

ICT Tools and its relevance to the judicial process

Video Conferencing Tools

Video Conferencing permits virtual interfacing of a Judge with witnesses, holding of conferences, meetings, production of under-trial prisoners, etc. The facility would be installed in the prison. Similar facility would also be made available within the court premise or in the Judge's office. The Judge would be able to interact with the prisoner without the prisoner being physically brought before him. This would save a lot of time and resources, which would have been involved in the physical transportation of the prisoner from the jail to the court. The policemen and other concerned authorities would also be spared so that they can utilize their time in other official tasks.

Publishing Tools

Publishing tools would be utilized for various documentation of the judicial system. An enormous amount of documentation/paperwork is involved in the judicial process. Many times there is also duplication of paperwork and files. Publishing tools would enable preparation soft copies of documentation, printing, copying etc would also be done through the publishing tools. This would be done through printers, scanners, copier machines etc.

Word Processing Tools

Documentation of the judicial system would involve producing various transcripts, data recording etc. This would be done through word processing tools. These tools permit multi-lingual, electronic transcription, formatting and storage of oral evidence, orders and judgments.

Storage Management Tools

The enormous data created in the Judicial System needs to be systematically stored in soft form with proper indexing, filing of the data/records. The existing data of the judicial system would also be replicated in the soft form and this would create a database of documents. These documents would be stored in high-end server/data center. Various High Courts, district courts and other subordinate courts would also have their localized storage of data. This would be replicated as per the hierarchy of the court. For instance, the data at District Court would be replicated at the High Court level. This kind of distributed database architecture would involve the application of storage management tools. Further, document management tools would be employed to facilitate management of documents in a scientific and easily accessible manner.

Regional Language Tools

The Indian Judicial System has documentation in various regional language depending upon the location of the court. This is also useful for the general public/litigants who desire to have the information in their regional language. For the provisioning of regional language in the ICT implementation in the judicial system regional language tools would be utilized. The regional language tools would provide the various documents that would be printed or available online in the regional language.

Intercommunication Tools

These tools include various applications such as e-mail, chat, etc. This would be useful for the internal communication within the judicial system. The existing communication in the judicial system is predominantly paper based. By the utilization of the intercommunication tools the communication with and within the judicial system, be it between courts, or between various departments, would be much faster and efficient.

Fingerprint Recognition System

This would involve fingerprinting of the witnesses, accused, prisoners, etc. and storage in soft form. A centralized database of fingerprints would be created. This would form a good reference during investigation to identify professional criminals. This system would also identify professional litigants and professional witnesses and thus help in preventing of their impersonation.

Internet, Website and Email tools

Various website and internet tools such as web browsers, etc. would be required for viewing of the created database of documents. The online access to information would also require the website/internet tools so that a litigant would be able to access various information like case status, orders pertaining to its case, causelists, etc. Electronic mail would facilitate in issuance of summons, notices, warrants, reports, statements, etc.

Tools for Encryption, Recognition of Digital Signature, etc.

These tools enable the recognition of digital signatures and perform various encryption/decryption functions so as to help a litigant to view case-status in a user-friendly manner without compromising on the security of the documents and avoidance of hacking by miscreants, etc. These tools ensure security, confidentiality and non-repudiation of documents. This can be meaningfully used for grant of certified copies of orders and judgments.

Voice Recognition and Recording Tools

This would be utilized for the tasks involving dictation, voice recording, etc. The judgments and orders being dictated by Judicial and Administrative Officers would be converted into digital form with the help of these tools.

The judicial process necessarily involved the preparation of various documents based on the dictation given by judges, etc. The manual work of taking the dictation work would be taken care of by the voice recognition system. But this tool is yet to acquire perfection. The experience so far is that it stores hardly 80% to 85% of the words spoken into the microphone. The tool is not apt for judicial functioning specially for the purpose of dictating judgments. It is a growing technology and may, in the coming years, become more efficient for the Indian environment. Still, a lot of research and development is required to be put in.

Imaging and Scanning Tools

Imaging and scanning tools would assist in storage and management of documentary evidence, photographs of accused, and litigant witnesses for future identification.

Web-enabled Connectivity

With the creation and implementation of a detailed Relational Database Management System (RDMS) and use of Wide Area Networking (WAN) including internet facilities, it is feasible to create a National Grid of court information for judicial reviews at all hierarchical levels as also for taking centralised policy decisions for effective court management and its implementation.

With the availability of national data in the centralized manner, well-devised national policies pertaining to delay reduction (i.e., arrears-control), programs can be conveniently implemented. A central data warehouse can be created where the data can be processed, analysed and reports can be prepared. The original, main data is filtered and transferred to the data mart which in turn, after further filtering, sends the data to the data warehouse. There can be a centralized research and planning wing for judiciary and the experts and jurists can then evolve centralized policies for the whole judiciary. Such an objective and rational administration is very much essential and critical for meaningful management of the judicial system today.

Bar Code Technology

Standard bar codes are like social security numbers or car licence plate numbers or in the context of court systems, like case numbers which act as reference number that a computer uses to look up associated descriptive data and other pertinent information. The process requires the conversion of a bar code that can be printed on or affixed to an item and subsequently, read by a light source and fed into the computer. This technology immensely helps in document management, moveable property identification. Bar code scanners are faster than human eye and far more accurate. Based on tests, bar code information has an accuracy rate of one error per ten million (one crore) characters. Compared to this, the keyboard error rates is one error per hundred characters. This form of "automatic identification" can help in prevent misidentification errors. It can be used in the court system. This can be used for locating files, documents concerning cases like pleadings, issues, evidence, both oral and documentary, orders, judgments as also the moveable properties seized, attached and exhibited. This technology can be very effectively tracks the file movements and its locations.

Document Management

Document management was originally developed to control and manage heavy information flows in corporate, non-profit and government organizations, document management systems focused on making data – whether legal documents, funding proposals, mail-merge documents, or white papers – readily accessible and easily archived. In essence, the goal was to organize files. Early systems focused on adding information about a document to the computer file containing the document, organizing that information in a database, and defining relationships between documents. What one had was essentially a computerised library.

Documents are defined by certain set criteria, generally known as metadata indexing elements. These include document author, date of creation of the document, type of document, topics covered in the document, completion date, related documents, keywords, and the like.

Document management can be very effectively used in the transcription and storage of judicial documents. One would no more be required to use a manual typewriter. Moreover, the typists and stenographers can better organize and format documents with facilities of simultaneous spell checks and font organisation and numerous other facilities. These documents can be easily accessible with all securities. The simple and basic advantages of using document management tools like, cut and paste instead of re-typing on a separate sheet, the ability to make correction without the use of erasing liquids, transfer of document from one work station to another on a click of a mouse, etc. would be of immense help in lessening the manual work.

Database Management System

A well-structured database is the heart of court management, case management and caseflow management. There are several important databases which need to be created to store the information captured in a systematic and meaningful manner:

1. *Courts database*: This database contains the entire information of all the courts, like, (i) the class i.e. Civil Judge (Jr. Dn.), Civil Judge (Sr. Dn.) or District Judge; (ii) jurisdictions both territorial and pecuniary; (iii) name; (iv) location; and, (v) judicial and revenue district in which it lies.
2. *Location database*: This database helps in storing and retrieving of object/correct location of an immovable property or address of a person i.e. the court, judge, litigant, advocate, staff etc.
3. *Judges database*: The information relating to the central human object in the judicial system is stored in this database. It contains a Judge's personal data including date of entry into service, grade, promotions, adverse remarks, disciplinary proceedings, transfers and postings. It helps in taking vital decisions regarding performance of a judge which has a direct bearing on delays and arrears.
4. *Court Staff database*: Like that of judges, this database contains the entire relevant information of the supporting infrastructural staff provided to the court. This helps in maintaining discipline, work culture and available strength of this class.
5. *Litigants database*: This database contains the information relating to parties to a dispute brought before the court as required in the procedural laws. It helps in convenient and accurate creation of cause titles, summons and notices, orders, judgment and decrees. With the help of this database, many statistical reports can instantly be generated, like, (i) in how many cases the same litigant is involved many cases pending in the state or elsewhere; (ii) whether he had earlier filed any other case for the same cause of action; or, (iii) litigants classification with variables in order to have a behavioral study, etc.

6. *Advocates database*: This database is designed to contain all relevant information relating to enrolled advocates. It helps in many ways. If any advocate appearing for any litigant is disabled from appearing in any case, because of other assignments or has expired, then all such cases can be sorted out immediately and court notice can be sent to the parties at the earliest. It helps in retrieving and recording the names of advocates and printing their names correctly in cause-lists, orders, judgments, etc. It permits class analysis in all desired manners.
7. *Case database*: This database, like the Court database, contains another set of key information for understanding the system behavior. This database is capable of answering all queries relating to all cases i.e. case institutions, pendencies, disposals, stages, nature, etc. The information contained in this database can reveal out all the miseries which has led to systemic failures.
8. *Case Updation database*: This database takes care of case progression and provides a key to case flow management. It facilitates tracking of the stages of cases and helps in case management through supervisory process.
9. *Exhibits and Witnesses database*: The witness and exhibits database is an integral part of judicial process. This database helps the Courts in finding out the witnesses examined, the exhibits marked and submitted to the court, admissible documents and details of witnesses and the evidences produced before the court.

ICT in Indian Court

Challenges & Solution

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Abstract - Over three million cases are pending in India's 21 High Courts and an astounding 26.3 million cases are pending in subordinate Courts across the country & only 14.7 Judges available per million people. With further growth in the number of cases increased the burden on our judicial system manifold. The cost and inefficiency of dealing with records has crept up slowly over time and become extremely unwieldy, inefficient and cumbersome. On the other hand if we see the efforts of the other investigating agencies like police, jails, forensic labs, hospitals etc in extracting information from accused, undertrials & evidences etc is enormous and extremely complex. Massive cost, time and risk are involved in bringing the accused, witnesses, reports etc to the courts. India is on the verge of technology revolution that enables law agencies to manage the case proceeding in electronic format, leading over paper-centric judicial scenario. This has also given birth to this new idea; adjudication through e-courts.

MoU has been signed among TIFAC (DST, Govt. of India), CDAC Noida and Gujarat & Delhi High Courts respectively under TIFAC's targeted programme: TECHNOLOGY VISION 2020 "Synergizing Science & Technology with Judicial Processes" to develop a state-of-the-art tamperproof & secured case recording & retrieval system which has been successfully piloted at City Civil and Session Court, Ahmadabad and the advanced version of this is recently implemented at Karkardooma District Court New Delhi.

I. INTRODUCTION

The rapid accumulation & slow disposal rate of pending cases has increased burden on our judicial system tremendously. Courts had to maintain all the records in physical manner i.e. either in files or registers and to keep such large data in paper form is not easy to retrieve and also not even safe and is prone to physical tempering & environmental degradation. The case takes long time to solve and apart from this Cases/Judges/Courts keeps on changing during the course of judgment. Even the witnesses and accused keep on changing their statements and turns hostile. It is always difficult for the new Judges to retrieve the case information & status; so far the available source is the written information in the case files only. As far as police & jails are concern, they already cramped for resources in dealing and bringing accused and undertrials to the courts. Similarly experts from Hospitals and forensic labs faced severe difficulties in presenting their investigating reports in front of courts. Therefore, there is a definite scope of bringing ICT to help and develop Case Record Management System for courtroom and to conserve the case file & audio/visual record for future references.

II. SYSTEM FEATURES

The entire courtroom proceeding are videographed using multiple high resolution PTZ cameras. The control of recording software interface is on the hand of judge who can start/stop anytime. File records, evidences (knife, gun etc) and other case related documents(depositions, notes, files, summons, orders etc) has been scanned and digitized via scanners and visualizers and are available to authorized users like judge, lawyers and public prosecutor etc for reviewing. Deposition can be captured as dictated by the judge at the time of case hearing, which is also linking with video records. Adequate security features through data encryption, digital signature, Network and application level have been provided to safeguard information from both unauthorized viewing and intentional or inadvertent damage. The system provides a flexible retrieval of captured information and allows the user to specify partial search terms involving the document identifier and/or parts of the expected metadata. System is integrated with video conferencing system with other locations over broadband IP or ISDN network. These locations can be police stations, jail, FSL, hospitals etc. This is a great advantage as both precious time and cost is getting saved and it is much safer too.

This system has following features:

- Role based access to authorized users
- Uploading the scanned files/evidence and adding appropriate metadata.
- Allows Judges to see recording of proceeding for review and why case was rescheduled last time..
- Making the knowledge and information content available in 24x7 online environments.
- Appropriate Searching of case records.
- Provision to provide case CD/DVD to authorized person.
- Provision for taking record backup at a specified backup site.
- Live webcast of case proceedings through web portal.
- Can be use by court reporters that missed a word or statement.

III. SYSTEM WORKING OVERVIEW

The system application is broadly categorize in four major privileges areas inter- linked with courtroom operations. They are Judge, Administrator, Courtroom staff (Steno, Almad, Reader etc) and other users (like Public prosecutor, lawyers). Application features are made available as per there functions and defined roles and responsibilities. Some of the major tasks of the entire workflow are explained below.

Digitization of Case files:

A scanning room has been created inside the courtroom where case files are brought first. The case files are then scanned & digitized and uploaded in encrypted form on centralized storage server so that authorized person can access the case files through the software interface. In earlier system, bringing the case files from store room (Maal khana) take lots of efforts which can be saved now. Here authorized user can access the case files from anywhere on a single click.

Paperless Deposition:

The proceedings of court are completely paperless. The deposition is typed by steno on computer and the draft deposition is visible to the Judge and to the lawyers on their screen. Once the draft is approved, the deposition is then digitally signed by Judge. This file is then uploaded & gets appended in to the case file.

Recording of court proceedings:

The court proceedings can be recorded with multiple high quality PTZ camera through interface

provided to Judge. The recordings are also kept in encrypted form on server. The user can access these recordings from the software interface which makes the user (Judge) flashback easily that what happened last time in this case and easily track the progress of the case.

Video conferencing:

Using video conferencing any person can give his/her deposition from remote place. He/she just needs a video conferencing setup either hardware or software based with internet connection. Initially three hospitals, FSL, two police stations and jail are connected to e-Court for video conferencing. Producing accused/witness every time in court consumes enormous amount of resources (transportation cost, security time and manpower etc) of the government, Using Video conferencing, they can give their deposition from hospitals and jails itself.

Evidences capture:

We provided imaging solutions for evidences and documents to court. The images from police, hospitals reports etc. can be uploaded from camera or any other imaging source. There is one visualizer to view & capture evidences and indexed with the in court case records.

Provision for DVD writing:

If any person (lawyer or concerned person) wants digital documents or videos of case, there is provision of providing required data on a CD/DVD.

Data sharing from remote location:

The police, hospital staff can remotely upload the documents or view the documents.

Court live proceedings:

The court's live proceedings can be seen on courts website by authorized person. If any person (lawyer or concerned person) wants to see live proceedings, he/she has to fill an online Registration form and after reviewing the application by administrator, access can be given to person for the particular case.

IV. TRADITIONAL SYSTEM VS e-COURT

When we think about judicial courts all that comes to our mind is thick files, hot arguments between lawyers and heated discussions. The judge can view the recordings and related documents of a particular case on just a click of a button. As a result of which both the judge and the lawyers need not to waste their time in finding a particular part in those documents (video or PDF) and can come directly to the point. Since every case is recorded the judge can review the earlier

recordings to refresh his memory. Hence helping the judge, to give a quicker and correct judgment.

Traditional Functioning	e-Court Functioning
Physical carrying of Case File and evidences to Courtroom at each hearing.	No need to carry Case File and evidences at each hearing in physical form, same are available at click of mouse to Judge and concerned staff. Reduces the human load on the court premises also ease the maintenance of evidences and documents. Court authorities can avoid frequent physical movement of case related files and evidences
Physical carrying of Case Documents and evidences if required by Judge, Judicial Secretary for review.	
No provision of sharing case information online.	Different courts are able to share the information online.
Required Case documents and evidences of Case file are submitted manually in Court by Police, Hospital, Forensic Officials and other stake holders.	Through e-Court concerned Police, Hospital, Forensic Officials and other stake holders can upload the required documents to the case file from their premises itself. System provides adequate security mechanism like role based user access.
Case cannot be proceed due to the non availability of accuse/witness on the scheduled date and case delays many years for final hiring.	With the help of video conference facility accuse/witness can participate in court room proceeding.

V. COST BENEFIT ANALYSIS

The following data is approximate and value is based on the available recording done at e- court in H.264 (4CIF) format.

S No	Channel	Data (MB/Min)	Total (MB/Hr)
1.	Judge View	1.85	111

2.	Accused View	1.65	99
3.	Witness View	2.05	123
4.	Mix Quad View	2.25	135
5.	Video Conf.	1.22	75
6.	Evidence View	0.55	33
7.	Operator View	1.60	96
TOTAL			672 = ~700

Average Calculation:

- ☞ Per day court runs for 7 hrs therefore $700 \times 7 = 4900 \text{ MB} = \sim 5\text{GB/day}$
- ☞ $22 \text{ days/month} = 5\text{GB} \times 22 = 110\text{GB/Month} \times 10$ (courts works for 10 months/year) = **1.1 TB/Year**

The following data is approximate and value is based on the available digitization done at e-Court for single case in .pdf format.

S No	Doc. Type	Data (KB/page)	Avg page/Case	Total (MB/Case)
1.	Case File	250	600	150
2.	Case/Evidence pics	3000	25	75
3.	Deposition/ord ers etc	100	100	10
Total			725	235

Average Calculation:

- ☞ Average Case handled by one court = $75/\text{Year} = 235 \text{ MB} \times 75 = 17.625 \text{ GB} = \sim 18\text{GB/Year}$
- ☞ Average files generated = $725 \times 75 = 54375 = \sim 55,000 \text{ files/Year}$
- ☞ Traditional Court maintenance cost approx Rs 8 Lacs 40 thousand annually.
- ☞ Capacity of the Server is 2TB. On an average a Court consumes 1.3 TB of data annually for both video and document.
- ☞ e-Court Server maintenance & capacity enhancement cost is approx Rs 1.5 Lacs annually.

Study at Lal Bahadur Shastri Hospital

- ☞ On an average 10-12 Doctors travel to court daily from each Hospital
- ☞ Average DA/day/head = 350 Rupees
- ☞ Average TA/day/head = 100 Rupees
- ☞ Average per day cost = $450 \times 12 = 5400/- \text{ per day}$

- ☞ *Average Monthly expenditure = 118000/-*
- ☞ *Average Annual expenditure = Over 14 Lakhs per Hospital*
- ☞ *Above cost does not include the salary part.*
- ☞ *Cost of patient care loss: ∞ INFINITY*
- ☞ *Travel and other related cost will be saved.*
- ☞ Support of other staff members involved in summon distribution, document gathering, logistic arrangements is not included in above study.

Study on Tihar Jail

- ☞ Approx 1,200 inmates taken to courts every day, at least 400 are under trials only seeking an extension of judicial remand.
- ☞ Jail vans have to make at least 10 trips to transport the under trials to court.
- ☞ We would save up to rupee 1.5 crore annually, the amount we spend on providing security and fuel.
- ☞ Earlier system costs around **20 Thousand Rupees per case** but using e-Court only **3 Thousand rupees spends per case**. We can save approx. 17 thousand rupees per case

VI. OUTCOME OF THE e-COURT

The entire existing files in Karkardooma eCourt have been digitized and a touch screen has been installed on the dais of Judge. He can view any file of the e-Court in digitized form by searching for the same date-wise, name-wise or Act/Section wise. There is a provision of a document visualizer and any document can be projected on the LCD Screens installed in the e-Court, so that the same are visible to the accused, witnesses or the prosecutor in the same Court, as well as when they are connected through Video-Conferencing. Other stakeholders of the case can have access to eFiles using secure login and password. The overall impact of establishment of E-Court will result in quick disposal of cases, ease of record maintenance, reliability of the evidence recorded and to bring more transparency in the functioning of the District Courts.

- Reduce the paper work. Ease of record maintenance
- Allow the judges to see e-files for review.
- Can be used by judge, judicial fraternity to review the case.
- Use as a backup by concern persons who have some doubt about the authenticity of the documents.
- Different courts will be able to share the information online.

- Playback live proceedings for court audience.
- Use of digital signature & encryption for integrity of documents.
- Tool for Education & Training of judicial officers and courtroom personnel.
- Doctors need not to cancel appointments for critical/emergency patients.
- Court, Hospitals, FSL, Jail can simultaneously share their presentations/documents and other information online in a secured mode.
- Remote parties can depose through Video Conferencing facility using ISDN and Broadband links in e-Court
- The documents of high secrecy which cannot be moved out of the department but needs to be shared with other agencies can be directly presented and discussed upon.
- System will increase physical security of doctors by not visiting the court thereby avoiding any physical presence in front of the accused or criminals.
- Doctors can depose and give expert opinion in much more relaxed and conducive environment.
- System can be used for other medical benefits other than the judicial matters.
- Travel and other related cost will be saved.

VII.SOME CHALLENGES & FUTURE SCOPE

With the arrival of e-Court concept the amount of data that needs to be managed and protect will be a mammoth and ultimate challenge for the judiciary.

- Based on data generated in the established e-Court, almost 85k files with 1.3TB data will be generated per year.
- System can't afford to lose even a single file as it makes the entire records unreliable and invalid in judicial terms
- Currently H.264 video format has been used with AES encryption for video recording which may be change/upgrade in the future therefore it is required to develop methodology for Interoperability of ever changing media formats/codecs.

Future Scope:

- e-Court on Cloud Network
- Setup TDR (Trustworthy Digital Repositories) for e-Court Records.
- Building Decision Support system for Judiciary

- Incorporation of OCR and smart discovery services, etc.

VIII. CONCLUSION

We have presented a state-of-the-art technique for introducing ICI in Indian courts for digitally preserving case files and visual information in chronological sequence. The design can be utilized to will help our judicial system to streamline and expedite their operation and case disposal rate in secure and cost effective manner.

IX. ACKNOWLEDGEMENT

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REFERENCES

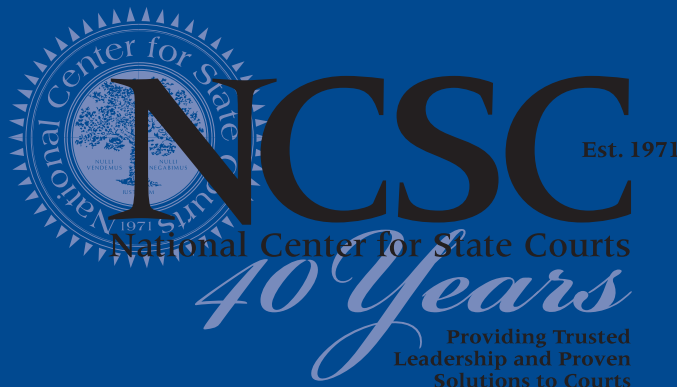
- [1] H.264 Compression and DVR card
<http://www.hikvision.com>
- [2] www.tifac.com
- [3] <http://www.rtiindia.org/forum/2385-nearly-30-million-cases-pending-courts.html>
- [4] <http://www.youtube.com/watch?v=LICXdP0n0r0>
- [5] <http://articles.timesofindia.indiatimes.com/keyword/tihar /featured/3>

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FUTURE
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*The Evolution of a
High-Technology
Courtroom*

Hon. Herbert B. Dixon, Jr.

THE EVOLUTION OF A HIGH-TECHNOLOGY COURTROOM

Hon. Herbert B. Dixon, Jr.

Judge, Superior Court of the District of Columbia

The District of Columbia Courts are evaluating what works best in a high-tech courtroom for making presentations and instructing juries. The courts are also trying to determine whether presentation formats that seem most favored by jurors are in fact the most effective.

Over the last several years, interest in high-technology courtrooms has grown. Traditional litigators and judges whose skills were honed without the newfangled gadgets were not the fastest to embrace new technologies. As time passed, however, the population of old-school litigators dwindled and interest in litigating in high-technology courtrooms increased. I had the good fortune over the last two years to be involved with the design and construction of a high-technology courtroom and to be assigned to the courtroom and asked to promote use of the new technologies among the practitioners on my calendar.

Once the courtroom was in operation, I encouraged use of the courtroom's new technology at every opportunity. At the same time, the Research and Development Division of the D.C. Courts developed a survey to capture juror impressions concerning the use of technology during trials. At the end of each trial, I urged jurors to assist our evaluation efforts by completing the survey.

After several months operating this high-technology courtroom, including 11 serious and complex criminal jury trials, and survey responses from 141

94 percent of surveyed jurors agreed or strongly agreed "Overall, the use of technology in the courtroom improved my ability to serve as a juror in this case."

deliberating jurors and alternates, I am ready to share some observations about the evolving use and juror impressions of courtroom technology.

High-Technology Equipment in the Courtroom

Video Displays

There is fair debate concerning the preference for large monitors to which all eyes are directed versus smaller individual (or jointly shared) monitors installed in the jury box. Among counsel, the preference is for large monitors. The large monitors encourage more eye contact with the presenter until the jury's attention is directed to some aspect of the image on the monitor, whereas jurors with individual monitors often remain focused on their personal monitors rather than on the presenter. In the lawyers' view, there is a perceived loss of connection with the individual jurors.

In many technology-enabled courtrooms, images are projected on a screen by a liquid-crystal-display (LCD) projector. The equipment in my courtroom includes a 72" x 72" drop-down projection screen; a 5,500 lumen LCD projector; and, for jury and audience viewing, four 52-inch diagonal, high-definition flat-screen monitors. The LCD projector and screen provide an 85-inch diagonal image, which explains why the parties and I often prefer to project images of evidence on that screen for primary viewing. As is totally understandable, however, the projector image is larger and more easily seen, but the smaller monitor image is often superior in terms of sharpness and clarity. I believe that flat-screen monitors, with their superior image display and falling prices, offer the best hope for larger and more affordable video displays in technology-enhanced courtrooms.

Annotation Monitors

Annotation monitors allow witnesses to mark an exhibit with notations that can be preserved for later viewing. For example, the markings can show where a person was standing in an area shown in a particular picture or where a crucial event occurred on a particular piece of evidence, such as where a metal fracture occurred or where failed equipment was not properly aligned during manufacture or construction. Once the notations are made on the monitor, additional markings may be added to identify the witness responsible for the notations, all of which may be preserved by printing a color copy of the exhibit. When the next witness

97 percent of surveyed jurors agreed or strongly agreed that “Viewing the judge’s instructions on the monitors improved my understanding of the laws in the case and my responsibilities as a juror.”

is called, the original copy of the exhibit will be free of any markings that might influence that witness.

Witness Monitor

The witness stand should have its own monitor. This monitor should have the annotation feature that allows the witness to make marks electronically on the displayed image. A witness monitor also allows presentation of the evidence to the witness, not viewable by the jury, to elicit testimony concerning the authenticity and relevance of the exhibit. When the exhibit is moved into evidence, the exhibit then may be displayed on the other courtroom monitors for the jury.

Evidence Camera

An evidence camera is indispensable for a technology-ready courtroom. No other piece of equipment surpasses this item in its ability to encourage litigants to use technology during in-court proceedings. An evidence camera instantaneously converts a paper document or physical exhibit to an electronic image, with the ability to enlarge and reduce the image as needed. An evidence camera can enlarge, for example, a 4” x 6” photograph or the face of a wristwatch for all to see on the courtroom monitors or projection screen. A demonstration that often amazes courtroom observers is to see the back of a pre-2009 one-cent coin enlarged to an extent that shows not only the engraved Lincoln Memorial in significant detail, but also the engraved silhouette of Lincoln’s statue between the memorial’s two center columns.

Laptop Connections and Other Digital Input Locations

Because of the popularity of laptop computers for presenting evidence as digital images and sound, laptop inputs to the courtroom’s audio and image-display systems are a necessity. In my courtroom there are three such inputs, namely,

image and audio connections located at each of the two litigants’ tables and a third set of image and audio inputs at the speaker’s lectern. This configuration permits the two opposing sides each to have their individual input location and a spare input if another is needed. This is helpful if either or both inputs for the opposing parties should become disabled (which happened in my courtroom when some unauthorized person rearranged the furniture and snapped one of the fragile fiber-optic cables). Additionally, the judge’s computer on the bench may also transmit images and audio to the courtroom’s audio and image-display systems.

One cannot overlook that, instead of a PC-type device, a fair number of litigators use the Mac, iPad, and other Apple computers. My courtroom has the standard VGA PC connections for images and 3.5 mm connections for audio. There is an adaptor available for each Apple product, and it is probably a good idea to have these adaptors as standard equipment in the courtroom for those litigants who never considered that the courtroom’s audio and image-display systems might not be “Apple ready.”

Combo VCR/CD/DVD Player

The combo VCR/CD/DVD player was thought to be necessary equipment for a technology-ready courtroom, but the slow demise of tape media and increased popularity of laptop computers have diminished the use of such players. Although exhibits still occasionally surface that need legacy equipment, including cassette tapes, VHS tapes, and maybe even a Betamax tape, parties nearly always offer to play their audio and video exhibits from their laptop computers using the computer’s hard drive, a thumb drive, memory card, or the computer’s CD or DVD player. The flexibility of the laptop computer to use various storage media will render combo VCR/CD/DVD players obsolete.

Courtroom Printing and Electronic Storage of Exhibits

A color courtroom printer remains a staple of the technology-ready courtroom for printing images of exhibits on which witnesses have made electronic markings. In addition to printing copies of images and markings and other notations for review by the judge or jury during deliberations, paper copies are often needed to satisfy the primeval urge for paper backups just in case the electronic Xs and Os disappear into the ether.

97 percent of surveyed jurors agreed or strongly agreed “With the use of the courtroom technology, I could clearly see the evidence presented in the case.”

An interesting alternative is preserving exhibits and markings electronically and providing the jury a laptop computer, kiosk, or other device to scroll through all of the electronic exhibits. The arguments in favor of this alternative are that the resolution and clarity of the electronic image

are superior to the printed copy, the time delay (15 to 20 seconds or more—an interminable wait in the courtroom for the electronically marked exhibits to print) is obviated, and electronically preserved exhibits are immediately ready for input into the court’s electronic records system without scanning. Obviously, eliminating any need to make an electronic image of the paper copy saves time and avoids a further decrease in image quality.

Integrated Controller

The ability to control the source of images and sound into the courtroom’s video and audio system are handled through a unified controller that is integrated with the courtroom system. Most often, the controller is a touch screen that allows the judge or courtroom clerk to direct the source of the images displayed and sound heard on the courtroom’s video-display and sound systems. While it is possible to allow counsel to determine when a video is displayed or audio is played, it is normally best to leave “traffic cop” control in the hands of the judge or courtroom clerk trained to perform this job. If the judge is not interested in performing this function, the courtroom clerk must have the training to perform this job. Whether this function is performed by the judge or courtroom clerk is likely to be influenced by tradition and the judge’s preference. In my case, my courtroom clerk and I have duplicate controls that allow either of us to determine the source of the video and audio to be played on the courtroom’s system. The standard configuration now allows the controller to direct the image and sound from any source to a selected monitor or monitors. And, of course, the controller must have a “kill switch” that allows, in case Murphy’s Law is invoked, instantaneous termination of any image or sound. My “kill switch” is euphemistically labeled with the much milder term “clear system.”

The advanced features of an integrated controller system allow different images from separate sources to be displayed simultaneously, for example, showing an image from the evidence camera on monitor 1 while at the same time showing on monitor 2 a video from the prosecutor’s laptop; the image of a still photograph from the defense attorney’s laptop on monitor 3; a limiting instruction in PowerPoint from the judge’s computer on monitor 4; and so on. However, the knowledge of the system and mental dexterity that the judge or courtroom clerk need to operate such a system effectively and efficiently might be a little too much to ask under normal circumstances. Indeed, the complexities of such a system may result in (1) the advanced features being rarely used or (2) discouraging use of the courtroom’s technology altogether. For this reason, the more simplified configuration discussed earlier is the most practical design until the use of courtroom technology becomes more the rule than the exception.

86 percent of surveyed jurors agreed or strongly agreed that “When the attorneys used the technology to display exhibits on monitors and play audio on the courtroom’s main speakers, I better understood the evidence presented in the case.”

Wireless Installation

Once upon a time, installation of the controller system for displaying images from various courtroom sources required removing and raising the existing floor to install wire cables, fiber-optic cables, and other wires to connect the various image and sound sources (counsel’s laptop, the evidence camera, etc.). That effort in my assigned courtroom resulted in a three-inch higher floor, calling for a pathway from the audience section to the well of the court that is slightly inclined over a three-foot length. As one might have expected, I have seen numerous folks stumble when they did not notice the incline as they entered the well. Now, with vast improvement in wireless technology, retrofitting a courtroom to accommodate the integrated system that controls the connection between sources and the courtroom’s video and audio system does not require extensive and expensive removal and raising of the floor to accommodate cables.

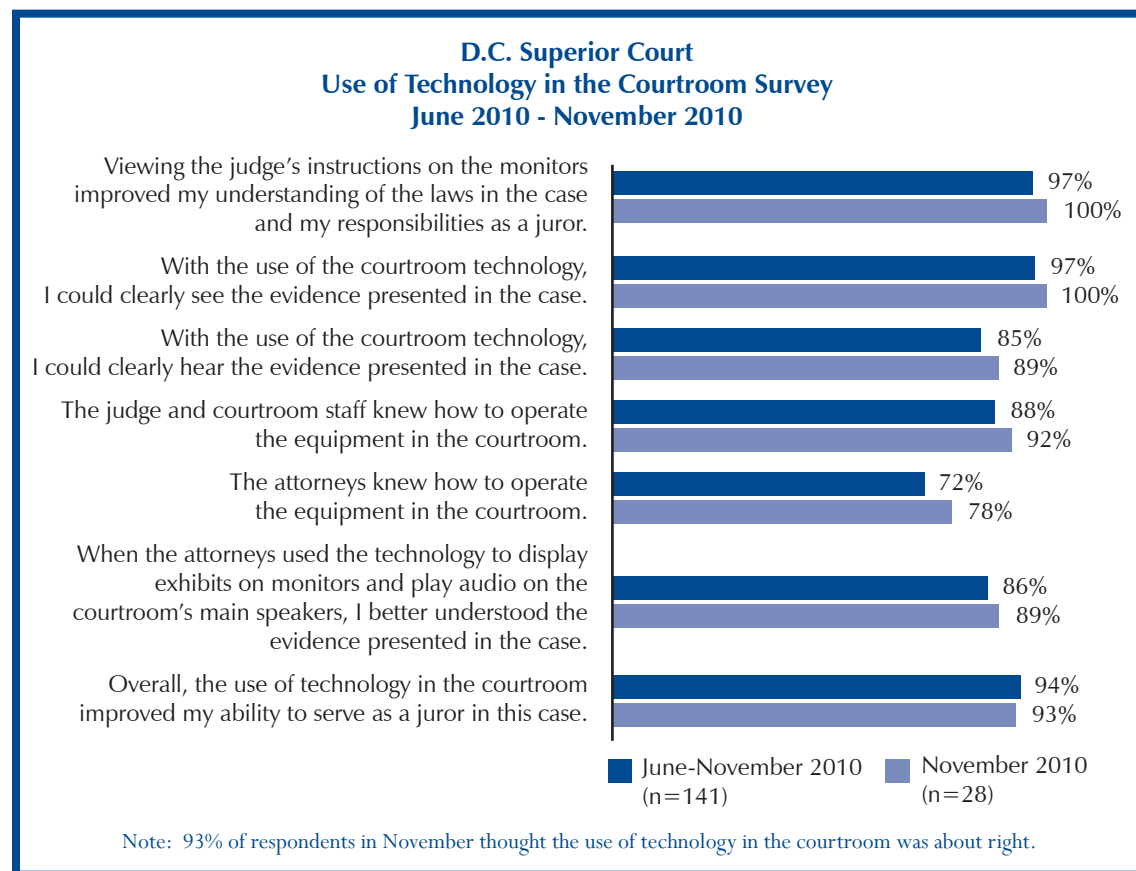
Remote Witness Testimony and Video Conferences

A video camera and broadband availability are essential for transmission or receipt of remote witness testimony or to conduct video conferences. Although remote witness testimony has occurred at an increasing rate over the last several years, even today it may be classified as occasional in civil trials and much less frequent in criminal trials. However, video conferencing does occur frequently in criminal arraignments and presentments, in status hearings and review hearings in dependency cases, and for remote language interpreting. With the availability of numerous online Web-conferencing solutions, any courtroom purporting to carry

the label “high-tech” must be able to transmit and receive remote witness testimony and conduct video conferences.

Juror Impressions Concerning Use of Technology During Trials

Over several months, I conducted 11 serious and complex criminal jury trials and presented surveys to the deliberating jurors and alternates after they were discharged from service. The surveys were intended to gather juror impressions concerning the effect, if any, the use of technology during the trials had on the jurors’ ability to see and hear the evidence and understand the instructions of law. Some aspects of the juror responses were very encouraging (see figure).



Final Thoughts

As time progresses, I expect all courts and counsel will improve their ability to use technology to enhance and improve the jury’s ability to see and hear the evidence and the court’s instructions. But, from personal experience, a court’s encouragement of the parties to use available technology accelerates that process. Some attorneys naturally are drawn to the use of technology in trials and other court hearings. Indeed, as I have urged and encouraged the use of the technology in my courtroom in complex and straightforward cases, I have noticed counsel gravitating to the use of the courtroom’s technology at a faster rate than previously experienced, which I can highlight with one example.

During one of my first trials during the survey interval, one defense attorney described himself several times by the redundant term “technology-challenged technophobe” to explain why he was making such limited use of the courtroom’s technology. The attorney probably thought this comment was necessary in his own defense. It was obvious during the trial that the prosecutor was making extensive use of the courtroom’s technology to project, for the benefit of the jury, enlarged images of videos, documents, and other evidence. In some of those instances the prosecutor directed the witness to mark the image where necessary to emphasize certain aspects of the testimony. However, something happened

to the defense attorney's way of thinking over the course of the trial. During a several-day recess before closing arguments, defense counsel prepared an outline of his closing argument using PowerPoint and projected a brief summary of the argument as he was making it. The PowerPoint summary projected at each stage of the argument was normally one sentence or less, including in some instances a topic heading or just a single word. It was obvious to me, and I am sure everyone else in the courtroom, that this was a well-prepared closing argument that touched all the important points. The attorney had obviously put significant thought into the order of his comments and the major points that he wanted to make. This self-proclaimed "technology-challenged" attorney gave the smoothest and most compelling closing argument that I had ever seen him make. This experiment became a transformational event. Since that time, PowerPoint-aided opening statements and closing arguments have become a staple for him, as has an increasing use of technology during trials. With this experience, my objective now is to increase the use of technology in trials, one lawyer at a time.

RESOURCES

Dixon, H. B., Jr. (2009). "The Courtroom of the Present: The Bare Essentials for a Technologically Competent Court Room," 48:1 *Judges' Journal* 37.

Federal Judicial Center (n.d.). *Effective Use of Courtroom Technology: A Judge's Guide to Pretrial and Trial*. Washington, DC: Federal Judicial Center.
[www.fjc.gov/public/pdf.nsf/lookup/CTtech00.pdf/\\$file/CTtech00.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/CTtech00.pdf/$file/CTtech00.pdf)

Fairfax County Courthouse, Virginia (n.d.). "High-Tech Courtrooms Lead to Legal and Logistical Solutions." www.fairfaxcounty.gov/courts/crto/high-tech-courtrooms.htm

First Judicial District of Pennsylvania (2007). "High Technology Courtroom." Brochure.
<http://courts.phila.gov/pdf/brochures/courtroom-625.pdf>

Lederer, F. I. (2010) "Wired: What We've Learned About Courtroom Technology," 24:4 *Criminal Justice* 18.

Ninth Judicial Circuit Court of Florida (n.d.). "Courtroom 23," Orange and Osceola Counties.
www.ninthcircuit.org/programs-services/courtroom23

Wiggin, E. C., M. A. Dunn, and G. Cort (2003). "Federal Judicial Center Survey on Courtroom Technology," Report, Washington, D.C., December.
[www.fjc.gov/public/pdf.nsf/lookup/CTtech03.pdf/\\$file/CTtech03.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/CTtech03.pdf/$file/CTtech03.pdf)

