Admitting Into Evidence Computer Animations and Simulations

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I. Introduction and Definitions

Computers have spawned many applications altering the way lawyers and judges work. Some of these applications involve the production of computer generated evidence to assist in the art of persuasion. Lawyers and judges struggle to understand how the computer software functions just as their professional forbearers grappled with photography, audio recordings and other technological advances. Although the technology evolves and seemingly becomes more complex with each advance, the basic tenets of the law of evidence are constant. Authenticity, competency (i.e, reliability) and relevancy remain the crucial requirements for admission into evidence. As the judicial decisions cited below demonstrate, courts employ these traditional requirements in determining the admissibility of computer generated evidence. This paper will examine admissibility into evidence of computer generated simulations and animations.

Animations are a form of demonstrative evidence. Animations are used to illustrate a witness's testimony by attempting to recreate a scene or process.[1] An animation is nothing more than a series of diagrams which, when played in rapid succession, give the effect of animation.[2]

Computer generated simulations are "computer opinions" produced by using a software program to produce a simulation of how an event would or could occur based on inputed data. The simulation is offered into evidence as substantive evidence or forms the basis of an expert's opinion.[3]

II. Admissibility of Animations.

The starting point for analyzing the admissibility of computer generated animations is the rules governing illustrations and demonstrative evidence.

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[1] *Harris v. State,* 13 P.2d 489 (Ok. 2000).
[2] *Constans v. Choctaw Transport, Inc.,* 712 So.2d 885 (La. App. 1997).

[3] Carbine and McLain, *Proposed Model Rules Governing the Admissibility of Computer-Genereated Evidence,* 15 Santa Clara Computer & High Tech. L.J. 1, 8 (1999).

Admissibility of demonstrative evidence is a matter within the sound discretion of the court.[4] Yet, limits have been imposed by the Virginia Supreme Court on the court's discretion in admitting evidence analogous to animations.

In *Brown v. Corbin,*[5] the Supreme Court held it was error to admit a photograph recreating the accident scene from the perspective of an involved driver. The driver testified the photograph was "somewhat similar" to what he saw at the time of the accident. This testimony was not an adequate foundation. In order to have admitted into evidence a reconstruction or recreation, the offering party must show the exhibit is "substantially similar, although not necessarily identical, to the actual event in all of its essential particulars."[6]

Although rough (often hand drawn), not to scale diagrams are used as demonstrative evidence to illustrate a witness's testimony frequently, use of computer animations will probably be held to a more rigorous foundational standard such as set forth in *Brown* because of the perceived power of the digital medium. Fear of a computer animation's potential to mislead jurors and create lasting impressions overriding other testimony or evidence has led courts to examine carefully and admit with caution animations.[7]

Several courts have voiced specific criteria an animation must meet before being admitted into evidence:

> (1) the animation must be a fair and accurate representation of the evidence to which it relates;
> (2) is relevant; and
> (3) its probative value substantially outweighs the danger of unfair prejudice, confusion of the issues, or misleading the jury.[8]

When admitted, a cautionary instruction is often required to be given informing the jury the animation is only a recreation of the proponent's version of the event and should not be deemed an actual recreation and may be accepted or rejected in whole or in part.[9]

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[4] *Bread v. Commonwealth,* 248 Va. 68, 81, 445 S.E.2d 670, 678 (1994).
[5] 244 Va. 528, 423 S.E.2d 176 (1992). Exercise of judicial discretion can sometimes result in some interesting and unexpected outcomes. In *Byrd v. Guess,* 137 F.3d 1126 (9th Cir. 1998), counsel for defendants in a wrongful death action arising out of a police shooting during a domestic call, offered into evidence animation of the shooting. The court permitted its use if all facial expressions were removed. The plaintiff's asserted on appeal (without success) that the tape, as modified per the trial court's ruling, should not have admitted into evidence because the deceased was portrayed a "nutty android…like somebody who is crazed." *Id.* at 1134.
[6] *Id.* at 244 Va. 531, 423 S.E.2d 178.
[7] *Clark v. Cantrell,* 529 S.E.2d 528, 536 (S.C. 2000); *Sommervold v. Grevlos,* 518 N.W.2d 733, 738 (S.D. 1994). *See also Hinkle v. City of Clarksburg,* 81 F.3d 416, 425 (4th Cir. 1996).
[8] *See Harris v. State,* 13 P.2d 489, 494 (Ok. 2000); *Clark,* 529 S.E.2d at 536.
[9] *Id. See also Hinkle,* 81 F.3d at 425.

Unlike simulations (as discussed below), the method of preparing the animation is not particularly significant. The focus is on the accuracy of the image projected by the animation since it merely serves to illustrate the testimony of a witness. For this reason, the *Daubert* foundational requirements for admitting expert testimony will not necessarily apply to the methodology employed in producing the animation.[10]

III. Admissibility of Simulations.

A computer generated simulation is not merely illustrative of a witness's testimony but produces an opinion of what did occur or could occur under a set of assumed facts. The computer software becomes an expert witness.[11] The computer simulation should therefore be subject to the same foundational scrutiny as any other expert opinion prior to being admitted into evidence.[12]

Each element of the creation of the simulation must be considered in determining the reliability of the simulation itself:

A. The Computer. Was a properly functioning computer used?

B. The Software Program. Is the software program reliable? The software program represents a selection of series of assumptions and calculations by the program's designer. Creation or "writing" of software entails converting algorithms into computer language. When this process is completed, the software's architecture consists of lines of code embodying the assumptions and algorithms of the programmer. The validity of each of these assumptions and algorithms determine the reliability of the software.

Authentication of an exhibit requires evidence sufficient to support a finding that the exhibit is what its proponent claims.[13] This authentication standard can be met with evidence describing a process or system used to produce a result and showing the process or system produces an accurate

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[10] *State v. Bauer,* 598 N.W.2d 352, 362 (Minn. 1999). However, one federal court has invoked *Daubert's* goal of excluding "junk science" in ruling a computer animation (which the court refers to as a "simulation") of a ship's path had no value as demonstrative evidence because "no reliable underlying core evidence supported its existence". *Exxon Corp. v. Halcon Shipping Co. Ltd.,* 1995 WL 20667, 23 (D.N.J. 1995). *See also Robinson v. Missouri Pacific R.R.,* 16 F.3d 1083, 1089 (10th Cir. 1994) (animations illustrative of an expert's opinion should be subjected to the same *Daubert* scrutiny as the opinion itself).

[11] Wienreb, *Counselor., 'Proceed with Caution': The Use of Integrated Evidence Presentation Systems and Computer-Generated Evidence In the Courtroom,* 23 Cardozo L. Rev. 393 (2001).

[12] *Commercial Union Ins. Co. v. Boston Edison Co.,* 591 N.E.2d 165 (Mass. 1992) (applying the *Fry v. United States,* 293 F.1013 (D.C. Cir. 1923) standard); *Livingston v. Isuzu Motors, Ltd.,* 910 F. Supp. 1473 (D. Mont. 1995) (applying *Daubert* criteria).

[13] Fed. R. Ev. 901(a). Boyd Graves Conference, *A Guide to Evidence in Virginia* Rule 901 (2002).

result.[14] Since the software must be deemed an expert's opinion, *Daubert* or other expert opinion foundational requirements of the jurisdiction must be satisfied in order to authenticate the software for use in producing an admissible simulation.

How to establish the reliability of the software is a matter of controversy. Is it sufficient to simply show its general acceptance by the relevant scientific or technical community and its history of producing accurate results or must the lines of code of the software be scrutinized for accuracy?

If the software is a standard, generally available software, it will be probably be easier to lay a foundation for its use than custom software. A court will not be prone to conduct an inquiry into the software codes. Custom software, which does not have a history of reliable usage for accepted purposes, is much more likely to require a scrutiny of the codes before a court is satisfied the software is reliable for preparing the simulation at issue. [15]

In some instances, difficulties arise in examining the codes for software. The codes may be "proprietary" meaning the codes are not freely available but are kept confidential by the designer of the software. If the designer is the testifying expert, the court may of course compel production of the codes for scrutiny as a condition for permitting introduction of the simulation. If the holder of the codes is an entity unrelated to the litigation, access to the codes may be resisted as a valuable trade secret.

C. The Data. As with any expert opinion or test or experiment offered into evidence, the data inputted into the program to produce the simulation must be reliable, complete and a good "fit" with the facts of the case.

The following cases show how three courts have analyzed the issue of adequacy of a foundation for admission of a simulation:

Commercial Union Insurance Co. v. Boston Edison Co.[16]. The court treated the simulation as a scientific test and conditioned admissibility upon proof that (1) the computer functioned properly, (2) the input and underlying equations are sufficiently complete and accurate (and disclosed to the opposing party, so that they may challenge them), and (3) the program is generally accepted by the appropriate community of scientists. The software at issue was a proprietary software. In affirming admissibility of the simulation, the court held the trial judge "need not determine whether all the complex,

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[14] Fed. R. Ev. 901(b)(9).
[15] Kenneally, *Gatekeeping Out Of The Box: Open Source Software As A Mechanism To Assess Reliability For Digital Evidence,* 6 Va. J.L. & Tech. 13, 73 (2001).
[16] 591 N.E.2d 165 (Mass. 1992).

underlying coding is complete and accurate."[17] The court found that the software's wide acceptance by the relevant scientific community was sufficient to establish the data and equations used in the program were accurate and complete.[18]

Bray v. Bi-State Development Corp.[19]. The court discussed the criteria laid out in *Commercial Union* in the course of affirming admission of a simulation which reproduced lighting conditions in a parking garage. The court stated it would not require proof the computer was functioning properly absent a challenge by the opponent.[20] The testimony of an expert familiar with the software who stated it produced accurate results and was used and relied upon engineers to design lighting and make lighting decisions was sufficient to establish its reliability.[21]

Livingston v. Isuzu Motors, Ltd.[22]. The court conducted a *Daubert* analysis to determine an accident simulation was admissible. The court relied upon the testimony of the expert witness who prepared the simulation about the software's development, use, peer review, accuracy and acceptance by the scientific community in holding the *Daubert* standard had been met.

Recently, the Virginia Supreme Court in *John v. Im*[23] ruled upon the admissibility of expert testimony based upon the results of a quantitative electroencephalogram (QEEG) test. This opinion reflects the analysis likely to be applied by the Court to the foundational requirements for a simulation. The QEEG test measures and converts into a digital format brain electrical activity to facilitate analysis of and to detect deviations from normal brain functioning. The Court held the foundation for the QEEG test results was insufficient because: (1) the person who actually performed the test was unknown and therefore the testing conditions and procedures could not be ascertained (2) an inability to account for testing variables (i.e., the medications used by test subject and the possible drowsiness of the subject during testing). In reaching this result, the Court cited to its rule that expert testimony is inadmissible if it is "speculative or founded upon assumptions that have an insufficient factual

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[17] *Id.* at 169.
[18] The party opposing admission of the software had sought to require production of the codes which were propriety. The Court affirmed the refusal to require production on the grounds the request was untimely. The Court seemed unsympathetic to the attempt to obtain the codes because the program was based on equations and procedures available in a standard reference handbook and the manuals for the software detailed the input needed by the program and the mathematical equations and algorithms which form the basis of the program. *Id.* at 171, fn. 5.
[19] 949 S.W.2d 93 (Mo. App. 1997).
[20] *Id.* at 97-98.
[21] *Id.* at 99.
[22] 910 F. Supp. 1473 (D. Mont. 1995).
[23] 263 Va. 315, 559 S.E.2d 694 (2002).

basis…[or if] the expert has failed to consider all variables bearing on the inferences to be drawn from the facts observed."[24]

The Virginia Supreme Court would undoubtedly apply at least as rigorous a standard for the admission of a simulation as that articulated in *John* and earlier cases for expert testimony. A proponent of admission into evidence of a simulation in a Virginia trial court should be prepared to prove the computer was in good working order, the reliability of the software, the accuracy and completeness of data entered into the software and that all variables material to the matter sought to established with the simulation have been considered in the simulation. What is uncertain is whether *Daubert* criteria must be met and the quantum and nature of proof required to establish reliability of the software.

IV. Using Animations and Simulations in Closing Argument.

Counsel frequently use illustrations and other visual aids during the closing arguments which were not introduced into evidence or used during the evidentiary phase of trial. This tactic may not be permitted in the case of a simulation or animation.

In *Bledsoe v. Salt River Valley Water User's Association*[25], plaintiff's counsel used a simulation of the plaintiff's version of how an accident occurred in closing argument. The simulation had never been offered into evidence or authenticated by any testimony. The appellate court held it was reversible error to have permitted use of the simulation in closing argument, rejecting the trial court's view that the simulation was no different than drawings routinely made by lawyers in closing argument albeit "more sophisticated". According to the court, the simulation was not the same as a chart or diagram but depicted an expert's opinion. Use of the simulation required an appropriate foundation and an opportunity for cross examination by the defendant.

Efforts to use a computer animation in the first instance during closing argument are likely to be rebuffed in the same manner as the simulation in *Bledsoe.* The perceived power of animations and the resultant heightened threshold for their use may preclude their use by counsel without laying a foundation during the evidentiary phase of trial.

V. Discovery.

A recurring theme in decisions addressing admissibility of computer generated evidence is desirability of pretrial disclosure of the simulation or

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[24] 263 Va. at 320, 559 S.E.2d at 696. The Court did not reach the issue of whether Virginia courts should apply a *Daubert* analysis to admission of expert testimony.
[25] 880 P.2d 689 (Ariz. App. 1994).

animation to give the opposing party adequate opportunity to raise objections and prepare for cross examination.[26] Pretrial requests for information about the software, the inputted data and how the evidence was generated will likely be granted. Although the expert witness disclosure requirements should flush out the needed information about most animations and simulations, counsel should consider requesting specific disclosure requirements in a pretrial order for computer generated evidence in cases where it is anticipated this type of evidence is likely to surface.

VI. Checklist.

Gregory Joseph, Esq., a recognized authority on visual evidence, has compiled useful checklists of the issues counsel need to consider in using and objecting to computer animations and simulations.[27]

[26] *Clark v. Cantrell,* 529 S.E.2d 528, 536-37 (S.C. 2000); *Bray v. Bi-State Development Corp.,* 949 S.W.2d 93, 98 (Mo. App. 1997).
[27] Joseph, *A Simplified Approach To Computer-Generated Evidence And Animations,* 42 N.Y.L. Sch. Rev. 875 (1999-2000).