CHAPTER - I

INTRODUCTION

JUDICIARY IS ONE of the pillars of Indian democracy. It is meant for the proper and effective functioning of judicial system there must be an active support and participation of the member of the bar. India has the proud record of not only having the second largest number of practicing lawyers in the world but also one which has been in the forefront of freedom movement and constitutional development.¹

Unfortunately after a variety of factors for which the Bar alone is not responsible, public perception about the profession is not flattering. In the field of criminal justice, this change in public perception has damage not only to the profession but also to the quality and efficiency of criminal justice system.² For this reason it is necessary to make some changes in the system of justice delivery system for the role and responsibility of prosecutor and defence lawyers will have to undergo changes in the process. Today every profession is seeking to specialize and acquire new skills and expertise to be able

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2. Ibid.
to do this job efficiently. The Bar has to realise the importance of specialization and
learn for example the nature and scope of forensic in detection and proof. Lawyers and
judges should be receptive to change on the benefits of technology should be fully
utilized.3

Dr. Justice V. S. Malimath4 (Chairman) on 28-3-2003 says:-

Society changes and so do its values. A system as vital and critical to the
society as criminal justice system cannot be static. Reforms ought to be
continuous process, keeping peace with emerging challenges. No
worthwhile reform is possible without deep study and intensive research. Accordingly the committee has made recommendation i.e. forensic science
and modern technology must be used in investigation right from the
commencement of investigations. A cadre of science of crime offences should
be created for preservation scene of crime and collection of physical
evidence therefore.

The application of science and technology in the detection and investigation of
crime and administration of justice is not new to India. Science and Technology is an
integral part of Indian culture. Although our ancestors did not know forensic science in
its present form yet scientific methods in one way or the other seem to have been
followed in the investigation of crime. Its detailed reference is found in Kautilya’s
Arthashastra, which was written about 2300 years ago. The Arthashstras of Kautilya
provides useful information about the classification of the methods of murder and use
of forensic medical investigation into such cases. Kautilya’s Arthashastra states that
death can be caused by four ways of stopping the breathing (strangling, hanging,
asphyxiation or drowning), two ways of physical injury (by beating or by throwing from
a height), or by poisoning (by poisons, snake or insect bite or narcotic drugs).
Arthashastra gives a list of forensic evidence for establishing the cause of death.5

If, the death is suspected to be due to poisoning, the undigested portion of the
meat may be examined in milk.6 Any dead person with body spread and dress thrown

3. Id at 250, Para 21.3.
4. Id at 262, Para 23.6, 22 (i)
   edn. Pg. 5.
out after excessive vomiting and purging may be considered as having been killed by the administration of the juice of the *madana* plant. Similarly, on finding the murdered body of a stranger, his persona; belongings such as cloths, dress and ornaments were examined.

In cases of sudden death, the corpse shall be smeared over with oil and examine and any person whose corpse is tainted with mucus and urine, with organs inflated with wind, with hands and legs swollen, with eyes open, and with neck marked with ligatures may be regarded as having been killed by suffocation and suppression of breathing.

The Indians knew for long that the handprints, known as the *Tarija*, were inimitable. The use of fingerprints as signatures by illiterate people in India, introduced centuries ago, was considered by some people as ceremonial only, till it was scientifically proved that identification from fingerprints was infallible.

As society cannot be static it always keeps on changing so the law should adopt the modern technology and scientific development which will be helpful in coming to a correct decision. Since the beginning of human race, crime in this or that form has existed. With the progress of science and development of technology the notion of crime as well as the methods used by criminals in commission of crime has undergone a phenomenal transformation.

The opinion of a witness under certain sections of Indian Evidence Act, 1872 on a question whether of fact or of law is irrelevant. It is not the function of a witness to draw inferences from the facts which he has seen, heard or perceived but he has to state the facts which he has observed or perceived, that is the providence of the judge, There are important exceptions to this which are categorized in Section 45 - 51 of Indian Evidence Act, 1972. Sometimes the subject – matter of inquiry so partakes of the character of science or art as to require the course of previous habit or study and in regard to which inexperienced person is unlikely to prove capable of firm or correct judgment.

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7. Ibid, Pg. 309.
8. *Supra note* 5.
9. *Supra note* 6 at Pg. 308.
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The reason for this exceptions is that when a subject – matter of inquiry is such that inexperienced person are incapable of forming a correct judgment upon it or when it so partakes of the character of a science or art as to require a course of previous habit or study, the opinions of persons having special knowledge of the subject matter of inquiry become relevant for it is very difficult for the Court to form a correct opinion on a matter of the kind, without the assistance of such persons.

At the beginning of the 21st century, it is not surprising that the question of how to handle scientific and technological information in judicial proceedings has moved into the limelight. The explosive growth and importance of scientific and technological knowledge in our society has run a parallel course in the courtroom, where an ever-increasing number of legal disputes cannot be resolved without the assistance of scientific and technological expertise. But, although remarkable new scientific findings are reported every day, there is still much we do not know. Consequently, the courts have been struggling with the difficult problem of determining when expertise will actually help the trier of fact in making a determination. An expert witness who claims to have specialized knowledge will be permitted to testify only when that specialized knowledge can really be of assistance. It is in the context of disputes about the admissibility of expert testimony that courts decide what kind of science and technology, information the legal system will take into account.12

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1.1 INTERRELATIONSHIP OF SCIENCE, TECHNOLOGY AND LAW:

One of the slogans of the 1933 Chicago Worlds’ Fair was the following: *Science discovers, genius invents, industry applies, and man adapts himself to, or is molded by, new things, Individuals, groups, entire races of men fall into step with science and industry.*

Lawyers and legal institutions regularly face technological change. Day to day there is scientific advancement and technological development which man in various field adapts. Science and technology, at present time, have become the focus of great interest. A number of research center have been formed to look into the relationship between science and law, science and its help in law, their correlation and how it help the judiciary in giving the justice.

Law is the set of rules that dictate how we must behave in the society. Law is to stop the crime. Law works on the best of understanding of the person in legal field and what science does is to find out how it works but not why it works. The role of science and technology should not be disregarded. The great advances in scientific knowledge, the speed at which scientific developments precede, the enormous part played by applied science in the life of a modern community and the degree to which our progress depends upon it, highlight the importance of a wider appreciation, among the people, of scientific principles and procedures and their impact on society. If we see, science and law share many mutual and compatible interests. As, both science and law seek reliable knowledge i.e. facts and truths and that through ostensibly apolitical and impartial means. Both science and law use standard and consistent mechanisms and methodologies to arrive at workable conclusions and solutions.

The fact that science is primarily a matter for the experts has been recognized by the law for a long time. It is precisely on this basis that Sec. 45 of the Indian Evidence Act, 1872, an Act which is now more than a hundred years old-allows experts to give evidence of their opinions. Initially, the law was reluctant to admit in evidence the opinions of ‘experts’, because of the traditional rule that evidence could be given only of facts which can be perceived by the senses, and not of opinion. But adherence to this strict doctrine was soon found to be unrealistic, when the matters of which evidence

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was to be given were themselves such as could not be perceived by the ordinary human being without the aid of specialized mental and physical equipment.¹⁴

Science attempts to seek the truth about observable phenomena. When the events that are the subject of legal disputes can be determined, at least in part, by virtue of scientific discovery, we might expect the law to embrace science as a means for ensuring that legal procedures get it right.¹⁵

Scientific evidence has special value in legal proceedings because science confers intersubjective validity that other categories of truth claims often lack. It offers fact finders and concerned observers a common yardstick against which to measure the validity and explanatory power of proffered evidence. So opinions grounded in science carry their own tests for reliability and usefulness, thus inspiring special confidence in judgments based on them.¹⁶

Today, we are in the age of knowledge revolution. The knowledge revolution has resulted in technological advancement leading to a drastic rise in the crime rate in India. Modern technology and recent advances in scientific area have enlarged the scope of use these in legal procedure.

1.1.1 MEANING AND DEFINITION OF SCIENCE, TECHNOLOGY AND LAW:

To understand the relationship between science, technology and law, first of all we have to understand what actually these words mean and after that the impact of science and technology on the several phases of achieving the purpose for which the law is laid down i.e. to give the justice and stop the crime.

1.1.1.1 SCIENCE:

The word ‘Science’ come from the Latin word scientia, meaning ‘knowledge’ or ‘knowing’. According Webster’s New Collegiate dictionary the definition of science is ‘knowledge attained through study or practice’ or ‘knowledge covering general truths of

¹⁶ Ibid.
operation of general laws, esp. as obtained and tested through scientific method and concerned with the physical world.’

In chapter 1, General Provisions of Constitution of the Socialist Republic of Vietnam, Article 2 defines, \textit{science as a system of knowledge about phenomena, things and laws of the nature, social and thought}.”\textsuperscript{17}

\textit{New oxford advanced learner’s} dictionary\textsuperscript{18} defined science as \textit{the knowledge about the structure and behavior of both natural as well as physical world, based on the facts that one can prove.}

\textit{Taber’s Medical} Dictionary\textsuperscript{19} defines science as \textit{the intellectual process for using all of the mental and physical resources available in order to better understand, explain, quantitate and predict normal as well as unusual natural phenomena.}

In other words, science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. The term science also refers to the organize body of knowledge that people have gained using that system. Less formally the word often describes any systematic field of study or the knowledge gained from it. Perhaps the most general description is that the purpose of science is to produce useful model of reality. Most scientific investigations use some form of the scientific method. Science which is defined above is sometimes called pure science to differentiate it from applied science, which is the application of research to human needs. Science commonly deals into two fields- natural sciences, which is the study of the natural world and social sciences, which is the systematic study of human behavior and society.

1.1.1.2 TECHNOLOGY:

The word ‘technology’ comes from the Greek word \textit{technologia}, which means the systematic treatment of an art, form or skill or a manner of accomplishing a task especially using technical processes, methods or knowledge. In other words, the term technology refers to the application of scientific knowledge, especially to commercial or industrial objects. Technology is also an application of science to solve a problem. It is

\textsuperscript{17} Manh, N. D. (National Assembly Chairman), Chapter 1, General Provisions - Article 2: Interpretation of terms, \textit{Law on Science and Technology}, (No. 21/2000/QH10), 9th June, 2000.
\textsuperscript{18} 7th edn., Pg. 1357.
\textsuperscript{19} 17th edn., Pg. 1761.
the use of science or knowledge which is put into practical use to solve problems or invent useful tools.

**Merriam - Webster Learner’s** dictionary defines the term *technology* as “the use of science in industry, engineering etc. to invent useful things or to solve problems” and “a machine, piece of equipment, method etc. that is created by technology.”

**Oxford** dictionary defined *technology* as *the application of scientific knowledge for practical purposes, the branch of knowledge dealing with applied sciences.*

**Cambridge English** dictionary defines the term *technology* as *the study and knowledge of the practical, especially industrial use of scientific discoveries.*

**Dunning** defines technology as *by scrutinizing the technology definition, there are two basic components that can be identified: 1 ‘knowledge’ or ‘technique’; and (2) ‘doing things’.*

**Bozeman** argues that *technology and knowledge are inseparable simply because when a technological product is transferred of diffused; the knowledge upon which its composition is based is also diffused. The physical entity cannot be put to use without the existence of knowledge base which is inherent and not ancillary.* Technology is a combination of measures, processes, skills, know-how, implements and means used to turn resources into products.

### 1.1.1.3 LAW:

Law is a rule of conduct established and enforced by the authority, legislation or custom of a given community, state or nation. In essence, law is the tangible and intangible context that links individuals to the community. In addition, it defines responsibilities of individuals to society as much as it defines and protects individual rights. In short, it is a pillar of good governance.

Law according to **H.L.A. Hart** is *generally understood to exist as a set of rules adopted by a society’s governing institutions that are applicable to all of its inhabitants.*

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24. ibid.
25. *Supra note* at 15.
Justinian’s Digest defines law as the standard of what is just and unjust.\textsuperscript{27}

Ulpian spoke of law as the art or science of what is equitable and good.\textsuperscript{28}

Salmond defines law as the body of principles recognized and applied by the State in the administration of justice.\textsuperscript{29}

So according to these definitions for doing justice, to decide what is just and unjust and for the administration of justice there should be the relationship between these three fields i.e. science, law and technology. In the court room whenever the question which has its answer in either science or technology and the person dealing with it legally does not have, they can take the help of it.

*Let the hundred culprits go free, no innocent should be convicted* is basic principle of our Criminal Jurisprudence. If ‘thieves’ and ‘murderers’ are not detected, prosecuted and punished then what is the use of meticulously defining the offences of ‘theft’ and ‘murder’ and prescribing ‘deterrent’ punishment for them.

While the general purpose of criminal procedure is to provide a mechanism for the administration of criminal law, its core object is to ensure for the accused a full and fair trial in accordance with the principle of natural justice. So, isn’t it proper that where there is the evidence to be examined by the person who have full knowledge about that and can judge, it properly then the help of such persons who are experts in relating field can be taken might be it related to science and technology? Therefore, criminal justice system must work to reduce the conviction rate of innocent accused and should give more importance to the system protecting the rights of such person. Also, Article 21 of Indian Constitution provides *No person shall be deprived of his life and person liberty except according to procedure established by law*, so proper procedure is to be followed; proper investigation is to be done with the help of experts where ever needed before conviction.

Development of science and technology is the result of the intellectual thinking of man. Science and technology have had a great impact on the way we live and have developed in response to our differing objects of interest. Today men are technically active, and technical knowledge of average man has increased tremendously in recent

\begin{footnotesize}
28. Ibid.
29. *Supra note* 27.
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years as result crime techniques are getting refined. Therefore, the investigating officer's needs scientific and technical methods to combat the modern criminals. Law has tried to regulate the use and abuse of science and the extent of its application. The major question however is whether we are well equipped with the laws to regulate the use of such technologies.

The subject law, science and technology are of great relevance today when courts have become 'activists' and there has been a tremendous advancement in science and technology. The need for sharpening the evidentiary techniques employed in courts with the help of science and technology cannot be denied. At the same time, one has to be conscious of the limitations. The limitations of both science and the law and the need for both to join hands to strengthen the court systems by legally admissible scientific evidence must be considered.

The courts required expert evidence earlier only to some limited field like medical doctors, engineers, architects. With the vast development in science and technology, the need of experts since from the beginning of the investigation stage has now become very common as well as helpful not only to the investigating team but to the courts also to reach upon a fair conclusion regarding commission of an offence. Today, the role of experts has been widened and the courts take their assistance in various aspects viz. ballistic experts, forensic experts, scientists who decide the legitimacy by DNA tests, chemical examiners, psychiatrists, radiologists etc. are playing a vital role in investigation of crimes and their evidence is admissible in the court of law.30

When the concept of science is used for law it is called forensic science. It is a diverse collection of scientific techniques as it dragged the principles of biology, chemistry, and physics and from other scientific methods. From the scene of crime materials are collected, identified and compared with the process of forensic science. Forensic science establishes the presence and absence of link between the crimes.

When there is some technical issue or such issue which relates to science or art, or as to identity of handwriting or finger impressions and the court has to form an

opinion upon that point, then the opinion of skilled/experienced persons in their respective areas may be taken into consideration.  

The high technology society today forces the two professions i.e. law and science to interact in a wide array of cases like the disputes those of patents, environmental torts, product liability and some of the criminal cases which uses both science and technology for solving the matter before it. Frequently the fact-finding agendas of the two disciplines i.e science and technology began to have each other field. Because, there is a general lack of understanding of each culture, these interactions often lead to a cognitive friction that is both disturbing and costly to the society. Scientists are distrustful of the lawyers and legal proceedings and not to venture into the courtroom. The scientific community that its method and procedure are above legal scrutiny and questioning often frustrates lawyers. Lawyers and scientists seldom speak the same language. Each should develop a better understanding of the principles and methods of the other’s profession.  

The court's today deal with complex cases relating to highly sophisticated crimes, where criminals take care to erase all evidence of their involvement. In such cases, modernized, scientific and highly sophisticated methods are required to trace the involvement of criminals. A report published in the York Times New 7th August, 2008 state that with the new analytical technique, a fingerprint can reveal much more than the identity of a person. It can also identify what the person has been touching: drugs, explosives or poisons. Such a laboratory technique can have a wider application in crime investigation.  

Science and technology seek knowledge through an open-ended search for expanded understanding whose truths are subject to revision. Law, too, conducts an open-ended search for expanded understanding: however, it demands definite findings of fact at given points in time. The meeting of these two disciplines in the courtroom magnifies the differences between the two cultures. Even the search of truth does not serve the same aims and may not be subject to the same constraints and requirements.  

31. Ibid.  
If the technical issue or issues related to science or art comes before the court, the court with the help of skilled and experienced person in that particular field can make an opinion on that issue and can come to the right conclusion.

The tension between the science and law is nothing new and both disciplines do not enjoy a comfortable relationship between them. The replacement in the eighteenth century of court-appointed scientific experts by experts called to testify by parties within the adversarial system, combined with changes in the nature of scientific inquiry and the proliferation of legal cases that raise questions of science and technology, have led to shifting roles for scientists in the courtroom. Historian Tal Golan in Revisiting the History of Scientific Expert Testimony, introduces many of these developments, and reactions of the legal system’s to them. Golan concludes that Far from being late twentieth-century pathology, the putative problem of scientific expert testimony has been chronic for over two centuries. Moreover, during the twentieth century, the courts were able to take advantage of the professionalization of science and the standardization of the market of expertise and actually improved their ability to control the performance of science in the courtroom.

Lawyers and legal institutions regularly face technological change. In recent years, the technical knowledge of an average man has increased tremendously. The criminal are using different methods of science and technology and get refined. The public record of the Twentieth and this century is populated by numerous crisis events that surround emerging technology where law was called forth to channel, to regulate, or prohibit certain technologies and technological mediated activities. This rich history coupled with the ever present concern of technological change would suggest that there is a detailed scholarly reflection on the relationship between law and technology.

Technology is the application of science and the arts for the benefit of life as it is known. It is a consequence of science. It was widely considered in the United States that technology was simply ‘applied science’ and that to fund basic science was to reap technological results in due time. ‘New products, new industries, and more jobs require continuous additions to knowledge of the laws of nature, and the application of that

34. Supra note 14 at Pg. 848.
36. Valiant, H., Special Symposium 2011: The Laws of Technology and the Technologies of Law, Socio-legal Research Center, Griffith Law School, Griffith University, Nathan Qld 4111, Australia.
knowledge to practical purpose. This essential new knowledge can be obtained only through basic scientific research’.  

As it is said that society never remains static it keeps on changing, it improves day by day so the demand, needs of the society is changing and as a result crimes in the society also increase and new ways of committing crime comes before court like cases related to information, communication, forensic etc. Now most of human activities are carried with the aid of modern technology as a result we become more dependent on it. The last century has witnessed the maximum advancement in the field of technology leading to dependency of every governmental affair, business activity and masses around the world on technology.  

With these developments criminals also go advanced; they create new and different methods of creating crime. They take the help of hi-fi technology while committing crime. Earlier crimes are limited only to local areas but now with the influence and uses of science and technology national and international crime arise and becomes a common phenomenon. To regulate this investigation team and persons in judiciary should take the help of the person who are expert in the field relating to situation that are in question.

1.2 TECHNOLOGY, AS THE APPLICATION OF BASIC SCIENTIFIC KNOWLEDGE:

As per Vannevar Bush report of an engineer in the Manhattan project came to the conclusion that basic research leads to new knowledge and this creates the fund from which the practical applications of knowledge must be drawn. Technology also creates new scientific possibilities and that leads technological innovation to scientific discoveries. For instance, Derek de Solla Price (1984) argues that there are some technological innovations that yield new scientific possibilities. Price gives an example of the development of the telescope by Galileo. He was able to change the cosmology of his time thanks to telescopic observations. This new instrument led to the acquisition of

new data, which made possible new scientific knowledge. Such relationships between science and technology occur in the field of experimentation.40

As the science leads to technological advance in the same way technology advances leads to new scientific discoveries e.g. science gives the concept of DNA, fingerprints etc. and technology has led to important breakthrough in many areas of science which further helps judges giving right decisions e.g. DNA copying, DNA fingerprinting, and matching fingerprints.

By the industrial revolution of the 18th & 19th century in Europe and America, machine production ushered in totally new kinds of social relations, the specific feature of which was a remarkable instability due to the revolutionary technical basis of industry. By continually changing the technique of production, modern industry is constantly causing major changes in social relations and the environment.

The Forensic Resource Network (FRN), an NIJ program is one example of a partnership among research institutes, technology centers and crime laboratories that promotes the implementation of new technologies and model training programs for the forensic laboratory community. Its mission serves to bridge the gap between the science and technology.41

To keep up with changing technology, the forensic community urges the continued development of scientific guides of best practice. The development of these guides for best practice has been primarily accomplished in the United States by scientific and technical group and these groups are composed of multidisciplinary professionals but also include forensic scientists with discipline specific experts.42

Science and technology feed off one another, propelling both forward. Scientific knowledge allows us to build new technologies, which often allow us to make new observations about the world, which in turn allow us to build even more scientific knowledge, which then inspires another technology and so on. The knowledge generated by science is reliable and powerful and it is used to develop new technologies. As an example, we will start with a single scientific idea and trace its

40. Ibid.
42. Supra note 35 at Pg. 67.
applications and impact through several different fields of science and technology, from the discovery of electrons in the 1800 to modern forensic science and DNA fingerprinting.\textsuperscript{43}

The identification of criminals through fingerprints was the first important breakthrough in the scientific investigation of crime. Scientific invention led to the conclusion that fingers have \textit{papillary ridges} and these \textit{ridges} form complex patterns. The \textit{ridge} patterns differ not only from individual to individual but also differs from finger to finger of the same individual.

Science, technology and innovation each represent a successively larger category of activities which are highly interdependent but distinct. Science contributes to technology in at least six ways:- \textsuperscript{44}

1. New knowledge which serves as a direct source of ideas for new technological possibilities.

2. Source of tools and techniques for more efficient engineering design and a knowledge base for evaluation of feasibility of designs.

3. Research instrumentation, laboratory techniques and analytical methods used in research that eventually find their way into design or industrial practices, often through intermediate disciplines.

4. Practice of research as a source for development and assimilation of new human skills and capabilities eventually useful for technology.

5. Creation of a knowledge base that becomes increasingly important in the assessment of technology in terms of its wider social and environmental impacts.

6. Knowledge base that enables more efficient strategies of applied research, development, and refinement of new technologies.

\textsuperscript{43} Science and Technology on Fast Forward, \textit{Understanding Science}, University of California Museum of Paleontology, Berkeley, and the Reagents of the University of California, California, 2013.

Further Brooks in *The relationship between science and technology*\(^45\) says that the converse impact of technology on science is of at least equal importance:-

(1) Through providing a fertile source of novel scientific questions and thereby also helping to justify the allocation of resources needed to address these questions in an efficient and timely manner, extending the agenda of science.

(2) As a source of otherwise unavailable instrumentation and techniques needed to address novel and more difficult scientific questions more efficiently.

In the field of science there are inventions, which are laid down in reality by the help of technology and are helpful in the judicial system. Law has often to deal with technologies, i.e. with human activities which, employing the attainments of science, bring into existence new media, tools, devices, systems which had its effect on human life. e.g. the law regulates the production, processing, distribution of energies and natural resources. Law and information technologies have made available tools such as e-documents and e-signatures. The law must cope with these technologies to regulate them or to make them legally available. The relation between law and technology has several implications.

\(^{45}\) Supra note 40.
There is a close relationship between law, science and technology, as technology is the product of the advancement of science, and science is to seek truth with strong reasons so is the objective of law i.e. to do justice. More specifically, there is a symbiotic relationship between law and human activities that, using the findings of science, create new resources, tools, devices, equipments with the goal of improving the living conditions of man himself.

The relationship between law and technology is the two sides of same coin. If the law is called upon to regulate technology, the law itself employs technologies in order to catch up with changes brought about by new technologies. As law employs new technology to pursue its work of giving justice by the use of computer, internet, and protect the use of by giving the right of privacy, through Criminal law (Amendment) Act, 2013 add the concept of voyeurism, stalking under Section- 354 of Indian Penal Code and making them punishable.

Society cannot be static so law cannot stand still. A major function of the legal system is to respond to changing values and concerns within society, resolve issues as they develop, overcome problems that occur in legal cases or events, promote equality and respond to scientific or technological developments. As the technology develops different new types of crime develops in the society, then there arises the need of law reform like new smart phone technology which allows for the taking pictures alteration in pictures, making of videos then sharing it on social media such as whatsapp, facebook etc. and sending of SMS as results there is calls for reform to privacy laws as a result it now becomes a crime under the Indian Penal Code, Sec. 354D for stalking etc. The development in technology which resulted in new crimes in society also helps in solving crimes liking tracing a phone, phone call, location of criminal or as per need of the case, in solving the cases of cyber crime etc.

Experiments in science and technology and its development in one way or another have its effect on the society. As the science and technology needs the society so the society needs the science and technology. The law is more and more involved in regulating scientific activities, products and results; at the same time legal intervention is often grounded on expert knowledge and scientific notions and concepts penetrate legal categories. The ‘double bind’ between law and science truly produces a ‘hybrid
knowledge’ in which contributions from both actors complement each other and reciprocally elicit and legitimise its contents.46

Technology develops as ways are found to produce new results or to produce old results using fewer or less costly inputs. Law is generally understood to exist as a set of rules adopted by a society’s governing institutions that are applicable to all of its inhabitants.47 Hart divides rules into primary rules of obligation and secondary rules. Primary rules are those that govern behaviour and facilitate contracting and other fulfilling activities. Secondary rules are concerned with interpreting, applying, and enforcing primary rules.48

With the development of technology, law enforcement officers have the ability to find criminals fairly and can protect the citizens. DNA, finger-prints, hair, footprints, sputum etc. is able to be tested and is used for evidence in crimes. Mobile communication is growing breathtaking speed. The number of mobile telephone subscribers has doubled over the past few years. Now Smartphone’s with various features are launched by various companies at a low cost. They are easily available in market as they take the place of simple mobile phones so the crimes related to Voyeurism (Sec. 354C), Stalking (Sec. 354D) etc. are a daily committed. We see various evidences of these crimes on different internet sites. The recent case is of kissing prank video made by a Delhi guy on 8th Jan., 2017 in which a guy with his friend make a video of randomly kissing girls and run away and posted it on YouTube.

Justice Singh T.49 on information and communication technology (ICT) views that ICT is not an option but a need of hour and mindset of judiciary needs to be changed. In all walks of life we use internet but hesitant to use in courts of justice.

Bangeman M.50 has stated:–

*Throughout the world, information and communication technologies are generating a new industrial revolution already as significant and far*

reaching as those of the past. It is a revolution, itself the expression of human knowledge. Technological progress now enables us to process, store, retrieve and communicate information in whatever form it may take, unconstrained by distance, time and volume. This revolution adds huge new capacities to human intelligence and constitutes a resource which changes the way we work together and the way we live together.

Schiffrin N.51 but while the internet enhances freedom of expression by allowing for free and effectively unregulated communication, it has also facilitated a great deal of crime. The dissemination of child pornography, not to mention fraud, gambling, blackmail and cyber stalking are all on the rise. Even incitement to murder is occurring over the internet.

Dr. A.P.J. Abdul Kalam, former President of India, a technocrat also had stated about technology in courts, Technology is definitely an essential element of change in all spheres of life. The human element involved also is an important factor. If technology is properly used, it can bring about tremendous changes for the betterment of life. Any change we contemplate is for speedy justice delivery mechanism keeping in focus the quality, transparency and public accountability. Today we hear the word e-governance, it enhances transparency and accountability, reduces red tape and corruption in administration. In the field of information and by introduction of computers, Smartphone’s technological development had made a turning point in the history of human civilisation.

President Dr. A.P.J. Abdul Kalam, Bharatratna awardees52 stated:-

Let me unfold the scenario. A litigant comes with his all the documentary evidence which he possesses. E-court service centre helps electronically to identify a civil lawyer to present his case. The lawyer files the case with prescribed format in the e-court. Once the case is filled, the e- Court web service agent crawls across the state and central e-governance grid and collects the relevant land records registry and gets the encumbrance certificate details of the litigant and the defendant. If necessary, it also

collects the credit history of the parties from the banking grid, criminal record if any from the police grid, litigant record if any from the other courts, property tax and service tax payment data for the particular disputed land from the state e-governance grid, legal heir verification from the Registrar of Deeds and classification and conversion details of the particular land from the district e-governance grid. The judicial officer has the documentary evidence submitted by the litigant and defendant and the certified and authentic documentary evidence collected from various government units which have relevance to this case on the fly in front of him.

As we all know technology is the product of advancement of science so in order to understand the relationship between law and technology it is inevitable to establish a dialogue between law and disciplines like biology, computer, science medicine engineering and like others.

In Mohammad Ajmal Mohmmad Amir Kasab v. State of Maharashtra53 - Hon’ble Supreme Court remarked we must not forget that the object of criminal law process is to find out the truth and not to shield the accused from the consequences of his wrongdoing. So for solving such a problem science and technology joined the hand with law to solve such cases. Technology help the law in various ways like in the cases related to information technology, communication technology, and medical technology.

Science and technology work hand-in-hand to accomplish a specific task or solve a particular problem. Today, complex scientific issues forced judges, legislators and policymakers to re-think about the relationship science and law. Complex scientific issues arise regularly before court, for that there is the need of time, science, technology and law should work together where question related to them arise. Law should join the hand of science and technology to reach the end of justice.

53. AIR 2012 SC 3566.
1.3 IMPACT OF SCIENCE AND TECHNOLOGY ON LAW:
1.3.1 IMPACT OF SCIENCE ON INVESTIGATION:

The application of science and technology to the detection and investigation of crime and administration of justice is not new to India. As, I already discussed that we are not new in the use of scientific methods Mr. Kata K. M. also said that the Indians knew for long that the handprints, known as the *Tarija*, were inimitable. The use of fingerprints or *angutha lagana* i.e. thumb impression, as signatures by illiterate people in India, and palm impression by both bride and bride groom was introduced centuries ago, even follow in modern times in India is simple a identification of the person, was considered by some people as ceremonial only, till it was scientifically proved that identification from fingerprints was infallible.

Science and Law are the two distinct professions have increasingly become commingled, for ensuring a fair process and to see that justice is done. The legal system today, has to deal with novel scientific evidence on several occasions, which has posed profound challenges for the law. At basic level many of these challenges arise from fundamental difference between scientific and legal processes. The dilemmas are self-evident. On the one hand, the scientific evidence holds out the tempting possibility of extremely accurate fact finding and a reduction in the uncertainty that often accompanies legal decision-making. At the same time, scientific methodologies often include risk of uncertainty that the legal system is unwilling to tolerate.54

In the administration of justice, science is strong and commanding weapon and when this science is used for law it is known as forensic science. This forensic science is used by the criminal investigation team during the investigation of case and the findings of which can lead to arrest and convictions. Undoubtedly, scientific investigation generates evidence in favour of the victims and against the accused. Forensic science helps in providing the identity of the culprit or the accused that willingly or unwillingly, in most of the cases, leaves the mark of his crime, thereby making the job of the investigator much easier in proving the culpability with the aid of Forensic Science.55

The word *investigate* in the legal context means ‘to follow up step by step by patient inquiry or observation. To trace or track; to search into; to examine and inquire

54. Tandon, N., “The Journey From One Cell To Another: Role of DNA Evidence”, *The Practical Lawyer*, (2004); 8 SCC (J) 17.
55. *Supra note 32.*
into with care and accuracy; to find out by careful inquisition; examination; the taking of
evidence; a legal inquiry.\textsuperscript{56} For the entire justice system investigation is so important
that in its absence, tardy or shoddy execution may lead to delay in the administration of
justice. ‘While the general purpose of criminal procedure is to provide a mechanism for
the administration of criminal law, its core object is to ensure for the accused a full and
fair trial in accordance with the principle of natural justice and as per constitutional
provision. For that it is necessary that there should be proper and fair investigation of
case.

As Maguire, said criminal investigation is viewed as a ‘truth finding’ process at
the end of which the crime is solved and offenders are caught,\textsuperscript{57} the main investigative
skills lie in discovering and interpreting ‘clues’ to find out ‘who did it’.\textsuperscript{58} Department of
Justice’s \textit{Managing Criminal Investigations Manual} under chapter - 1 ‘The Investigative
Roles of Patrol’ defines criminal investigation as:-\textsuperscript{59}

The total police efforts to:-

(1) Collect facts leading to the identification, apprehension, and arrest
of an offender.

(2) Organize these facts to present the evidence of guilt in such a way
that successful prosecution may occur.

It is further said by the Department of Justice’s ‘Managing Criminal
Investigations Manual’ that the criminal investigation managing process is a complex
and multidimensional undertaking.\textsuperscript{60}

Innes, M. defined criminal investigation as, \textit{The identification, interpretation and
ordering of information with the objective of ascertaining whether a crime has occurred
and if so, who was involved and how}.\textsuperscript{61}

\begin{footnotes}
\item[56] Supra note 35, Pg. 71.
\item[57] Maguire, M., \textit{Criminal Investigation And Crime Control}, Handbook of Policing, 2003 Pg. 5.
\item[58] Hekim, H., et. al., “Police Use of Information Technologies In Criminal Investigations”, \textit{European
\item[59] Cawley, D. F., et al., \textit{Managing Criminal Investigations Manual}, National Institute of Law
Enforcement and Criminal Justice, United States Department of Justice, 1977, Pg. 1.
\item[60] Ibid.
\item[61] Innes, M., \textit{Investigating murder: Detective work and Police Response to Criminal Homicide},
\end{footnotes}
Forensic Science provides scientific study for investigation of crime. Forensic is the term given to an investigation of a crime using scientific methods and is one of the factors affecting the outcome of criminal investigation. It is the name used for the application of scientific knowledge to legal matters. Without the use of scientific and technological methods criminals could not be convicted of his crimes. Clues that criminal leaves behind can be traced to themselves through scientific evidence. This field of science dealing with criminal investigation is known as forensic science, which means the use of science in law and is employed in order to investigate cases or questions that are of interest to the legal system for solving cases.

Justice Kalgo of the Supreme Court of Nigeria has defined the relationship between criminal investigation and justice as ‘there is no doubt that in criminal allegations, investigation plays an important part and it will make or mar subsequent criminal proceedings’. The growth development and use of forensic science in detection of crime in developed countries are tremendous and increasing with new techniques. The area of forensic science in India has not been properly looked into, as it ought to have been and more so when the average acquittal rate is alarmingly high. Therefore, in our country, also, the necessity and importance of forensic science needed. The lack of understanding and appreciation of the importance of specialist in general, by non-specialists, in all fields cannot be denied. The field of Forensic Science is no exception. Many a time neither the judge nor the lawyer nor even the police appreciate fully, the advances or the extensive promising potentialities of the science and the fusion of new technologies, methodologies, modalities and research. Multitask and multi-professional nature of forensic science needs an inter-professional approach, which is, many a time, lacking. Therefore, sincere and serious efforts are required to be made to eliminate personal and professional bias of the involved personnel and professionals.

Law enforcement agencies refer to forensic experts to help solve mysterious situations concerning human life and thereby, provide help and useful contribution to the criminal courts in the journey for search of truth in criminal trials. Forensic science deals with various aspects, including routine post-mortem to sophisticated tracking

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piece like DNA, Odontology etc. Systematic uses of forensic science provide significant assistance in answering the following question:-

1. Has a crime been committed?
2. When and how was the crime committed?
3. Who committed the crime?

When a dead body was found first question arises is that whether it is natural death, accidental or homicide, then forensic science by ascertaining the nature of death establishes the existence or absence of corpus delicti, and regarding to when and how, by the condition of dead body, by the presence of bugs, flies that are at present at the crime scene. If the question arises who committed the crime, the science inventions like fingerprints, footprints, blood samples, DNA, hair and other such methods come to help in solving the question. From the microscopic examination of the hairs it is possible to say whether they are of the same or of different colours or sizes and from the examination it may help in deciding where the hairs come from and also DNA.\(^\text{63}\)

Unfortunately, science and its methodology with necessary materials used extensively in Western countries, while it has not successfully clicked in India because of a variety of reasons, the major one being the investment of huge finance. This science is also at times useful in finding out the truth in some of civil cases.

The prosecution mainly calls forensic scientists as expert witnesses. The practice of the defense producing forensic scientists or the courts consulting on their own listed experts is not very much vogue. In fact, there is an acute need to bridge the communication gap that presently exists between lawyers, judges and forensic scientist.

DNA test and profile is widely employed in western countries, but in countries like ours, such a test and profile is not emphasized. In many developed countries now a days a techniques of science and technology like DNA test, odontology, entomology and racmization testing has proved to be very useful. ‘Racmizaiton’ testing technique is based on systematic examination of teeth and bite-mark technique is currently used in Japan and Germany, has potential to replace the traditional method that took into account the eruption or fusion and falling sequence of teeth and a fusion of such knowledge of forensic science and newly developed techniques will, undoubtedly, not

only provide proper perspective and dimensions, but will also lead to detection of crime, and be a great help in search of the truth which will be useful in the prevention and control of crimes and will provide required assistance to the parties to civil disputes, as well.⁶⁴

Klinker, M.⁶⁵ in 2009 explained the relation between forensic and criminal investigation as employee-employer respectively, i.e. forensic science is employed in order to investigate cases or questions that are of interest to the legal system and to help solve legal disputes.

Sometimes, there might be no witness at the scene of crime then forensic expert come to help the prosecutor for example if human body are found in a ravine and have decayed to the point where they cannot be recognized, forensic scientists use DNA from the body, for the examination of dental work odontologist and where the body was in this position and warms on the body come, the entomologist come to give the answer various question, which helps the investigating teams to reach the conclusion.

Usually, only the two common crimes are investigated in the forensic lab one is drug related and another sex crime. In the crime lab with the help of forensic toxicology the unidentified substance like that of cocaine, marijuana or a controlled substance recovered from a suspect is determined. The result of test if used as an evidence in court to prove whether the person had drunk or not and in the same way in case of sex crimes, DNA evidence recovered from a victim body help in determining, who was responsible for physical or sexual assault. As the DNA is the blueprint of an individual. The presence of teeth mark on the victim body help the odontologist to answer the question related to teeth mark is it?, in the court room resembling it those of suspect, as in Nirbhay case in which the court relied on forensic evidence that include fingerprints, dental models, DNA sample and other medical and electronic evidences. In the Nirbhay’s case, a number of bite marks were found on the body of the prosecutrix and therefore, bite mark analysis was undertaken by the investigation to establish the identity of the accused.⁶⁶ In the investigation of causes related to cyber crime computer specialist’s

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⁶⁴. *Supra note* 32.
⁶⁶. Death sentence reference no.6/2013; CRL.APP. NoS. 1398/2013 1399/2013, 1414/2013, para 93; Delhi High Court, Delhi.
searches database, IP addresses are traced and document are recovered to determine who committed the crime.

1.3.1.1 SCIENTIFIC SECTIONS IN THE CRIMINAL INVESTIGATION DEPARTMENT:

During 1936, a scientific section was set up under the CID in Bengal and facilities were created for examination of bullets, cartridge cases, firearms, etc., used in committing crime. Few other states also started scientific sections in their CID, where investigations on fingerprints, footprints, firearms and questioned documents were also carried out. Gradually, more and more branches of sciences were embraced and the laboratories gained maturity over the years.67

For men and women who, in their daily life, pursue only one field of study it is refreshing to cross over its boundaries and to have a look at wider horizons. Such activities, covering as they do the boundaries of more than one discipline not only widen one's mental sweep, but also lend it depth and content. If science is the accumulated knowledge of centuries, law can be rightly described as collected wisdom of the ages.68

Human labour and education may be revolutionized by computers. The achievements of medicine and surgery in the prolongation of life may alter the very concept of life. New developments in the processes involved in the creation of life may also raise interesting problems. A scientific discovery or a technological invention could be a threat or a promise. It is for society to decide which one of the two it shall be.

Science in the twentieth century has become big, complex, and expensive. It has also become relevant to the ordinary lives of men to an unprecedented extent. One could say, without too much exaggeration, that the course of history since the last quarter of the nineteenth century has been a story of increasing acceptance and incorporation of the scientific knowledge and scientists into the practical institutions of society.

The role of science should not be disregarded. The great advances in scientific knowledge, the speed at which scientific developments proceed, the enormous part

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67. Supra note 9.
68. Supra note 13, Pg. 1.
played by applied science in the life of a modern community and the degree to which our progress depends upon it, highlight the importance of a wider appreciation, among the people, of scientific principles and procedures and their impact on society.

Forensic expert are the person who are qualified in forensic science but forensic medicine is ‘quite different from healing art’. The forensic or medical experts have to look at the facts more with the eyes of lawyer than with the eyes of doctor. When the accident occurs instead of healing the patient he has to go through the questions and decide whether it accidental, homicidal, suicidal or whether the act is dangerous to life and such more questions

‘Of course, law is much older than science – at least modern science as we commonly recognize it. The law is an ancient institution for the collective consideration of matters of concern. In many ways, the law is more like its nearly 6000 years old self, more similar in function and processes to Hammurabi’s code than, for example, the modern nuclear family, the market economy or the nation-state to their historic counterparts. For these 6000 or more years, the law has been attempting to resolve whatever family or economic disputes and controversies have been voluntarily or coercively brought to it, transforming diverse matters of concern into the objects and expectations of daily life. However, the law is a powerful and durable institution not merely because it is long-lived, but also because it has been a common feature of everyday life, if only in the last several hundred years achieving widespread hegemony.’

Although science can also trace its lineage for thousands of years, it has become recognizable as science, rather than a matter of everyday life, only in the last several centuries. It would be a mistake, however, to suggest, as earlier generations of historians of science have, that there was a distinctly pre-scientific age pre-dating a revolutionary seventeenth-century transformation into the age of science.

1.3.2 IMPACT OF SCIENCE ON THE JUSTICE DELIVERY SYSTEM:

In a criminal case appreciation of evidence is one of the first and foremost tests to consider the credibility and reliability of the prosecution version both oral and

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70. Bensuade-Vincent and Stengers, 1996.
documentary. The finding of the facts, the question of law and the conclusion of the Judges of the court culminating into the judgments in a criminal case mainly based on the appreciation of evidence. Right from setting the law in motion in a criminal case by preferring FIR and after completion of investigation filing the final report ultimately resulting in producing and adducing the evidence before the court consist varied kinds of evidence both oral and documentary and the admissibility and reliability of such evidence should be considered by the court on the basis of the facts and law for arriving at the just decision of the case. Therefore appreciation of evidence is the heart and soul of the dispensation of justice delivery system in criminal law. Criminal cases involves life and death problem of a citizen and the destiny of the citizen is to be decided by carefully analyzing and scrutinizing the evidence adduced by the prosecution.

The Hon’ble Apex Court in Rang Bahadur Singh v. State of U.P. 71 has held as follows: -

The time-tested rule is that acquittal of a guilty person should be preferred to conviction of an innocent person. Unless the prosecution establishes the guilt of the accused beyond reasonable doubt a conviction cannot be passed on the accused. A criminal court cannot afford to deprive liberty of the appellants, lifelong liberty, without having at least a reasonable level of certainty that the appellants were the real culprits.

Common view is that the Indian justice administration system is slow. However, the major question is, is it the primary problem with Indian justice delivery system? The key issue is, is it delivering justice at all in majority of cases? If a machine is faulty and makes bad products, then if one speeds up the machine, it will deliver more of those bad products. Therefore, if we speed up a malfunctioning Justice Administration System, it will simply toss up more of injustice. Is that the goal of any justice delivery system?

In the words of Justice Sen, S. K., The investigation process needs to be hastened; otherwise the criminal justice system will suffer. Justice Sen urged that research and development should be initiated in a way that would ensure that crime at the grassroots level is detected immediately and an effective management system should be introduced.72

71. AIR 2000 SC 1209
72. Supra note 32.
Today science and technology has made a deep invasion in man’s life the modern inventions of science and technology has a serious impact on the law and justice delivery system of the country. The basic function of forensic science and technology is to assist in the administration of justice, the evolution of science and technology has enabled law enforcement agencies to solve many crimes with the help of experts of science and technology like cyber crimes.

According to Singh, M. P., Vice-Chancellor, West Bengal National University of Juridical Science, new techniques should be introduced as it will help in crime detection and the infrastructure should be developed in a way that will not only give momentum to effective criminal delivery system but will also hasten the entire long drawn process of investigation.

In Scots Law, Davie v. Magistrates of Edinburgh\(^{73}\) (1953) provides authority that where a witness has particular knowledge or skills in an area being examined by the court, and has been called to court in order to elaborate on that area for the benefit of the court, that witness may give evidence of his opinion on that area.

**1.3.3 IMPACT OF SCIENCE ON COURT AND COURT PROCESSES:**

Our own ancestors from this line [of woodland apes] began shaping stone tools and relying much more consistently on meat around 2 million years ago. They tamed fire perhaps 1.5 million years ago. They developed human language at some unknown later time, perhaps 150,000 years ago. They invented agriculture 10,000 years ago. They made gunpowder around 1,000 years ago and motor vehicles a century ago. This typical summary of human history from stone age tools to Ford cars illustrates the shared ‘scientific’ understanding, circa 2010, of the history of technology.\(^{74}\)

Science is not new to the Indian courts. Towards the end of 1989, one low-end computer was installed in Supreme Court of India for caveat matching. Immediately thereafter, in 1990, Justice Bharuka, G. C., as a sitting Judge at the Patna High Court initiated the process of court computerization. On his transfer to Karnataka in 1994, he undertook to introduce Information and Communication Technologies (ICT) in the entire judiciary of the state of Karnataka. Presently all the courts upto the taluka level

\(^{73}\) 1953 SLT 54,1953 SC 3

\(^{74}\) Marx, L., “Technology: The Emergence of A Hazardous Concept”, *Technology And Culture*, (2010); Vol. 51, Pg. 562.
are computerized. All the judicial officers and court staff are trained. There is complete automation from filing of a case to grant of a certified copy. Digital production of undertrial prisoners by video-conferencing is made possible. Through website, case lists of the Supreme Court of India, High Courts, district courts and various Tribunals are made available online.

In established fields of science, the court may take the view that expert evidence would fall beyond the recognised limits of the field or that methods are too unconventional to be regarded as subject to the scientific discipline. But a skill or expertise can be recognised and respected, and thus satisfy the conditions for admissible expert evidence, although the discipline is not susceptible to this sort of scientific discipline.\(^75\)

Previously, men live like animals but as there is development in science and technology men have arisen above the animal level. By the use of scientific inventions and implementation or transfer of these inventions into ‘technics’ men made a tremendous development. Knowledge of the material world; its purest form is science, and when put to practical use, it becomes technology. Wisdom, at the peak of its excellence is the foundation of the ideal political system and when utilised to regulate human relationships, becomes law Herbert Spencer defined Science as organised knowledge.\(^76\)

Law is ultimately the set of rules that dictate how we must behave in society and for committing the crime a person need both mens rea and actus reus. \textit{Actus non facit reum nisi mens sit rea} is a well known maxim of criminal law which means that the act itself does not make a man guilty, unless his intention were so.\(^77\) Actus reus which means a wrongful act, is such a result of human conduct as the law seek to prevent.\(^78\)

Mens Rea means the mental element in crime. The liabilities to conviction of an individual depends not only on his having done some outward act which the law


\(^{76}\) Supra note 13, Pg.1.


\(^{78}\) Id at Pg. 9.
forbids, but on his having done them in a certain frame of mind or with a certain will.\textsuperscript{79} This means an act in order to be punishable at law must be a willed act or a voluntary act and at the same time must have been done with a criminal intent.\textsuperscript{80}

Hypothetically, if we were to take two examples, we can intuitively understand what they mean:-

1. A drug dealer does not want to get caught. So, when cop comes knocking on the door, he shoots him to prevent witness.

2. A schizophrenic has severe hallucinations, and believes he is seeing a hostile alien that is about to vaporize him. He reaches for the gun and ends up shooting the alien. But, unfortunately, in real life, this ‘alien’ is actually a cop. Although they both had a similar mens rea we cannot jail a schizophrenic, because mentally, he didn’t know what he was doing.

Scientific conscious planning is absolutely essential in the scientific era, as this will minimize the chance factor before which mankind has hitherto felt helpless and which inevitable leads to social friction and anarchy. So, the modern legislator and the judiciary should upgrade themselves with the new advancement in the field of science and technology.

It is only in the modern age that the science and technology have become closely interlinked and the gap between them has narrowed down e.g. the discovery of nuclear fusion by Otto Hahm in 1936 was followed in 1945 by first atomic explosion which catapulted man into the atomic age. The result of these scientific discoveries and technical invention has been the rapid progress of both science and technology and the radical transformation of society.\textsuperscript{81}

Day by day complex issue of science and technology comes before the court as a result court has to deal with such problems for that court needs the expert in these fields. Associate Justice Stephen Breyer of the U.S. Supreme Court in an address to the AAAS Annual Meeting observed that the law “increasingly requires access to sound

\textsuperscript{79} Id at Pg. 10.
\textsuperscript{80} Supra note at 72.
science, because society is becoming more dependent for its well-being on scientifically complex technology, this technology, he went on to state, ‘underlies legal issues of importance to all of us.’

1.3.4 IMPACT OF TECHNOLOGY ON INVESTIGATION:

Technology speeds up many lives’s process. Earlier there was use of typewriter than electric typewriters and now there are computer, tablets and smart phones through which judges have easy access to statutes, national and international cases at their fingertips. A few years back, lawyer expressed security concerns about Cloud and Dropbox for confidential, legal documents, but now all new iPads comes with iCloud Android with their own Dropbox and security purposes. Litigators with the use of technology can store all documents as a case in an electronic device. Witnesses are examined through video conferencing. Evidences in the form of video recording and CCTV enter the courtroom.

As per Harris, C., ‘With the proliferation of telephones in the early twentieth century, policing change. Citizens called and in fact were encouraged to call the police to deal with a multitude of problems and the police responded to those calls from dispatch via a two-way radio, and sped quickly to locations via patrol cars. These technological advances, along with changes in police administrative procedures, helped to create the police as we know them today.’

With the advancement in technology, if criminals are using these technologies for committing crime, crime investigation agencies has to go more advanced and use these technologies to combat illicit usage. Most important technology of modern time is computer, smart phone, internet services, and various search engines which are misused by criminals and used by crime investigating during search process. Like Bagdadi leader of ISIS use it for creating a threat in between public, UNO and Russian forces using the technology to target their area while bombarding. Technological advancement have helped investigating team in many different ways and enhancing the effectiveness and fairness in their works.

Dr. Joseph Schafer of Southern Illinois University's department of criminology and Criminal Justice, in his book note that general society adopts new technology in eighteen months and public safety departments usually takes forty-eight months.

Simple technology which is generally in use and we always see in every one's hand is cell phone. It is too easy to use a simple technology. Now these technologies are replaced by smart phone which is the advanced form of technology; internet is used, allowing access to a variety of program. These smart phones help the investigating team to easily have access to photographs and criminal history of criminals and a significant opportunity to gather information relating to crime and criminal as there is a GPS system, person used it for banking, shopping, communication and gambling etc and can be easily traced where the criminal goes what he do etc.

Another technology which helps the investigating team is Mobile Data Terminals (MDT). MDT technology allows investigating team to have access to criminal histories and motor vehicles. In the bank robbery cases MDT allow the responding personnel to view what is happening inside the building. MDT is used for updating incident details, creating and updating crime, for identification purposes, updating details on internet related to situation on incidents.

Record Management System (RMS) is the technology backbone of a police agency as it is the primary link to additional critical technologies. The RMS is needed to store
reports, book prisoners, maintain evidence inventories, computer accident reports and most importantly accurately record the police interaction with the public.84

When any criminal run away on any motor vehicles after committing any offence like murder, theft, robbery, stolen vehicle and like others and police get the information about the crime, by the use of Automatic License Plate Reader criminal can be chased. License plate readers (LPRs) are high-speed camera and information systems that read vehicle license plates in real time using optical character recognition technology. Plates are checked instantaneously against databases that may contain license plate information in stolen vehicles, vehicles linked to fugitives and criminal suspects and other vehicles of interest. LPR serve an important surveillance function, they can also be viewed as information technologies, as the data they collect can be stored, analyzed and searched for investigative purposes.85

Such technological advances have great potential for enhancing police work e.g. technology may strengthen crime control by improving the ability of police to identify and monitor offenders (particularly repeat, high-rate offenders), facilitating the identification of places and conditions that contribute disproportionately to crime, speeding the detection of and response to crimes, enhancing evidence collection, improving police department and strategies, creating organizational efficiencies that put more officers in the field and for longer periods of time, enhancing communication between police and citizens, increasing perceptions of the certainty of punishment and strengthening the ability of law enforcement to deal with technologically sophisticated forms of crime e.g. identity theft and cybercrimes.86

Deoxyribonucleic acid, commonly known as DNA, DNA testing assists them in the identification of criminal offenders. DNA testing is commonly used by the agencies in sex crimes and other violent crimes might be property crimes or revenge any type of violent crimes. DNA samples are extracted from biological evidence such as blood, semen, hair and saliva.

86. Id at Pg 25-26.
With the help of technology a recent case of ‘Delhi Kissing Prank’ was solved by the police. Delhi Police have arrested the youth, who had posted a prank video in which he was seen randomly kissing girls and running away and his associate on charges of molestation and distributing obscene material following outrage over clip. A case was registered against Sumit Verma under Sec. 354 (assault or criminal force to woman with intent to outrage modesty) of IPC and Sec. 67 (punishment and publishing or transmitting obscene material in electronic form) of IT Act.87

1.3.5 IMPACT OF TECHNOLOGY ON COURT AND COURT PROCESS:

Since the computerization and modernization of courts with the help of technology, many applications of court have been computerized which have its impact on litigation, court and court process? Some of the applications like LOBIS, Filing Counter Computerization, COURTNIC, JUDIS, Cause list on internet, Supreme Court Pending Cases on IVR by National Informatics Centre (NIC) have its direct or indirect impact on the masses and on the work of court.

List of Business Information System (LOBIS) - by this the Registries of Supreme Court and High Courts is done without any manipulation by any interested party as it eliminate manual process. It contains details relating to cases which are disposed, which are pending and of fresh ones. It is the backbone application of every court. Now Judges and lawyers easily recall dismissed case when review petitions are filed with the help of this application. Cases are listed strictly in chronological order of date of filing and generate reliable and instantaneous statistical reports.

Now, the Supreme Court of India and all High courts fresh cases are filed only before the Computerized Filing Counters.88 By this filing process becomes easy. It saves time and efforts of advocates and court officials and also of the litigants as Query Counter helps them to know filing status of their case In the same way COURTNIC provide litigants and advocates the information relating to their case, they can easily have access of the status of their pending case form anywhere even on their phone. One

87. The Tribune (Delhi edn.), Gurgaon, Jan. 14, 2017 (Saturday), Pg. 02.
more application JUDIS - Judgment Information System contains the complete text of all reported judgments of Supreme Court of India from 1950 to till date.\textsuperscript{89}

Internet is an abbreviation for ‘International network.’\textsuperscript{90} The Internet is a worldwide linkage of computers joined by telephone lines and fiber optic cables. The internet is basically a network of networks. In our daily lives, this means that in-line services will replace the middleman or agent.

According to Lord Woolf believes that the case load management systems will greatly assist in the administration of courts as it will facilitate the allocation of resources within courts including the scheduling of judges workloads, timetabling and listing of cases and allocation of courtrooms.\textsuperscript{91} Lord Woolf concludes in his report as: \textit{The overall aim of my inquiry is to improve access to justice by reducing the inequalities, cost, delay and complexity of civil litigation and to introduce greater certainty as to timescales and costs}.\textsuperscript{92}

\textbf{1.3.6 IMPACT OF TECHNOLOGY ON JUSTICE DELIVERY SYSTEM:}

Role of court starts with the case come before it and trail process starts but in reality the criminal trial process starts even before it during the period of investigation and technology has a role to play from an early stage. The justice delivery system consist of many agencies and participants first of all Police who investigate the case, then Lawyers, Public Prosecutors, the Court, Legal Aid Services, Expert evidences (scientific and technical experts or experts in any other field). The main function of judiciary to determine the case by proper process, fair hearing and in timely manner and this process must be efficient, effective and equitable. Modern technology helps the judiciary to reach its goal of fair decision.

Now, the witnesses are taken through video conferencing. The use of videoconferencing technologies reduce the risk of elimination of criminals, useful in the case of hardened criminals, solve the security problems and reduce the tension of jail

\textsuperscript{89} Ibid.
\textsuperscript{92} Peysner, J. and Seneviratne, M., “The management of civil cases: the courts and post-Woolf landscape” \textit{Department for Constitutional Affairs Research Series 9/05}, Nottingham Trent University, Nov., 2005, Pg. 2.
personnel's. The parliamentary committee report of Victorian\(^3\) of law reform on law and technology listed the advantages of videoconferencing as, that while the prisoner is in custody, the advantages include:

1. The reduction of inmate transportation costs.
2. The elimination of security problems in prisoner transportation.
3. A reduction in the number of jail personnel needed for inmate movement.
4. Reduction in tension by eliminating inmate movement and waiting in holding cells.
5. The ability of inmates to be released more quickly after the court hearing, savings in travel time and costs, and savings in court time awaiting the arrival of inmates.

In National Policy and Action plan for Implementation of Information and Communication Technology in the Indian Judiciary, e-committee, Supreme Court of India, 2005, committee has taken the initiative of setting up of a web portal named indianjudiciary.in and indianscourts.in. The portal can be utilized by the general public, advocates, court officers etc. the portal contain the encyclopedia of digital version of legal documents.

Dr. A.P.J. Abdul Kalam, Hon’ble President of India launched the National e-Court Project for extensive computerization of Courts on 9\(^{th}\) July, 2007 at Vigyan Bhawan, New Delhi.\(^4\) E-committee Supreme Court of India in Policy and action Plan Document Phase II of the E-courts Project, 2014 the e-court pational portal (ecourts.gov.in) was launched by Hon’ble the Chief Justice of India on the 7th Aug., 2013. This portal provides case-list, case status information in respect of more than 2.5 crore cases (pending and decided). This Portal provides training material for judicial officers and staff and general information to the public and will eventually be a very powerful mode of communicating all aspects of judicial reforms.

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94. Court News, April-June-2007, Pg.17.
In International Planned Parenthood Federation (IPPF) v. Madhu Bala Nath\textsuperscript{95} Justice Sanjeev Sachdeva in a Judgment said with the development of law and technology, the Courts have to use procedure, which facilitates the Courts in Dispensing speedier justice. If a facility is available to the Court for the purpose of expediting the trial then every opportunity is to be taken by the Court to make use of such technology so as to further the process of dispensation of justice.

In the above said case the application was filed by the appellant in the High Court of Delhi for permission to record the testimony of the sole appellant’s witness through audio and video link on the ground that the sole witness is based at London and is unable to travel to Delhi for her cross examination. The learned single judge dismissed the application. Hon’ble Mr. justice Badar Durrez Ahmed and Hon’ble Mr. Justice Sanjeev Sachdeva said that Procedures have been laid down to facilitate dispensation of justice. Dispensation of justice entails speedy justice and justice rendered with least inconvenience to the parties as well as to the witness. If a facility is available for recording evidence through video conferencing which avoids any delay or inconvenience to the parties as well as to the witness, such facilities should be resorted to.\textsuperscript{96} And the appellant is permitted to record the testimony and cross-examination through audio video conferencing.\textsuperscript{97}

In the case of National Textile Workers Union v. P.R. Ramakrishan and Others,\textsuperscript{98} Justice P.N. Bhagwati stated as we cannot allow the dead hand of the past to stifle the growth of the living present. Law cannot stand still; it must change with the changing social concepts and values. If the bark that protects the tree fails to grow and expand along with the tree, it will either choke the tree or if it is a living tree, it will shed that bark and grow a new living bark for itself. Similarly, if the law fails to respond to the needs of changing society, then either it will stifle the growth of the society and choke its progress or if the society is vigorous enough, it will cast away the law which stands in the way of its growth. Law must therefore constantly be on the move adapting itself to the fast-changing society and not lag behind.

\textsuperscript{95} F\textsuperscript{A}O(OS) 416/2015 & CM No.13475/2015(stay).
\textsuperscript{96} Id at Para 14.
\textsuperscript{97} Id at Para 17.
\textsuperscript{98} 1983 AIR 75, 1983 SCR (1) 9.
As we all observe science and technology have made a huge invasion in our lives. Human brain made a tremendous growth in the field of science and technology according to the interest and needs of humankind. If there are uses, there are misuses also. If with the use of these, there are increases of crime in society, these new inventions also help the law and law governing authorities to solve the cases. The modern inventions of science and technology have serious impact on the justice delivery system. Science has gives us concept and technology has put these concepts in work. As science gives us concept of DNA, technology give us DNA technology. My research work is concerned with the study of the emerging trends in the expert evidence and investigation process. The study and uses of new techniques in the investigating process and in the court related to cases, as an expert evidence. My study is to know how the emerging trends in science and technology are useful in the investigation and court process, what their impacts are and what precaution and changes are needed in this field.