform terminology when dealing with computer generated evidence. Even the January 2007

edition of American Jurisprudence fails to make meaningful distinctions between animations, re-creations, and simulations.<sup>23</sup>

### **Re-Creations**

Re-creations are just animations in the technical sense – images generated by a computer that produce the image of motion – but the source of the input data is different and more involved. Instead of eye-witness testimony, as with animations, re-creations are created by inputting scientific data into a computer program. Thus, re-creations are derived from a series of images generated on a computer (like an animation), but they rely upon data collected. The input data is not merely a witness’s description of an event that has been witnessed and is now described better through animation (although it certainly could be used that way as a demonstrative exhibit). Instead, the input data must be independently determined and confirmed and then “fed into” the computer. The computer program must then process that input data to generate an image or a result of what “must have happened” given the input data and the scientific assumptions underlying the computer program. The general image must rely on the validity of that input data, the assumptions made by the computer program, the reliability of the computer programmer to correctly input the information, and the computer program to correctly process that information so that the end result can be characterized as a “re-creation” of what must have happened according to the computer program and the input data. The reliability of a re-creation stems not from eyewitness accounts of past events, but from the input data itself (skid marks, or other measurements and scientific readings), along with the reliability of the computer programmer, the assumptions made by the computer program to generate the correct result, and how it depicts via computer imagery what must have actually happened. Both animations and

re-creations are backward-looking in that they always depict an event that has occurred in the past.

### **Simulations**

Simulations are predictive. In essence, a computer simulation creates new evidence from pre-existing data.<sup>24</sup> This is called a computer model or “simulation” because an expert enters a compilation of mathematical formulae or other scientific principles into the computer so that the computer can generate a model – based on the data and scientific assumptions – that the expert will use to form an opinion as to what must have or could have actually happened.<sup>25</sup> The key difference between a simulation and a re-creation or animation is that the former is used by an expert to arrive at his opinion, while the latter is used to illustrate his opinion so that it can be visualized by the jury. An expert bases his opinion testimony on a simulation, as opposed to merely illustrating his opinion to a jury with a re-creation or animation.<sup>26</sup>

### **Second and Third Level Technology**

Second and third level technologies include more esoteric equipment that can be enormously effective for certain kinds of presentations. It is often quite expensive, and its use needs to be examined carefully to determine if its benefits outweigh any negative impact on the courtroom and trial proceedings and the cost. The two second and third level technologies described here have never been used in a real court proceeding. However, technology is infiltrating our courtrooms at a record pace. It is realistic to believe that technology such as holographs and virtual reality systems will become a courtroom reality in the near future.

### **Holographs**

A holograph is a three-dimensional image created by specially manipulated laser beams. The image seems to hang in midair. If done correctly, it is an exact replica of the real thing,

shown in three dimensions. Motion can also be reproduced. Three-dimensional displays correspond closely to real life experiences because the human eye perceives three dimensions easily. Two-dimensional displays require interpretation to imagine what the thing being displayed looks like in real life. Much can be lost in this interpretation, so that two people looking at a single diagram may have different perceptions of the object portrayed in the diagram. That rarely happens when viewing the object itself because the third dimension adds considerably more information. This is the reason lawyers prefer, in most instances, to bring the real thing to the courtroom.<sup>27</sup>

Because holographs have not been used in a real trial setting yet, it is still unclear exactly how they will affect the Federal Rules. However, it can be presumed that holographs will be used for both demonstrative and substantive purposes. For example, a medical expert in a medical malpractice case may wish to explain the anatomy of the muscles in the back. He would be able to use a holograph that depicts the back and encompassing muscles in order to explain his testimony to the jury.<sup>28</sup> Furthermore, holographs have the potential of being used in the same way as a re-creation. A full three dimensional re-creation could theoretically be created to depict a scene that actually occurred. This would do more than merely depict a witness's testimony. The holograph would be based on actual data inputs, mathematical formulas and scientific assumptions.

### **Virtual Reality Systems**

Virtual reality is an often overused expression that is most often employed to describe one form or another of computer graphical re-creation of a given location. In its more basic form, virtual reality gives the user the ability to move through an accurate image of a place as displayed on a computer monitor. Immerse Virtual Environment Technology is the most current

and most dramatic of the virtual reality systems. Immerse Virtual Environment Technology would allow the judge, jurors, and witnesses to experience a re-creation as if he or she was really there. 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.”<sup>29</sup> Rather than controlling images on a screen, the witness is in the recreation, which then reacts to the actual physical movements of the witness. The witness wears a set of computer-linked goggles that transmits to the wearer’s eyes what the witness would actually see if he or she were to be physically present in the computer recreated room or location. To the witness, it actually seems as if he or she has been physically transported to the virtual environment. Courtroom participants see what the witness sees via projection on courtroom screens.<sup>30</sup>

Immerse Virtual Environment Technology also relies on data input into a computer program, mathematical formulas and scientific assumptions. It therefore will be subject to many of the same evidentiary issues as that of a re-creation. The difference will likely be that the virtual reality system is much more persuasive and will raise more Rule 403 objections.

## **ADVANTAGES AND DISADVANTAGES OF TECHNOLOGY**

### **Advantages**

The appropriate use of technology to display or play evidentiary exhibits or illustrative aids changes the dynamic in a courtroom in productive and helpful ways. For judges, technology can increase opportunities to control the proceedings, set time limits, and decide matters expeditiously.<sup>31</sup> For jurors, it can increase the sense of participation and improve the understanding of the facts. Juries have a growing sophistication in visual imagery. Although blow-ups and charts have been used predominantly for illustrative or substantive purposes, the

expectations and demands of today's fact-finders dictate that litigators pay attention to several issues in dealing with demonstrative evidence: (1) jurors have a constant need for visual stimulus to reinforce verbal content; (2) juror retention increases with the use of interactive demonstrative evidence; and (3) jurors are growing increasingly demanding discerning and expert in the use of media and technology.<sup>32</sup> Graphical presentations are the trial lawyer's opportunity to communicate in a way that jurors, increasingly immersed in visual stimuli in their everyday lives, are familiar with and have come to expect.<sup>33</sup>

Courtroom technology allows advocates to clarify and synthesize trial information to increase the jury's interest, comprehension and memory retention. Studies show that visual presentation is more effective than verbal communication, and that verbal communication is most effective when coupled with a visual presentation.<sup>34</sup> Studies show that jurors retain 70% of what they hear three hours later and only 10% of what they hear 72 hours later. However, if the method of presentation involves both telling and showing, jurors retain 85% after three hours and 65% after 72 hours. As one professional photographer put it, "pictures are images, directly entering the bloodstream, bypassing the brain."<sup>35</sup> Digital displays also streamline witness examination, expedite the flow of relevant information to the judge and jurors, and facilitate the drawing of connections between the testimony of different witnesses.<sup>36</sup> In addition, jurors become more involved in the proceedings when they can see the exhibits clearly and follow the lawyers' presentation more easily. Properly presented displays on monitors allow jurors to read at their own pace without embarrassment, rather than passing an exhibit from hand to hand without time to study it."<sup>37</sup>

For lawyers, the faster pace, coupled with the need to respond to visual cues for objections as well as the traditional oral cues, puts a premium on a concise case theory and

thorough preparation; there is less time for “making it up” as one goes along.<sup>38</sup> Jurors also appreciate the generally faster pace of trials using technology. They become impatient when lawyers spend time digging through piles of paper looking for exhibits. In addition, some experts believe that jurors who have seen electronic displays work better as a group because they have all experienced the trial “together” and are more likely to have a common understanding of the evidence.<sup>39</sup>

At its foundation, courtroom technology is a means for putting evidence before everyone in the courtroom – the judge, the jurors, the opposing lawyers, the courtroom support staff, and even onlookers – at the same time. The displays, usually on monitors – convey many kinds of information more efficiently. Courtroom technology is also a means to draw attention to particular points, to emphasize certain aspects of the evidence, and to make visible that which otherwise would exist only as a mental picture formed from words spoken by an advocate or a witness.

Good technology installations make court proceedings more efficient. Judges have more flexibility to impose time limits on lawyers because technology assists in making presentations move along more predictably. Lawyers can complete openings, closings, and direct and cross examinations in less time than it would take using paper documents supplemented by enlargements or illustrations propped on an easel. Electronic displays allow exhibits to be previewed quickly on the bench when objections are raised. . . Technology installations also can make cross examination go faster because there are no long pauses to find the page and line in deposition transcripts, and video clips eliminate quarrels about whether what appears in print captures what was actually said.<sup>40</sup> Most who work in this area agree that evidence presentation

technology saves at least a quarter to a third of a traditional trial's time (some say up to fifty percent).<sup>41</sup>

### **Cases In Which Technology Has Played a Significant Role in the Outcome**

The first use of a full motion generated exhibit at trial was entitled "Hexane Explosion," and was utilized in a Kentucky case in which a gas leak triggered multiple explosions in Louisville.<sup>42</sup> If a re-creation had not been used "the jury would have had to digest cumbersome traditional forms of demonstrative evidence needed to make the same points: diagrams of the chemical plant, maps of the city sewer system, eyewitness accounts of the explosion, and expert testimony on gas chemistry."<sup>43</sup> Instead, with the use of a re-creation, the jury was ostensibly able to "see what happened." Two days after the jury was shown the computer re-creation of the hexane explosion, the defendant settled the case for over \$18 million.<sup>44</sup>

In *Connors v. United States*,<sup>45</sup> both sides used computer re-creations and animations in a case surrounding the crash of Delta Flight 191 on August 2, 1985.<sup>46</sup> The case involved the death of 136 passengers and crew members, as well as one person on the ground, after the airliner passed through a small-but-violent wind system called a "microburst."<sup>47</sup> In the fourteen month trial between Delta Airlines and the United States government, \$150 million to \$200 million in wrongful death claims hung in the balance.<sup>48</sup> In computer re-creations, the United States Justice Department input 40 different parameters (including acceleration, pitch, roll, and heading) to create a three-dimensional image of the planes last minutes, fused with the crew's recorded voices and weather conditions.<sup>49</sup> Roy Krieger, one of the attorneys then working for the Justice Department, described the role of the computer simulations as "pivotal."<sup>50</sup> The federal district judge found in favor of the United States.<sup>51</sup>

In *Schmutz v. Boulder Community Hospital*,<sup>52</sup> the parents of Peter Schmutz, an epileptic, brought a products liability and negligence action against the hospital and surgeon for injuries while in surgery.<sup>53</sup> The surgeon used a device called a Smith perforator to drill a hole in Schmutz's skull. The drill was designed to stop when it no longer encountered solid matter, but it failed to do so during Schmutz's procedure. The drill perforated the protective brain membrane and severed branches of a brain artery which had wrapped around the drill bit.<sup>54</sup> As a result, Peter Schmutz suffered a massive stroke, leaving him permanently brain damaged, paralyzed on the left side of his body, and partially blind.<sup>55</sup> Throughout the trial, counsel for plaintiff attempted to explain to jurors exactly what had occurred, yet they offered only anatomical diagrams as visual illustrations.<sup>56</sup> The jury returned a verdict for the defendants, and that verdict was affirmed by the appellate court.<sup>57</sup>

The Colorado Supreme Court reversed the verdict, however, and ordered a new trial.<sup>58</sup> The plaintiff's hired new counsel who presented a computer re-creation to the jury that demonstrated a Smith perforator boring into a skull and severing the brain artery.<sup>59</sup> In this second trial, the jury awarded the plaintiff \$4.5 million in actual damages for negligence against the hospital, as well as \$1.5 million in punitive damages against the manufacturer of the drill.<sup>60</sup>

These cases are mere examples of how full motion computer generated evidence and trial technology have played an integral role in the outcome of jury trials in which significant damages are claimed. There are many other analogous cases.

### **Disadvantages**

While the use full motion computer generated evidence and other forms of trial technology can be impressive, it is argued that they can also be used to manipulate the events being shown, either intentionally or unintentionally.<sup>61</sup> As one author explains, "[j]ust as a writer

uses punctuation, the selective use of zoom, close-up and fadeout can accent different points. A constantly moving object can appear to change speed or direction by merely changing the point from where it is viewed.”<sup>62</sup> There is real danger that computer generated evidence may be erroneous, misleading, or unreliable. The underlying data may be full of errors or discrepancies, or it may, for one reason or another, be irrelevant or improper as evidence.<sup>63</sup> The data may have been fed into the computer inaccurately.<sup>64</sup> The computer may have been improperly programmed or not programmed to detect errors.<sup>65</sup> The assumptions on which the program is based may be wrong, illogical, or simply irrelevant to the issues to be proved.<sup>66</sup> As each frame represents innumerable calculations and assumptions, each frame has the potential for intentional or unintentional miscalculation.<sup>67</sup> The possibility of miscalculations and misleading computer generated evidence is a real and major concern, as jurors tend to rely on computer generated evidence as representations of fact, not simply as a party’s theory of the case.<sup>68</sup>

However, the fear that computer generated evidence can be unreliable based on incorrect data and calculations or improperly programmed computers can all be addressed by requiring that the underlying data and calculations be disclosed in advance of trial. Amendments to the Federal Rules of Civil Procedure acknowledging and requiring disclosure of animations and simulations would address and minimize the fear that computer generated exhibits were being used in a way which manipulates the facts and juror’s perceptions.

From a social policy perspective, there is also fear that the use of computer generated exhibits and the high expense of trial technology may exacerbate existing inequities between litigants and therefore be unfair to less wealthy litigants who cannot afford them. This problem is not new. Inequity concerns began long before litigants started considering the use of technology at trial. Wealthy litigants have the ability to hire more expensive expert witnesses,

expensive jury consultants, and higher priced lawyers in an effort to gain a litigation advantage. It is clear that economic inequality is a long-standing problem in the American legal system. However, beyond the normal and inevitable inequalities in our legal system, there is a fear that with today's rapid technological advances, large firms will leave small firms and solo practitioners in the dust, and that wealthy litigants will have an unfair advantage over poor litigants.

However, in 1997 and 1998, the American Bar Association Legal Technology Resources Center ("ABA") conducted two surveys.<sup>69</sup> One was directed at large firms of seventy-five or more lawyers, and the other at firms of twenty or fewer lawyers.<sup>70</sup> Both surveys concluded that small and large firms are using cutting-edge technology in their practices.<sup>71</sup> In fact, the ABA further found that while smaller firms approach new technology with more caution than large firms, they nonetheless embrace it.<sup>72</sup> In addition, there is a strong argument that the federal judiciary's embrace of technology has actually leveled the playing field.<sup>73</sup> With built in technologies in our federal courtrooms, there is no longer the disparity between large and small firms where the available resources are vastly different. The installation of new technology is argued to equalize what would otherwise be a "digital divide" if the parties were required to provide their own systems.<sup>74</sup>

#### **CURRENT ADMISSIBILITY STANDARDS FOR COMPUTER GENERATED EVIDENCE**

The Federal Rules of Evidence offer only the broadest guidance with respect to the new methods and techniques brought to the courts along with new technology. Federal Rules of Evidence 102 and 611(a) can be read and interpreted to embrace new technology. Rule 102 provides: "*Purpose and Construction:* These rules shall be construed to secure fairness in administration, elimination of unjustifiable expense and delay, and promotion of growth and

development of the law of evidence to the end that the trust may be ascertained and proceedings justly determined.” Rule 102 appears to invite judges to allow new forms of displays that help develop better juror understanding of the evidence and move trials along more efficiently. Rule 611(a) asks only that in exercising their discretion, judges be mindful of whether the illustrative aids brought to the courtroom by lawyers are effective for the ascertainment of the truth.

Specifically, Rule 611(a) provides: “*Control by Court*: The court shall exercise reasonable control over the mode and order of interrogating witnesses and presenting evidence so as to (1) make the interrogation and presentation effective for the ascertainment of truth, (2) avoid needless consumption of time, and (3) protect witnesses from harassment or undue embarrassment.”<sup>75</sup>

Despite the positive and progressive approach of Rules 102 and 611(a), the Federal Rules of Evidence do not specifically address computer generated evidence of any kind. Therefore, the rules applicable to high-tech visual and motion displays are the same ones governing the presentation of traditional evidence. Static Images and Manipulated Static Images do not tend to pose any special admissibility problems as they can be characterized in the same way as an image on a poster-board. However, the real debate over admissibility begins with detailed animations, re-creations and simulations, and will likely continue with holographs and virtual reality systems. Although these exhibits are merely graphic, they are not the real events captured on film or video. They are reconstructed images of what happened *according to the witness* (animations), *or according to input data* (re-creations, simulations, virtual reality systems), which, like any testimony or data in court, may or may not be credible.<sup>76</sup>

Basically, to be admissible, evidence must be relevant to some fact of consequence to the case (Rule 401)<sup>77</sup>; its probative value must not be substantially outweighed by the risk of unfair

prejudice, confusion of the issues, or misleading the jury (Rule 403)<sup>78</sup>; it must be what its proponent claims that it is (it must be authenticated, Rule 901); it must not violate the rules against hearsay (Rules 801 and 802); it must conform to the rules governing the presentation of lay (Rules 602 and 701) or expert (Rules 702 through 705) testimony as the case may be; and it must not violate any other rule pertaining to the presentation of demonstrative or other evidence (for example, Rules 102, 106 and 611).<sup>79</sup>

Due to the growing prevalence of trial technology and computer-generated exhibits, the Federal Rules of Evidence need to catch up with the technology occurring in American courtrooms. Specifically, computer generated exhibits should be mentioned and defined in the text of the rules of themselves. Additionally, the advisory notes to the Rules should draw attention to the fact that there is a clear difference between computer generated evidence used for demonstrative versus evidentiary purposes; and that demonstrative evidence should not have to go through the rigorous authentication requirements that substantive evidence must pass through. While computer generated exhibits can be similar to traditional evidence, they have important differences. In addition, more judges should fully accept, as an interpretive manner, the legitimate place of CGEs as helpful and admissible exhibits in the courtroom.<sup>80</sup>

## **AMENDING THE FEDERAL RULES OF EVIDENCE & FEDERAL RULES OF CIVIL PROCEDURE TO ADAPT TO COMPUTER GENERATED EVIDENCE**

### **A. Recommended Amendment to the Federal Rules of Evidence**

Are the current evidentiary rules and practices sufficient to deal with technology-augmented trials? At its heart, American evidentiary law is rule oriented. Whether common law or promulgated rule, our evidentiary law prizes certainty and stability. Although everyone recognizes the often extraordinary degree of discretion vested in trial judges to decide concrete

evidentiary issues, practitioners demand that evidentiary law and practice be based upon a substantial core of clear cut rules.<sup>81</sup> In that spirit and in the spirit of Federal Rule of Evidence 102, which states that “these rules shall be construed to secure fairness . . . and promotion of growth and development of the law of evidence to the end that the truth may be ascertained and proceedings justly determined,” the following proposals are made.

### **Acknowledge and Define Computer Generated Evidence**

First, the Federal Rules of Evidence should be amended in order to acknowledge the use of trial technology, and more specifically, computer generated exhibits. On July 1, 1998, Maryland took the first step in this direction and added a new rule governing computer generated evidence. Section (a) of Rule 2-504.3 of the Maryland Rules of Procedure provides:

(a) **Definition--Computer-Generated Evidence.** "Computer-generated evidence" means (1) a computer-generated aural, visual, or other sensory depiction of an event or thing and (2) a conclusion in aural, visual, or other sensory form formulated by a computer program or model. The term does not encompass photographs merely because they were taken by a camera that contains a computer; documents merely because they were generated on a word or text processor; business, personal, or other records or documents admissible under Rule 5-803 (b) merely because they were generated by computer; or summary evidence admissible under Rule 5-1006, spread sheets, or other documents merely presenting or graphically depicting data taken directly from business, public, or other records admissible under Rules 5-802.1 through 5-804.

The Federal Rules of Evidence should similarly acknowledge and define computer generated exhibits. Within the advisory comments to this section, the Federal Rules should distinguish between a computer generated exhibit used for demonstrative versus evidentiary purposes. A demonstrative exhibit (also referred to as an illustrative exhibit) cannot qualify as evidence and is not specifically mentioned in the Federal Rules of Evidence. Demonstrative evidence can be characterized as a visual aid that helps explain admitted evidence, witness testimony, or attorney argument.<sup>82</sup> Before being displayed to the jury, the exhibit must normally

be qualified as useful. This foundation includes either its utility in assisting the witness to present testimony, or its utility in assisting the jury to understand the testimony being presented. When dealing with animations, the advisory notes should require that an animation be deemed “substantially similar” to the actual event in order to be properly authenticated. Demonstrative aids are not allowed to be used by the jury during deliberations, as they have nothing to do with whether the existence of any fact or consequence to the determination of the action is more or less probable. The demonstrative exhibit is to be used solely for the purpose of helping the witness convey information to the jury in an understandable fashion.<sup>83</sup>

An evidentiary exhibit, on the other hand, is an exhibit that will be admitted into evidence. To be admitted, it must have a foundation that includes the competence of the witness to testify about the exhibit, the relevance of the exhibit to an issue in the case, the identification of the exhibit distinguishing it from all other things, and the trustworthiness or authentication of the exhibit. Evidentiary exhibits may be used by the jury during deliberations.<sup>84</sup> The difference between demonstrative and evidentiary exhibits is important for admissibility purposes and should be included in the advisory notes to any definition of computer generated exhibits or changes to the Rules of Evidence. Due to the differences in the purpose of demonstrative and evidentiary exhibits, any proposed definition regarding computer generated exhibits should distinguish between the uses of the exhibits, as the admissibility requirements will inevitably differ.

An example of the way in which evidentiary and demonstrative exhibits differ in relation to computer generated exhibits can be illustrated through the authentication process under the Federal Rules of Evidence. Animations, for example, are used as demonstrative evidence. They are merely illustrative of a witness’s related testimony. Therefore, in order to authenticate the

animation, the witness or expert should testify that the animation is a “fair and accurate portrayal” of what the expert or witness is testifying about, or that the animation is “substantially similar” to the event in question. Re-creations and simulations, on the other hand, are more difficult to authenticate because they are based on mathematical models and therefore go beyond the mere pictorial depiction of a witness’s testimony. For re-creations and simulations that are used as substantive, or evidentiary evidence, one practitioner has recommended that counsel should take the following appropriate steps to satisfy authentication:

- (1) The sources of the input data are accurate, reliable, and trustworthy in their own right;
- (2) The assumptions used to quantify non-measured items are reasonable, consistent with the laws of nature and are bracketed at the upper and lower ends;
- (3) commercially recognizable hardware is employed;
- (4) commercially recognized software was employed that has the capacity of executing those applications it was intended to perform and is subject to appropriate input controls, processing controls and output controls;
- (5) no relevant data have been overlooked; and
- (6) the data were “inputted”, processed and retrieved by properly trained and supervised technicians.<sup>85</sup>

The point is that demonstrative computer generated exhibits (animations) and evidentiary computer generated exhibits (re-creations and simulations) should not be subject to the same rules of admissibility, and therefore, the Federal Rules of Evidence should distinguish between the two in its definition of computer generated exhibits. An animation should not be subjected to the same rigorous authentication gauntlet as is a simulation being used for evidentiary purposes.

There is no need to undertake a drastic overhaul of the Federal Rules. Most of the rules are capable of dealing with technology issues, dependant on a judge’s interpretation of the rules. Rather than completely re-vamping the Federal Rules of Evidence, the issue should be whether

the Rules of Evidence are being utilized in such a way that they stand in the way of the use of technology. By creating a definition for computer-generated evidence and by creating an advisory note that contemplates the different uses of computer-generated evidence, courts will be in a better position to act uniformly and fairly when dealing with trial technology.

### **Recommended Amendments to the Federal Rules of Civil Procedure**

Pre-trial disclosure of evidentiary computer generated exhibits should be a specific requirement under the Federal Rules of Civil Procedure.<sup>86</sup> While the current Federal Rules of Civil Procedure already have mandatory disclosure requirements,<sup>87</sup> which may encompass computer generated evidence, a specific rule would be beneficial. Special consideration should be given to the disclosure of evidentiary computer-generated exhibits.<sup>88</sup> These are normally complex displays, constructed by experts, and can have an enormous impact on jurors. They may have been put together to sell a particular theme, case theory, or point of view and may be based on considerable jury and market research. A good re-creation or simulation often has a presence in a courtroom akin to a separate witness. Even if the cross-examiner does a good job in discrediting the expert witness who sponsored the exhibit, the exhibit may “testify” for itself – that is, it may make sense to jurors and be given significant weight regardless of the status of its foundation. For these reasons, the cross examiner needs a fair opportunity to deal with the computer generated exhibit itself. The cross-examiner may need to construct a counter-re-creation, or de-construct and modify the re-creation to show its weaknesses. If an expert has already been retained and has cleared the necessary time, it takes four to eight weeks to deal with complex computer-generated exhibits, depending on the nature of the assumptions and how they are expressed.

Therefore, mandatory disclosure of evidentiary computer-generated exhibits provides sufficient time for the opponent to conduct appropriate discovery of the exhibit itself and affords a meaningful opportunity to depose and cross examine the persons creating the exhibit. The Federal Rules of Civil Procedure should look to the Maryland Rules of Procedure as an example. Maryland Rule 2.504.3 provides in part:

**(b)Notice.**

(1) Except as provided in subsection (b)(2) of this Rule, any party who intends to use computer-generated evidence at trial for any purpose shall file a written notice within the time provided in the scheduling order or no later than 90 days before trial if there is no scheduling order that:

(A) contains a descriptive summary of the computer-generated evidence the party intends to use, including (i) a statement as to whether the computer-generated evidence intended to be used is in the category described in subsection (a)(1) or subsection (a)(2) of this Rule, (ii) a description of the subject matter of the computer-generated evidence, and (iii) a statement of what the computer-generated evidence purports to prove or illustrate; and

(B) is accompanied by a written undertaking that the party will take all steps necessary to (i) make available any equipment or other facility needed to present the evidence in court, (ii) preserve the computer-generated evidence and furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and (iii) comply with any request by an appellate court for presentation of the computer-generated evidence to that court.

In addition, the Federal Rules of Civil Procedure should go a step farther than the Maryland Rules and should require that the party using computer generated evidence also disclose the underlying data used to create the computer-generated evidence. The Maryland rule provides that computer-generated evidence must be disclosed no later than 90 days before trial, and therefore allows counsel to investigate the underlying facts and theories supporting the computer-generated evidence. However, without also disclosing the underlying data used to create the computer-generated evidence, opposing counsel will not be able to tell whether there are errors in the computer generated evidence.

The disclosure requirements minimizes any claim the underlying data for the computer-generated evidence is inaccurate or wrong. Additionally, it eliminates claims for Rule 403 danger of unfair prejudice based on unfair surprise. In addition, the rule promotes courtroom efficiency. Early discovery affords an opportunity to obtain stipulations or court rulings on admissibility long before trial, thereby eliminating interruptions during the trial to resolve disputes through the time-consuming process of objections, side-bar exchanges and legal argument. Early pre-trial discovery enhances the flow of the trial because many additional trial inefficiencies can be eliminated, such as the marking of every single exhibit during trial. To the extent that stipulations are made because there was ample time before trial, courts can also forego the painstaking process of “laying the foundation” for every exhibit, even for complicated computer-generated exhibits.

Pre-trial discovery of computer-generated exhibits is also advantageous for the parties involved. An attorney can more easily and readily prepare her case for trial using computer-generated evidence if she knows in advance that the exhibit will be admitted. With pre-trial discovery of the exhibit, the attorney can avoid spending valuable resources and time on a computer-generated exhibit and corresponding theory that is deemed, before trial, to be inadmissible. Additionally, without assurances before trial that computer-generated exhibits will or will not be allowed in evidence at trial, counsel will be forced to prepare two cases. The attorney will be forced to prepare one case with computer-generated evidence, and another without computer-generated evidence. Preparation for two cases is both a valuable drain on time and resources for both an attorney and her client.

Finally, the notice section provides the judge with flexibility in ruling. In lieu of simply ruling to admit or prohibit a computer-generated exhibit, a judge may require modifications to it or impose conditions relating to its use.

The Maryland notice and mandatory disclosure rule regarding computer-generated exhibits gives an advantage to the court and to both parties. It gives a judge flexibility, avoids claims of unfair prejudice and unfair surprise, and allows a party time and assurance in planning and strategizing a case. The Federal Rules of Evidence should, therefore, implement changes similar to Maryland Rule 2.504.3.

## **CONCLUSION**

In the twenty-first century, the computer has become a virtual member of our society. Its ubiquitous presence touches practically every aspect of our lives. Therefore, it is not surprising that the computer, and its related technologies, have entered the trial lawyer's domain and constitute an important weapon for litigators. Trial technology and computer generated exhibits are important and valuable tools for the advocacy system. They promote juror comprehension, attention and retention, and significantly decrease trial time. However, in order for trial technology to work effectively and with justice in the American courtroom, some institutional changes need to be made. As stated by Bill Gates, "when change is inevitable, you must spot it, embrace it, and find ways to make it work for you."<sup>89</sup>

While most technology-related evidentiary questions can be resolved under existing evidentiary rules, there are some technology issues and Rule interpretations that need to be addressed on an institutional level. The Federal Rules of Evidence should be amended in order to acknowledge and address the use of trial technology in our federal courtrooms; and there

should be a clear distinction in the advisory notes between computer-generated exhibits used for demonstrative versus evidentiary purposes.

The other requirement likely to be of consequential importance is that of advance notice by a proponent of the intent to use technology produced or presented evidence. Notice, along with pretrial disclosure would go a long way to moot concerns about digital alteration and would permit considered decisions about in-court practices that could otherwise affect admissibility decisions.

## ENDNOTES

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<sup>1</sup> Timothy W. Cerniglia, *Computer Generated Exhibits – Demonstrative, Substantive or Pedagogical – Their Place in Evidence*, 18 AM. J. TRIAL ADVOC. 1, 1 (1994).

<sup>2</sup> *Id.*

<sup>3</sup> Fred Galves, *Where the Not So Wild Things Are: Computers in the Courtroom, The Federal Rules of Evidence, and the Need for Institutional Reform and More Judicial Acceptance*, 13 HARV. J.L. & TECH 161, 165 (2000).

<sup>4</sup> Elizabeth C. Wiggins, Meghan A. Dunn, and George Cort, *Federal Judicial Center Survey on Courtroom Technology, December 2003*. Federal Judicial Center, Washington, D.C., available at <http://www.fjc.gov>.

<sup>5</sup> *Id.*

<sup>6</sup> Adam T. Berkoff, *Computer Simulations in Litigation: Are Television Generation Jurors Being Misled?*, 77 MARQ. L. REV. 829, 829 (1994).

<sup>7</sup> *Id.*

<sup>8</sup> Frederic I. Lederer, *Courtroom Technology: A Status Report*, William and Mary Law School (2005), available at <http://www.legaltechcenter.net/publications/articles/status.pdf>, see also Joint Administrative Office/Department of Working Group on Electronic Technology in the Criminal Justice System 3(2003), (citing Kenneth J. Withers, *Electronic Discovery: The Challenges and Opportunities of Electronic Evidence*, Presentation to Federal Judicial Center, National Workshop for Magistrate Judges, July 23-25, 2001).

<sup>9</sup> Interview with Judge David W. McKeague, 6th U.S. Circuit Court of Appeals, in Lansing, MI (Mar. 21, 2007) (Based on his conversations/interviews with jurors as District Judge for the United States District Court for the Western District of Michigan.)

<sup>10</sup> See Galves, *supra* note 3, at 170-71.

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> FEDERAL JUDICIAL CENTER, EFFECTIVE USE OF COURTROOM TECHNOLOGY: A JUDGE'S GUIDE TO PRETRIAL AND TRIAL, 2-4 (2001).

<sup>15</sup> See Paul A. Rajkowski & Paul D. Krueger, Admissibility of Computer Evidence, *Toxics L. Rep.*, Mar. 6, 1991, at 1243, 1244.

<sup>16</sup> See Galves, *supra* note 3, at 178; see also Cerniglia, *supra* note 1, at 4-5.

<sup>17</sup> Demonstrative Evidence is not evidence itself; it is simply a visual aid that helps explain admitted evidence, witness, testimony, or attorney argument. It is addressed directly to the senses and is concerned with real objects that illustrate some verbal testimony, but has no independent probative value in itself. See BLACK'S LAW DICTIONARY (7<sup>th</sup> ed. 1999).

<sup>18</sup> See Galves, *supra* note 3, at 180.

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<sup>19</sup> Elizabeth C. Wiggins, *The Courtroom of the Future is Here: Introduction to Emerging Technologies in the Legal System*, 28 LAW & POL'Y, 182, 185 (2006).

<sup>20</sup> Some courts require that the animation be “substantially similar” to the events that occurred; while others require that the animation be a “fair and accurate representation” of the events.

<sup>21</sup> 57 AM JUR. 3D PROOF OF FACTS § 455 (2007).

<sup>22</sup> *Id.* at \*17-19; *see* People v. McHugh, 476 N.Y.S.2d 721 (Sup. Ct. 1984) (court requires animations depicting laypersons testimony to be relevant, an accurate representation of the testimony, and that it aid the jury’s understanding); *see also* Hinkle v. Cit of Clarksburg, 81 F.3d 416 (4<sup>th</sup> Cir. 1996) (court does not require animation depicting expert testimony to possess the high degree of similarity that a simulation purporting to show the actual event does. The simulation need only portray the expert’s opinion accurately).

<sup>23</sup> 57 AM JUR. 3D PROOF OF FACTS at 18-19; (article interchanges use of animations and simulations in describing admissibility standards. The article describes the difference to be made not in terms of demonstrative versus substantive evidence, but between lay and expert testimony. This distinction is erroneous, as an expert can use a demonstrative animation in the same way as a lay person, and the animation should be subject to the same basic admissibility standards. The distinction should be made by determining what purpose the full motion computer generated evidence is being used for).

<sup>24</sup> *Id.* at 17.

<sup>25</sup> *See* Wiggins, *supra* note 19, at 185.

<sup>26</sup> *See* Cerniglia, *supra* note 1, at 4-5.

<sup>27</sup> *See* FEDERAL JUDICIAL CENTER, *supra* note 14, at 37.

<sup>28</sup> Using the holograph to illustrate the expert’s testimony would be demonstrative.

<sup>29</sup> *See* Wiggins, *supra* note 19, at 185.

<sup>30</sup> Fredric I. Lederer, *The Potential Use of Courtroom Technology In Major Terrorism Cases*, 12 WM. & MARY BILL RTS. J. 887, 899-900 (2004).

<sup>31</sup> *See* FEDERAL JUDICIAL CENTER, *supra* note 14, at 50-55.

<sup>32</sup> H. Mitchell Caldwell, L. Timothy Perrin, Richard Cabriel, & Sharon R. Gross, *Primacy, Recency and Pathos: Integrating Principles of Communication Into the Direct Examination*, 76 NOTRE DAME L. REV. 423, 491 (2001).

<sup>33</sup> Brian Carney & Neil Feigenson, *Visual Persuasion in the Michael Skakel Trial: Enhancing Advocacy Through Interactive Media Presentations*, 19 SPG CRIM. JUST. 22, 23 (2004).

<sup>34</sup> *See* Berkoff, *supra* note 6, at 845.

<sup>35</sup> *Id.* (quoting J. Ric. Gass, *Defending Against Day in the Life Videos*, PLI Order No. H4-128, available in Westlaw, TP-All database, at \*3 (1992)).

<sup>36</sup> *See* Carney, *supra* note 33, at 34.

<sup>37</sup> *See* FEDERAL JUDICIAL CENTER, *supra* note 14, at 52.

<sup>38</sup> *Id.*

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<sup>39</sup> *Id.*

<sup>40</sup> *Id.* at 54-55

<sup>41</sup> See Lederer, *supra* note 8, at \*7.

<sup>42</sup> See Berkoff, *supra* note 6, at 845; (quoting Sharon Panian, *Comment, Truth, Lies, and Videotape: Are Current Federal Rules of Evidence Adequate?* 21 SW. U. L. REV. 1199, 1211 (1992).

<sup>43</sup> See Berkoff, *supra* note 6, at 845.

<sup>44</sup> *Id.*

<sup>45</sup> 720 F. Supp. 1258 (N.D. Tex. 1989), *aff'd* In Re Air Crash at Dallas/Ft. Worth Airport, 919 F.2d 1079 (5th Cir.), *cert denied*, *Connors v. United States*, 112 S. Ct. 276 (1991).

<sup>46</sup> *Id.*

<sup>47</sup> *Id.*

<sup>48</sup> *Id.*

<sup>49</sup> *Id.* at 54. The flight recorder used on Delta Flight 191 was a newly designed “digital flight-data recorder;” the first of its type to record an airline crash after the craft has passed through a microburst. The final simulation showed not only the aircraft’s movement with respect to the storm, but also displayed the cockpit instrument readings on screen. Packaged together with the voices of the crew, “the various animations created an eerie feeling of being there, of seeing and hearing what the crew experienced.”

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> No. 83 Civ. 1164 (Boulder 20th Dist. Ct. March 26, 1992), (*cited* in J. Stratton Shartel, *The Changing Litigation Landscape: Three Winning Uses of Technology*, 6 No. 5 INSIDE LITIG. \*11-12 (1992).

<sup>53</sup> See Shartel, *supra* note 52, at 11-12.

<sup>54</sup> *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> *Id.* at 13.

<sup>58</sup> *Id.*

<sup>59</sup> *Id.* at 14.

<sup>60</sup> *Id.* at 18-19.

<sup>61</sup> See Berkoff, *supra* note 6, at 849-50.

<sup>62</sup> Paul Marcotte, *Animated Evidence, Delta 191 Crash Re-Created Through Computer Simulations at Trial*, A.B.A. J., Dec. 1989, at 52.

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<sup>63</sup> See Berkoff, *supra* note 6, at 829.

<sup>64</sup> *Id.*

<sup>65</sup> *Id.*

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

<sup>68</sup> See Wiggins, *supra* note 19, at 186.

<sup>69</sup> Michael E. Heintz, *The Digital Divide and Courtroom Technology: Can David Keep Up With Goliath*, 54 FED. COMM. L. J. 567, 580 (2002), (citing ABA, Large Law Firm Technology Survey: 1998 Survey Report 1 (1998); and citing ABA, Small Law Firm Technology Survey, 1997 Survey Report 1 (1997)).

<sup>70</sup> See Heintz, *supra* note 69, at 580.

<sup>71</sup> *Id.*

<sup>72</sup> *Id.*

<sup>73</sup> *Id.* at 568.

<sup>74</sup> *Id.*

<sup>75</sup> FED. R. EVID. 611(a).

<sup>76</sup> See Galves, *supra* note 3, at 182.

<sup>77</sup> FED. R. EVID. 401 provides: “Relevant Evidence” means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.

<sup>78</sup> FED. R. EVID. 403 provides: “Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by consideration of undue delay, waste of time, or needless presentation of cumulative evidence.

<sup>79</sup> See Carney, *supra* note 33, at 29.

<sup>80</sup> See Galves, *supra* note 3, at 190.

<sup>81</sup> Fredric I. Lederer, *Some Thoughts on the Evidentiary Aspects of Technologically Presented or Produced Evidence*, 28 SW. U. L. REV. 389, 390-91 (1999).

<sup>82</sup> See Galves, *supra* note 3, at footnote 137.

<sup>83</sup> *Id.*

<sup>84</sup> See FEDERAL JUDICIAL CENTER, *supra* note 14, at 120.

<sup>85</sup> Edward A. Hannan, *Computer-Generated Evidence: Testing the Envelope*, 63 DEF. COUNS. J. 353, 358 (1996).

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<sup>86</sup> The Federal Rules of Civil Procedure were amended in 2006 to deal with E-Discovery. See Rules 16, 26, 33, 34, 37 and 45. However, the amendments to the Rules of Civil Procedure deal specifically and only with “e-discovery” and do not address computer generated evidence created specifically for use at trial.

<sup>87</sup> See FED. R. CIV. P. 26(a)(1), (a)(2), and (a)(3).

<sup>88</sup> In addition to holographs and virtual reality systems.

<sup>89</sup> Katherine A. Godden, *Cartoon Criminals: The Unclear Future of Computer Animation in the Minnesota Criminal Courtroom – State v. Stewart*, 30 WM. MITCHELL L. REV. 355, 355 (2003), (citing Frank Herrera, Jr & Sonia M. Rodriguez, *Courtroom Technology: Tools for Persuasion*, 35 MAY-TRIAL 66 (1999) (quoting Bill Gates).