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Engineering, Law, and Justice: Relationships/Interactions Based on New Philosophical and Scientific Perspectives, and Philosophy of Justice

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In this work, firstly the general definition of law and types of law are presented. Then general definition of justice and types of justice are explained. Constructional and/or complementary theories are defined as general/specific, and interaction theories, relationship theories, and hybrid theories are specifically mentioned. Accordingly, the interactions between the disciplines of law and justice are explained in more detail. Then, the general definition of engineering and philosophy of engineering are explained. The interactions between engineering and law are specifically evaluated, and interactions between engineering and 52 types of law are defined and case studies found in the literature are indicated for each. Then interactions between engineering and justice briefly mentioned. Relationships/interactions between engineering and 25 different types of justice discussed and evaluated with specific examples. Emphasis was placed on the historical development of the subject of philosophy in general, and philosophy of law was defined more specifically. Some of the philosophers of law and their areas of interest are presented in a table format and compared. The new perspective of philosophy was defined and the disciplines of R-Philosophy, R-Science, R-Justice, R-Law, R-Engineering, and R-Religion were expressed with the relevant basic concepts. New Era Philosophy, new and reconstructed Basic Philosophies, and Ideal Philosophical System explained generally. New perspective for the philosophy of justice is defined by considering the related new theories. Philosophy of defense, philosophy of equity, philosophy of equivalence, philosophy of judgment, philosophy of law, philosophy of protection, philosophy of punishment, and philosophy of rights are defined due to new perspective of philosophy. Also, philosophy of engineering law, philosophy of information technology law, philosophy of telecommunication law, and philosophy of security are defined by taking into account hybrid philosophies and general theories related to them. The interaction of engineering, law, justice, and basic philosophies has been generally expressed.

Keywords: engineering and law, engineering and justice, philosophy of engineering, philosophy of justice, philosophy of law, New Era Philosophy, Hybrid Philosophies, Basic Philosophies, Hybrid Sciences, law and justice

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Introduction

There are various starting points to define and/or express the relationship/interactions between the subjects, disciplines, and concepts. Author made an R-Synthesis and evaluated all philosophical, scientific, and other disciplines and subjects accordingly (Ramiz, May 2010; September 2015; June 2016). Here author considered the definitions, theories, and historical developments of the related disciplines and concepts. With this respect, history of science, history of philosophy, history of law, history of justice, history of politics, history of religions, and history of engineering are evaluated generally/specifically and separately.

In one point of view, history of engineering is classified starting with the designs, constructions in ancient era. There are Göbekli Tepe of South-East Turkey Anatolia (around 9.000 BC), the ziggurats of Mesopotamia (around 4.000 BC), the pyramids and Pharos of Alexandria in ancient Egypt (around 3.000 BC), cities of the Indus Valley civilization (around 3.300 BC), the Acropolis and Parthenon in ancient Greece (around 500 BC), the aqueducts (around 300 BC), Via Appia (around 300 BC), and Colosseum (around 100 AD) in the Roman Empire, Teotihuacan—the cities and pyramids of the Mayan, Inca, and Aztec Empires, and the Great Wall of China, among many others, stand as a testament to the ingenuity and skill of the ancient civil engineers and military engineers. Later there is middle ages that covers engineering works of Byzantine Empire period, Islamic Golden Age, and European Renaissance period. Then the modern era covers the works about mechanical engineering, electrical engineering, electromagnetics engineering, chemical engineering, aeronautical engineering, aerospace engineering, computer engineering, and so on.

On the other hand, the history of engineering is roughly divided into four overlapping phases, each marked by a revolution: (i) Pre-scientific revolution: The prehistory of modern engineering features ancient master builders and Renaissance engineers such as Leonardo da Vinci. (ii) Industrial revolution: From the eighteenth through early nineteenth century, civil and mechanical engineers changed from practical artists to scientific professionals. (iii) Second Industrial revolution: In the century before World War II, chemical, electrical, and other science-based engineering branches developed electricity, telecommunications, cars, airplanes, and mass production. (iv) Information revolution: As engineering science matured after the war, microelectronics, computers, and telecommunications jointly produced information technology.

Author has defined the era we are in as a New Era (Ramiz, May 2010; June 2016) in which hybrid revolutions and hybrid engineering studies are influential and will continue to be influential in human life in the future.

History of law (some named it legal history) is the study of how law has evolved and why it has changed. History of law is closely connected to the development of civilizations and operates in the wider context of social history—the field of history that looks at the lived experience of the past. Certain jurists and historians of legal process have seen legal history as the recording of the evolution of laws and the technical explanation of how these laws have evolved with the view of better understanding the origins of various legal concepts; some consider legal history a branch of intellectual history—history of ideas which is the study of the history of human thought and intellectuals, people who conceptualize, discuss, write about, and concern themselves with ideas. According to some thinkers, twentieth-century historians are viewed legal history in a more contextualised manner—more in line with the thinking of social historians. They have looked at legal institutions as complex systems of rules, players, and symbols and have seen these elements interact with society to change, adapt, resist, or promote certain aspects of civil society.

There is Ancient World law; that is expressed started with ancient Egyptian law dating far back as 3000 BC which was based on the concept of Ma'at—the goddess who personified the ancient Egyptian concepts of truth, balance, order, harmony, law, morality, and justice. And Southern Asia law; where Ancient India and China represent distinct traditions of law, and had historically independent schools of legal theory and practice. There is also Eastern Asia law; where the eastern Asia legal tradition reflects a unique blend of secular and religious influences. Japan was the first country to begin modernising its legal system along western lines, by importing bits of the French, but mostly the German Civil Code. Another important law is canon law; where the legal history of the Catholic Church is the history of Catholic canon law, the oldest continuously functioning legal system in the West. Islamic law; where one of the major legal systems developed during the Middle Ages is effective. European law; that includes Roman Empire period, Middle ages, modern European law. African law; where the African law system is based on common law and civilian law. Many legal systems in Africa were based on ethnic customs and traditions before colonization took over their original system. United States of America law; where the United States legal system developed primarily out of the English common law system (with the exception of the state of Louisiana, which continued to follow the French civilian system after being admitted to statehood). Some concepts from Spanish law, such as the prior appropriation doctrine—water rights system (where states that the first person to divert water from a source and use it for a beneficial purpose, such as mining, agriculture, or municipal use, acquires a superior right to that water), and community property, still persist in some USA states, particularly those that were part of the Mexican Cession in 1848. And there are global legal traditions where a comprehensive view of legal history must encompass legal systems beyond Western traditions.

Interactions between the disciplines have become more important due to problems related to disciplines, or inadequate content of disciplines, or the needs of the evolving era.

It is important to understand the meaning of the words, their definitions, and the related contents in good and/or correct way (Ogden & Richards, 1956; others). With this respect, author considered most of the subjects/words related with philosophy, science, engineering, law, justice, and other disciplines during his synthesis.

It is possible to talk about different types of interaction for the disciplines: (i) multidisciplinarity; that involves studying a subject from multiple disciplines that maintain their separate identities, and (ii) interdisciplinarity; that integrates these perspectives to create something greater than the sum of its parts, (iii) transdisciplinarity; that extends beyond academia by involving societal partners in co-creating knowledge that combines scientific and practical expertise to develop solutions with direct impact on society.

There are various ways of evaluating the subjects and interaction regarding the disciplines, and author considered and applied new synthesis.

Author considered R-Synthesis (Ramiz, June 2016) as a method for the evaluation of the philosophy, of all related branches of philosophy, of science, of all related branches of science, of law, of all types of law, of justice, of all types of justice, of engineering and for all other disciplines defined in the past (Ramiz, June 2016). This synthesis is different from the one which is defined in the past literature.

R-Synthesis includes general/specific perspective with eight categories, 21-dimensions, 12 general subjects (with related scope and contents), and theoretical and experienced information for the past 12,000 years (Bucaille, 1973; Gülaltay, 2005; History of Philosophy, 2016; History of Religions, 2010; History of Science, 2015; Yücel, 1985; others). With this respect, the method considered for this new synthesis includes all subjects and it is not

necessary to apply the following evaluation process triple of "… going past, then come to present, propose something for future, then go to past, and come to present, and propose something for future…"

There are theories of interactions, theories of relationships, theories of hybrid cases defined in other work as part of the separate theories.

Here the interactions that consider history of science, history of law, history of justice, history of philosophy and history of engineering are taken as reference.

Here it is considered that, engineering, law, justice discipline interactions can create three types of interactions given above for the literature.

The purpose of this article is: (i) to define systematic solution for the possible conflicts, problems, confusions related with the interactions of the disciplines, (ii) to define and express the importance and place of new philosophy perspective in the new system, (iii) to define new questions and questioning about philosophy, branches of philosophy, law, justice, philosophy of law, philosophy of justice, philosophy of engineering, (iv) to define new or re-constructed branches of philosophy, science, law, justice, and of engineering, (v) to define the relations between the philosophy branches, science branches, types of law, types of justice and engineering, (vi) to define good and/or correct structure of philosophy, branches of philosophy, law, justice and engineering, (vii) to extend the definition/limits of philosophy, law, justice and of engineering, (viii) to make correction about the meanings of some philosophical definitions, law definitions, science definitions and of engineering definitions, and (ix) others.

The author described this study by taking into account his own theoretical and practical experiences about all disciplines and with the analysis/synthesis he made.

Author worked as law-court expert at the various Istanbul Civil Courts of First Instance, İstanbul Administrative Court, and at İstanbul Commercial Court, and examined/evaluated files, systems and premises, sites, places and prepared reports, made measurements for/about various individuals, companies, organizations, associations, GSM Operators, Turkish Government and Turkish Military in Turkey on Radio Base Stations, Electromagnetic Field Measurement, Environment and Human Health, Compliance with Microwave Radiation Safety Standards, Electricity, Electronics, Communication, Telecommunications, Computer, Software, etc. There are Turkcell, Vodafone (Telsim), Aria, Nokia, Motorola, Telekom, İnsa, İETT, TEİAŞ, TREDAŞ, and other associations among the evaluated projects and/or companies. Author also worked as consultant for the Turkish Telecommunication Authority, and prepared law drafts about Electronic and Communication, IMEI, Information Technology law, and others. Author also reviewed European Union standards for harmonizing them as a Turkish Standard, and prepared reports for Turkish Standards Institute TSE, and participated to the International Electro-technical Committee (IEC) General Assembly as a Delegate Representative of Turkey.

Here, in this work "R-abcde… xyz" are used to express that they are considered by the author and they are new defined and/or re-constructed from the past/present one, or modified, or used with the same name and arranged due to all 21 dimensions of the R-Synthesis (Ramiz, June 2016), and by applying 27 (+) definitive/certain result cases of the synthesis to science, law, justice, engineering, philosophy disciplines in general manner. Author used (*) signs together with some words to denote that these words, "sciences", "philosophies", "branches of philosophy" are defined in the "past" and due to past philosophical/scientific/religious perspectives.

There are "®©" symbols/signs which denote that it is re-constructed by the author, and there are "®®" symbols/signs which denote that it is new defined by the author.

General Definition of Law and Types of Law

Law is defined as set of rules that are created and are enforceable by social or governmental institutions to regulate behaviour, with its precise definition a matter of longstanding debate. It has been variously described as a science and as the art of justice.

State-enforced laws can be made by a legislature, resulting in statutes; by the executive through decrees and regulations; or by judges's decisions, which form precedent in common law jurisdictions. An autocrat may exercise those functions within their realm. The creation of laws themselves may be influenced by a constitution, written or tacit, and the rights encoded therein. In one point of view, the law shapes politics, economics, history, and society in various ways and also serves as a mediator of relations between people.

Law generally provides a source of scholarly inquiry into legal history, philosophy, economic analysis, and sociology. Law also raises important and complex issues concerning equality, fairness, and justice.

In the literature, scholars, thinkers, or scientists used the words "areas", "fields", "branches", "categories" or the word "types" of law to express the content of same laws. Here author used the "types of law" as one common word to express the current wide spectrum of law in some manner.

With this respect, types of law are given as follows (in alphabetic order): (1) administrative law, (2) animal law, (3) art law, (4) banking and finance law, (5) bankruptcy law, (6) civil law, (7) civil rights law, (8) commercial law, (9) competition law, (10) constitutional law, (11) constructional law, (12) contract law, (13) corporate law, (14) criminal law, (15) cyber law, (16) education law, (17) elder law, (18) employment law, (19) energy law, (20) entertainment law, (21) environmental and natural resources law, (22) equity and trusts law, (23) EU law, (24) family law, (25) fintech law, (26) franchise and distribution law, (27) health law, (28) human rights law, (29) immigration and nationality law, (30) insurance law, (31) intellectual property law, (32) international law, (33) juvenile law, (34) labour law, (35) land law, (36) maritime law, (37) media law, (38) military law, (39) municipal law, (40) personal injury law, (41) private client law, (42) probate law, (43) property law, (44) public law, (45) real estate law, (46) securities law, (47) sports law, (48) tax law, (49) technology law, (50) telecommunications law, (51) tort law, (52) travel law.

There are relations between laws and regulations, directives, rules, guidelines, instructions (Ramiz, upcoming work). Law and Regulations interactions are another important case to evaluate. Here it is briefly expressed as follows: Laws are mandates passed by legislatures, and regulations are the detailed rules agencies draft to enforce those laws. A law answers the "what" and "why" of a statute, and regulations explain the "how". Knowing both is crucial. On the other hand, regulations and rules interaction is important too. Rules are specific guidelines or instructions created by an organization or authority to regulate behavior and activities. Regulations are official rules and directives established by the government or regulatory body, typically with legal binding, to govern specific sectors or industries.

Author defined a new political administration system for the world countries (Ramiz, September 2015; April 2016) and this study and the other work to be done on the sustainable justice administration system (Ramiz, upcoming work) are in a way complementary to each other.

General Definition of Justice and Types of Justice

In general, in its broadest sense, justice is expressed as the idea that individuals should be treated fairly. The idea of justice occupies center stage both in ethics, and in legal and political philosophy due to one perspective. Generally, people apply it to individual actions, to laws, and to public policies, and people think in each case that if they are unjust this is a strong, maybe even conclusive, reason to reject them.

According to the Stanford Encyclopedia of Philosophy, the most plausible candidate for a core definition comes from the Institutes of Justinian, a 6th-century codification of Roman law, where justice is defined as "the constant and perpetual will to render to each his due". A society where justice has been achieved would be one in which individuals receive what they deserve. The interpretation of what "deserve" means draws on a variety of fields and philosophical branches including ethics, rationality, law, religion, and fairness. With this respect, the state may pursue justice by operating courts and enforcing their rulings.

Here author used the "types of justice" as one common word to express the wide spectrum of justice in some manner. With this respect, types of justice are given as follows (in alphabetic order): (1) comparative justice, (2) corrective justice, (3) criminal justice, (4) design justice, (5) distributive justice, (6) economic justice, (7) environmental justice, (8) global justice, (9) informational justice, (10) injustice, (11) interactional justice, (12) legal justice, (13) linguistic justice, (14) occupational injustice, (15) open justice, (16) organizational justice, (17) poetic justice, (18) political justice, (19) procedural justice, (20) racial justice, (21) restorative justice, (22) retributive justice, (23) social justice, (24) spatial justice, (25) transformative justice.

Author expressed science of justice, theories of justice, types of justice, levels of justice, principles of justice and other related subjects in other work with more details (Ramiz, upcoming work).

According to the author, one of the other important thing is to have good and/or correct sense of justice, and justice can be provided officially and/or non-officially in general: (a) by educating judicious persons; (b) by improving justice system; and/or (c) by making the system judicious.

With this respect, author defined New Perspective for Philosophy of Politics, Ideal Political Construction, New Era Theory of Justice, and continuable political administration system for a world country to express the new perspective of philosophy and science.

With this respect, Philosophy of Justice and Philosophy of Politics are complementary branches that consider and apply the same new theory of justice named as New Era Theory of Justice defined by the other.

Constructional and/or Complementary Theories

As a result of the R-Synthesis, the author defined constructional and/or complementary theories (Ramiz, June 2016). With this respect, there are more than one theory, which are directly/indirectly related with science, branches of sciences, philosophy, and branches of philosophy, to define new philosophy perspective, new science perspective, and other subjects. Here, some important three of these theories are considered as constructional and/or complementary references for the definition of the new science perspective, new philosophy perspective, and other disciplines. These are: (a) theory of interactions, (b) theory of relations, and (c) theory of hybrid (Ramiz, June 2016)

As generally/specifically explained in the other work sections (Ramiz, June 2016), there are different categories of the interaction concept. To be able to understand these theories, simply, it is necessary to evaluate the meaning of these words in good and/or correct way. If the meaning of the word "know" is considered as "to

have necessary/exact information", the word "conditional" can be considered as "dependent to condition", and "identify" as "to discover"; "interaction" can be defined as "unconditional/unknown/unidentified and variable effect on each other"; interactions, are unruled, unnamed, unjust effects, and limited with a number of the possibilities. With this respect, "relation" can be defined as "known dependence/exact dependence/conditional interactions/principal interactions/fixed interactions/fixed conditions on each other, and ruled/named/judicious/continuous", and "hybrid" can be defined as "fixed relations/fixed principles/combined relations/common relations/complementary relations between each other."

With this respect, here in this work author applied these theories to the disciplines of engineering, law, science, justice, and philosophy.

First of all, the interactions between "law" and "justice" are discussed here in the following chapter. Later, interactions between "engineering" and "law", "engineering" and "justice, "engineering" and "philosophy", "law" and "philosophy", "justice" and "philosophy", and other disciplines are explained, defined, and/or reconstructed by the author.

Interactions Between Law and Justice

The interactions between law and justice are helpful to express the interactions, similarities, differences, connections, interconnections, and relationships between/of the two disciplines.

Here in this work, author evaluated some experts' studies about these possible interactions to summarize and express his thoughts and senses.

Archita Sengupta (2022), worked on how the law is different from justice. According to him,

Difference of law and justice can be expressed as follows: Law refers to the system or body of rules and regulations which are created by the governmental authorities to regulate the actions of the citizens and of the government. Whereas, Justice refers to the exercise of administration that maintains the idea of fairness, equality, and righteousness based on morals and ethics. Justice is a chaotic mass of moral principles. Laws can be modified or changed with time, but Justice is universal in nature, it can't be changed. The Law could be a codification of do's and don'ts and is backed by sanctions. Justice is nothing however an assessment created by the Judicial Authority in respect of dispute referred to the same. Every country has its own laws, the concept of law varies from country to country whereas, Justice almost remains the same in every country. All the Countries are divided by the law but are united by the concept of justice which consists of morality, dignity, and ethics. Law can't help to regulate the inner domain of personal conduct; justice can. Law is created for the nation's welfare. Whereas, Justice is based on values that are inherent to human behaviour.

Similarities of law and justice can be expressed as follows: Law and Justice are interconnected with each other which share few similarities among them. There are not so many similarities between law and justice because they are not the same thing, but they share one thing as a similarity that is "Motive". Their main motive is to provide harmony and peace among people. Both regulate human behaviour and ensure equality among all. Both are implemented in society without any discrimination based on religion, region, caste, gender, language, and colour. Law and Justice guarantee to distribute equality among individuals without any discrimination. Both act as a norm to the society which promotes fairness, righteousness, order, and equality. Both have the power to differentiate and understand what is right and what is wrong.

Interconnection of law and justice can be expressed as follows: The relationship between both is very complex. They are two faces of the same coin. The most effective way to understand the connection between

Law and Justice is that law exists to provide justice to every individual. Justice is an integral part of the law. Justice is an essential ingredient of the legal system in which the rule of law helps to enforce people's rights. So, Justice is inseparable from the law. Both are influenced by each other. Justice acts as a spur by which laws are enacted, enforced, modified, or quashed down. Justice is a moral concept, in which law acts as a mechanism to get justice. In simple words, Justice is a goal, where law acts as a tool to achieve the goal. They both seek to treat human behaviour. Law serves as a source of ensuring justice.

Ayan Mondal worked on the relation between law and justice. According to Ayan, the terms "law" and "justice" refer to two similar yet different concepts. The ideas of law and justice often go hand-in-hand but refer to two different ideas. Law is a system of regulations, standards, principles, and norms created by a country's government, and international bodies in order to regulate the life and the actions of the citizens. Laws are found in written codes and are enforced by the government and its bodies, including security forces, police, judiciary, etc. Conversely, justice is a more abstract concept based on the idea of equality of rights, and fairness. All laws should be based on the idea of justice and should be implemented and enforced in a just way without discrimination of sex, gender, age, colour, race, religion, language, or any other status. Laws are written norms that regulate the actions of the citizens and of the government itself in all aspects, whereas justice is a principle that may or may not be universally recognized. Ayan expressed some of the similarities between law and justice as follows: (i) Both concepts regulate human behavior and aim at creating a more just and equal environment; (ii) Law should be based on the idea of justice and should be implemented and interpreted in a just manner—without discriminations; and (iii) Both are based on the ideas of morality, equality, order, and fairness. On the other hand, he expressed some of the differences as: (i) The term "law" refers to an existing and concrete set of written regulations established by the government in order to regulate and control the actions of the citizens. Conversely, justice is not a universally recognised concept and is subject to interpretations. Justice is often depicted as a woman wearing a blindfold—representing equality and fairness, and applying laws and regulations to all individuals without discrimination. Yet, there is no common understanding of justice and there is no unique book or text to refer to; and (ii) Laws can vary from country to country and the process with which they are created can change as well. For instance, in democratic countries, laws are adopted following a long debate and an even longer process of checks and balances; conversely, in authoritarian countries, laws are decided and established by the ruling party (or by the ruling person) without seeking the support of the majority. Conversely, the idea of justice is more or less consistent across all countries: moral values and ethics tend to supersede borders and geographic divisions.

According to Yan Tang (2024) who studied on the relation between law and justice, since ancient times, but even today, there are still cases of law violating justice. Theoretically, law can be divided into natural law and statute law, justice into substantive justice and procedural justice. Then their definitions are proposed. Natural law derives from reason and morality in the human heart, and statute law is regarded as irrelevant to justice. Substantive justice refers to the value standard that people should follow, and procedural justice refers to the fairness of the judgment process. The relationship between the four is also analyzed by Yan. The theories of illegality of evil law, procedural natural law, irrelevance of statute law and substantive justice, and procedural justice derived from statute law are mentioned in this paper. This article also points out that an important reason of current law failing to deliver justice is the imbalance between substantive justice and procedural justice. He proposed two solutions which are to test the judgment by natural law, and to combine procedural justice with substantive justice.

Anthony D'Amato (2011), studied about the connection between law and justice. He worked on the importance of what it means to assert that judges should decide cases according to justice and not according to the law. Legal and political theorists since the time of Plato have wrestled with the problem of whether justice is part of law or is simply a moral judgment about law. Nearly every writer on the subject has either concluded that justice is only a judgment about law or has offered no reason to support a conclusion that justice is somehow part of law. This essay attempts to reason toward such a conclusion, arguing that justice is an inherent component of the law and not separate or distinct from it.

Law and Justice are a wide concept. The rule of law only works in the end among people who have a "sense of justice". In other words, Law can't be separated from the virtue of Justice. The concept of Law leans on the concept of rules and regulations set up by the government. It is a concrete concept, and it is a kind of duty that must be followed by every individual. On the other hand, Justice is an idea of morality, fairness, and equality of rights. It is a more abstract concept, and it is a kind of responsibility in the hands of the judiciary or other regulating bodies that serve justice. But sometimes, Laws are not followed and respected by the people. Some laws are even imposed as being biased and partial. The entire legal system that features laws and all the alliances including the advocates and courts relies upon the idea of Justice. Law acts as means to get justice. A valid measure of society is how well its laws coincide with and serve justice. The duty is not to make everyone happy but is to make things fair enough for everybody, neutral to everyone without taking into consideration our very own self-preferences.

General Definition of Engineering and Philosophy of Engineering

Engineering, is the practice of using the natural sciences*, mathematics*, and the engineering design process to solve problems in technology, increase efficiency and productivity, and improve systems. The engineering discipline encompasses a broad range of more specialized engineering fields, each with a more specific emphasis on the applications of mathematics and science.

The fundamental aspects of engineering can be expressed from one perspective into the following four groups:

(a) Problem solving: Engineers identify and analyze problems and then develop solutions using their technical knowledge and skills.

(b) Design: Engineers create detailed plans and specifications for structures, machines, and systems.

(c) Construction/implementation: Engineers oversee the construction and assembly of their designs, ensuring they are built to specifications.

(d) Maintenance and improvement: Engineers work to ensure that existing systems continue to operate effectively and efficiently and ensure their maintenance and improvement.

In general, "branches of engineering", "interdisciplinary engineering", "multidisciplinary engineering", and "relationships with other disciplines" are other considerations. Furthermore, the collaboration between engineers, scientists, and technicians in conducting studies is crucial.

For this work, the collaboration between engineers, scientists, and lawyers, judges is another important case that could be involved.

According to the old general approach, engineering branches consist of six main branches, and there are 23 engineering disciplines (Ramiz, September 2025).

On the other hand, Philosophy of Engineering, is a new discipline that deals with what engineering is, what engineers do, and how their work affects society, and therefore includes ethical* and aesthetic* aspects, as well as areas that can be studied in philosophy of science* or philosophy of technology*, such as ontology*, epistemology*, etc.

In addition to those mentioned in the section above, engineering is a profession that aims to modify the natural environment through the design, production, and maintenance of artifacts and technological systems. Therefore, it can be compared to science, whose goal is to understand nature. Engineering is essentially about causing change, and therefore, managing change is central to engineering practice. Philosophy of Engineering, on the other hand, addresses how philosophical issues apply to engineering. These issues may include the objectivity of experiments, the ethics of engineering activities in the workplace and society, the aesthetics of designed artifacts, and so on.

Philosophy of engineering, in other words, examines the fundamental nature of engineering, its relationship to society, and its impact on the world. It examines what engineers do, how they think, and the ethical, social, and cultural implications of their work. The field also explores the nature of engineering research, the role of engineering in shaping our understanding of reality, and the connection between engineering and other disciplines such as science and philosophy.

Looking more specifically at the fundamental aspects of engineering philosophy, philosophy of engineering examines the cognitive processes involved in engineering, such as design thinking, problem-solving strategies, and the use of heuristics. It examines how engineers make decisions, manage uncertainty, and learn from experience. Philosophy of Engineering examines the professional responsibilities of engineers, including ethical behavior, public safety, and the pursuit of excellence. It explores the nature of engineering expertise and the role of engineers in shaping technological development. It also addresses the relationship between engineering and other professions, such as science, management, and law.

Interactions Between Engineering and Law

It is denoted as “Engineering Law” in some sources. Due to one point of view, “Law and Engineering” refers to fields where legal principles are applied to engineering practice, and where engineers use their technical knowledge in legal settings, such as in patent law, intellectual property law, and engineering ethics.

Engineers often transition to legal careers because their problem-solving skills and ability to understand complex technical information are valuable in legal practice.

In some other sources Engineering law (Wikipedia, August 2025) is defined as the study of how engineering ethics and legal frameworks are adopted to ensure public safety surrounding the practice of engineering.

It is interesting that the definition of engineering by law is different in the states of USA. USA California State Law defines engineering as:

> the professional practice of rendering service or creative work requiring education, training and experience in engineering sciences and the application of special knowledge of the mathematical, physical and engineering sciences in such professional or creative work as consultation, investigation, evaluation, planning or design of public or private utilities, structures, machines, processes, circuits, buildings, equipment or projects, and supervision of construction for the purpose of securing compliance with specifications and design for any such work.

By comparison, New York and Ontario law uses life and health in their definitions. Ontario defines engineering as the: “planning, designing, composing, evaluating, advising, reporting, directing or supervising

that requires the application of engineering principles and concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment, or the managing of any such act." USA California State law makes public protection paramount. The legislative intent is that protection of the public shall be the highest priority of the Board for Professional Engineers in California.

There is a work by David Howarth named as "Law as Engineering: Thinking about What Lawyers Do" published in 2013. According to that, Law as Engineering proposes a radically new way of thinking about law, as a profession and discipline concerned with design rather than with litigation, and having much in common with engineering in the way it produces devices useful for its clients. It uses that comparison to propose ways of improving legal design, to advocate a transformation of legal ethics so that the profession learns from its role in the crash of 2008, and to reform legal education and research.

David Howarth also explained his interest in his study "Is Law a Humanity (or Is it More Like Engineering)?" published in 2004 with other specific manner. In that work, Howarth expressed that Law often appears to be in a limbo between the Social Sciences and the Humanities. Movements within legal scholarship itself, the law and economics movement, and the law and literature movement, represent efforts to portray law as a social science or as a humanity. But if one looks at what lawyers do, one finds that law is more like engineering—lawyers make social devices and structures for their clients just as engineers make physical devices and structures. Just as engineers can usefully draw on scientific knowledge, lawyers can usefully draw on the Social Sciences and the Humanities in making their devices, but lawyers, like engineers, also have their own autonomous concerns about design and effectiveness. Legal education, however, tends to stress only one element in legal design, the validity of legal rules. The position of judges and academic lawyers has a special feature that, unlike practising lawyers, their client is the whole of society or the whole of humanity. This presents academic lawyers and judges with special ethical problems beyond those faced by ordinary professionals. It also brings them close to the practical and normative humanities, such as ethics and political philosophy.

Another work named as "Engineering a Law Degree" posted in 2018 is about the session where professors, students, and advisors from the Ohio State University Moritz College of Law discussed the advantages of engineering students attending law school. The one result case here is how we can get more people with training in both engineering and law so that we're getting better informed decision-makers.

As an engineer, academic, and advisor, the author has worked as a law court expert in Istanbul Courts since 2000 and has had the opportunity to evaluate the evaluation methodology to be followed for case files with various court judges. At that time, the author and the judges agreed on the methodology by which the author researched, analyzed, evaluated, and reported the relevant case files using electronic and communications engineering methods. The court judges' explanations regarding the necessary evaluation processes were taken into consideration as they agreed.

There is another work published in 2012 named "The Systems Engineering Approach to the Design of Laws" by David G. Schrunk. Here in this work author expressed that this paper discusses the application of the methodologies of systems engineering to the design of laws of government. The systems engineering approach will bring the knowledge and expertise of investigative science and engineering to bear upon the design, operation, follow up evaluation, and optimization of laws that effectively solve societal problems. Of significance, the creation and simulation of engineering models of laws will be a multidisciplinary effort that includes experts from all relevant fields such as software engineering, law, economics, political science, sociology, and statistics. The systems engineering approach to the creation of laws promises to advance the science of laws, establish

quality standards for laws and lawmaking, transform lawmaking into a knowledge industry, and improve the ability of governments to satisfy their public benefit purpose.

Relationships/Interactions Between Engineering and Different Types of Law

Author searched and evaluated the possible interactions between the "engineering" and all 52 types of law given above separately.

Author defined 52 hybrid disciplines below to evaluate and emphasize the importance of all possible interactions and relations which will cause to realize the importance and effect of the engineering disciplines in human life and in world country systems. Author also informs that each of these interaction disciplines are another kind of works to express the details of the related theories and concepts (Ramiz, upcoming work).

Author expressed the works and studies he found for each of these 52 hybrid disciplines below. As result of the evaluation, author noticed that there are some kind studies which express the good interactions between engineering and the related types of law. However, it is also noticed that there are not any interaction studies for 12 types of law. On the other hand, there are one or two studies for some types of law that express the possible interactions too.

(1) Engineering and Administrative Law

The Council of Europe has study about "Artificial Intelligence and Administrative Law". Here, "Comparative Study on Administrative Law and the use of Artificial Intelligence and Other Algorithmic Systems in Administrative Decision-Making in the Member States of the Council of Europe", is prepared by Johan Wolswinkel (December 2022).

There is another work named "Engineering the Modern Administrative State: Political Accommodation and Legal Strategy in the New Deal Era" expressed by Daniel B. Rodriguez and Barry R. Weingast in 2021.

Another work is, "Engineering Administrative Procedures and Their Impact on Increasing the Administrative Efficiency of Public Sector Institutions", expressed by Mohamed diaa Mohamed Refaei, in 2024.

(2) Engineering and Animal Law

There is a work named "Genetic Engineering of Animals: Ethical Issues, Including welfare Concerns", expressed in 2011 by Elisabeth H. Ormandy, Julie Dale, Gilly Griffin (2011).

Another work named as "Genetic Engineering of Domestic Animals: Human Prerogative or Animal Cruelty?" published by Michelle K. Albrecht, in 2000.

Also, there is a book titled as *Animals, Ethics, and Engineering: Intersections and Implications*, written by Rosalyn W. Berne in 2025.

An article published in 1997 named as "Ethics and the Genetic Engineering of Food Animals" is another example about the interactions.

There is a study titled "Economics and Ethics in the Genetic Engineering of Animals" published by Chad West.

Julian Savulescu's article named "Genetically Modified Animals: Should There Be Limits to Engineering the Animal Kingdom?" in 2012 is another example of the interactions.

(3) Engineering and Art Law

There is a study of M. J. Rosado named "When Engineering Is Art: The Meaningful Value" published in 2022.

Another work is "The Art of Engineering: The Number of Bachelor of Arts in Engineering Programs Is Increasing. What Are the Advantages and Pitfalls to This Blend of Liberal Arts and Engineering?" published in National Society of Professional Engineers site by Eva Kaplan-Leiserson in 2010.

(4) Engineering and Banking & Finance Law

There is a work named “Financial Engineering and Banking Liability” published by Charlotte Gauchon in 2025.

(5) Engineering and Bankruptcy Law

There is a work titled “Technology, Information and Bankruptcy” published by Douglas G. Baird in 2007. He stated that Financial innovations, spurred by the growth of information technology, have transformed the consumer lending industry.

There is an internet discussion at Quora named “What Happens to An Engineering Company’s Existing Contracts if They File for Bankruptcy?”

(6) Engineering and Civil Law

There is a work named “How Are Engineers Used as Expert Witnesses in Civil Law Cases?” published by Damon Wooten in 2023.

(7) Engineering and Civil Rights Law

There is a work titled as “Engineering for Human Rights: The Theory and Practice of a Human Rights-Based Approach to Engineering” published by Davis Chacon-Hurtado and Tulasi Ravindran (2024).

Another work is “Creating Opportunities in the Future of Engineering and Human Rights” published by Gabriel Velez in American Association for the Advancement of Science.

There is work named “An Insight into Human Rights in the Engineering Workplace and Education”, published in 2022 by Mary Doyle Kent, Blertë Retkoceri, Brenda O'Neill, Larry Stapleton, Edin Bula, and Edmond Hajrizi (2022).

Another work is “Issues at the Intersection of Engineering and Human Rights” published in 2024 at the National Academy of Engineering website.

(8) Engineering and Commercial Law

There is a study named “Applicable Law for Construction and Engineering Contracts: Constraints on Freedom of Choice” published by Adrian Elliott in 2023.

(9) Engineering and Competition Law

There is a work published by Leo J. Raskind in 1986 named “Reverse Engineering, Unfair Competition, and Fair Use”.

(10) Engineering and Constitutional Law

There is a work named as “Para-constitutional Engineering and Federalism: Informal Constitutional Change through Intergovernmental Agreements”, published by Johanne Poirier and Jesse Hartery in 2022.

Another study is a book edited by Xenophon Contiades and named as *Engineering Constitutional Change: A Comparative Perspective on Europe, Canada and the USA* published in 2013.

There is also a work “A ‘Flawless’ Constitutional Engineering Project in Turkey: Regime Transformation through Constitutional Amendments of 2007, 2010, and 2017” published online by Ömer Faruk Gençkaya and Seda Dunbay (2024).

(11) Engineering and Constructional Law

No studies have been found yet.

(12) Engineering and Contract Law

There is a work named “Overview of Contract Law for Engineers” published by Bill Searfoorce in 2020.

Another work is published as a course note named “Engineering and Contract Law—Legal Foundations for

Professional Practice".

(13) Engineering and Corporate Law

No studies have been found yet.

(14) Engineering and Criminal Law

There is a work named "Forensic Biomechanics: Bridging the Gap between Engineering and Criminal Justice" published in 2023 by Ryan Uggen.

Another work is "Applying Criminal Justice Principles to Detection Engineering" published by Andrew Schwartz in 2025.

There is a study named "Genetic Engineering: Issues of Criminal Law Regulation" published in 2020 by Oleg A. Belov, Yuliya N. Spiridonova, and Aleksandr I. Odintsov.

Another work is "Re-engineering the Criminal Justice System" published by Sir Dennis Byron, President of the Caribbean Court of Justice.

Forensic engineering is another important topic about the interactions.

(15) Engineering and Cyber Law

There is a cybersecurity engineering which expresses the interactions between the two concepts.

(16) Engineering and Education Law

There is a book named *Law in Engineering Ethics Education* published by Andreas Kotsios, Thomas Taro Lennerfors, Mikael Laaksoharju in 2024 and expressed at the European Society for Engineering Education site.

There is an article named "New Education Law Includes Engineering Provisions" published in 2015 at National Society of Professional Engineers, NSPE web site.

There is a study named "Laws, Rules and Regulations for Engineering" published by New York State, Education Department, Office of the Professions.

Another work is named as "Teaching Law on Engineering and Construction Programs" published by Brodie McAdam (2009).

There is a work titled "Law as Engineering" published by David Howarth (n.d.).

(17) Engineering and Elder Law

No studies have been found yet.

(18) Engineering and Employment Law

There is a work named "Engineering and the Law-Employment Obligations. I. Duties of an Employee to His Employer" published in 1990 by C. Walter and E. P. Richards (1990).

Another study is published by Grant Thornton with the title "Employment Law & HR Engineering".

(19) Engineering and Energy Law

No studies have been found yet

(20) Engineering and Entertainment Law

No studies have been found yet.

(21) Engineering and Environmental & Natural Resources Law

There is a work titled "Engineering Development and Environmental Law" published in 2000 by P. Riley at the *Engineering Management Journal*. He expressed that the legal regulation of processes that affect the environment has been influenced by engineering development and vice versa. Three specific aspects of environmental law are identified where engineering development, primarily in the field of nuclear energy, has led to the implementation of formal regulation through environmental law.

(22) Engineering and Equity and Trusts Law

No studies have been found yet.

(23) Engineering and EU Law

There are works named "Enhancing EU Law on Emerging Technologies: Our Recommendations" and "Enhancing EU Law on Climate Engineering, Neuro Technologies, and Digital Extended Reality" published by Julie Vinders, Trilateral Research, and Ben Howkins in 2023.

There is a work published in EU Law Enforcement named "Preparing the European Union for a Geoengineering Future: Exploring the Interplay of EU and International Law in Geoengineering".

There is a European Intellectual Property Review 2019 named "Reverse Engineering of Software: A Safe Harbour in Europe but Not Safe in the US: SAS Institute Incorporated v World Programming Ltd" published by Vincent Capati.

(24) Engineering and Family Law

No studies have been found yet.

(25) Engineering and Fintech Law

There is a work named "Relationship between FinTech and Financial Engineering: A Review" published by George L. Ye in 2023. Here author expressed that the emergence of financial technology (FinTech) has been transforming the financial services industry by creating new opportunities and challenges, while financial engineering, on the other hand, has been a key driver of financial innovation by enabling the creation of complex financial products and services. This paper provides an overview of the relationship between FinTech and financial engineering, highlighting their key differences and similarities, exploring the ways in which they are being used to develop new financial products and services, discussing the challenges faced by FinTech firms and financial engineers, and the opportunities for growth and development in the financial services industry, and the implications for the future of financial services.

Another work is named "Financial Engineering and Engineering of Financial Regulation" published in 2011 by Yener Çoşkun.

(26) Engineering and Franchise and Distribution Law

No studies have been found yet.

(27) Engineering and Health Law

There is a study named "Public Health Safety and Welfare—Engineering Standards" published in 2017 by National Society of Professional Engineers.

(28) Engineering and Human Rights Law

There is a work named "Engineering for Human Rights: The Theory and Practice of a Human Rights-based Approach to Engineering" published by Davis Chacon-Hurtado, Kazem Kazerounian, and Tulasi Ravindran (2024).

There is a work published at UCONN-Engineering for Human Rights Initiative named "What is Engineering for Human Rights?"

Another work is named "New Technologies for Human Rights Law and Practice" edited by Molly K. Land and Jay D. Aronson in 2018.

(29) Engineering and Immigration & Nationality Law

There is a work named "Breakout Sessions—Session one: I, Robot: The Use of Technology in the Immigration System" published in 10th Biennial IBA Global Immigration Conference in 2022.

(30) Engineering and Insurance Law

There is a work titled "Engineering Insurance and Reinsurance: An Introduction", published in1997 by Peter Howard at Swiss Reinsurance Company.

Another work is "Engineering Insurance" published by Bank of China.

(31) Engineering and Intellectual Property Law

There is also a book named *Intellectual Property Law for Engineers, Scientists and Entrepreneurs* published by Howard B. Rockman (2004).

Another work is published by Feeney in 2023 named as "Mechanical Engineering and Intellectual Property".

(32) Engineering and International Law

There is a study published by Jesse L. Reynolds named as "International Law and Climate Engineering".

Another work is "Climate Engineering and International Law: Challenges for Scientists and Scholars" published by Alexander Proelss.

(33) Engineering and Juvenile Law

No studies have been found yet

(34) Engineering and Labour Law

There is a work named "Engineering and the Law-Employment Obligations. I. Duties of an Employee to His Employer" published by C. Walter and E. P. Richards in 1990.

Another work is titled "Artificial Intelligence and Labor Law" published as book chapter by Aida Ponce Del Castillo and Simon Taes in 2025. Book: *The Law, Ethics and Policy of Artificial Intelligence* by Nathalie A. Smuha.

There is a work named "Labour Law as a Technology for Humanizing Work in the Digital Era" published in 2024 by Debbie Collier as book chapter.

(35) Engineering and Land Law

There is an article named "Land Policy and Land Engineering" published in 2014 by Jichang Han and Yang Zhang.

(36) Engineering and Maritime Law

There is study named "Maritime Law and Engineering Ethics: A Crucial Intersection" published by Dave Ramzy in The Marine Engineers' Blogger Association website.

Another work is titled as "The Intersection between Law and Technology in Maritime Law" and published in 2023 by Aybüke Naz Durmuş as book chapter.

(37) Engineering and Media Law

There is a study named "Engineering and the Media: Building A New Relationships" published by Tylisha Baber and Norman Fortenberry in 2008.

Another work is "Artificial Intelligence and Media", published by Lidia Dutkiewicz, Noémie Krack, Aleksandra Kuczerawy, and Peggy Valcke as book chapter in 2025.

(38) Engineering and Military Law

There is also Military Engineering that expresses the interactions between the two concepts.

(39) Engineering and Municipal Law

There is a study named "The City Engineer and Indiana Municipal Law" published by Christian J. Litscher.

(40) Engineering and Personal Injury Law

There is a work named "How Technology is Impacting Personal Injury Cases" published in 2023 by Allison Barshinger.

(41) Engineering and Private Client Law

No studies have been found yet.

(42) Engineering and Probate Law

No studies have been found yet.

(43) Engineering and Property Law

There is a work titled "The Importance of Intellectual Property in Engineering" published by Hayden Horner in 2023 at Engineering Institute of Technology.

Another study is named "Intellectual Properties—Engineer's Perspective" published in 2016 by Taj Alasfia M. Barakat

There is a work titled "The Intersection of Computer Engineering and Intellectual Property Law" published in 2024 by Shweta Bansal, Sachin Sharma, Sipra Sagar, Shamim Ahmad, Rahul Mishra, and Arvind Kumar Pandey.

There is a book named *Intellectual Property Rights for Engineers* (2nd Edition), published in 2005 by Vivien Irish.

(44) Engineering and Public Law

There is a work named "How Engineers Can Engage More Effectively in Public Policy", published in 2023 by Rob Goodier.

Another work is "The Role of Engineers in Protecting and Advancing the Public Interest (Demand-Side Legislation)".

There is another work titled "The Engineer's Role in Public Policy" published by Patricia D. Galloway and

(45) Engineering and Real Estate Law:

There is a work named "How Engineering Services Help Real Estate Developers" published by Michael Tobias.

(46) Engineering and Securities Law

There is *European Securities Law* (3rd Edition) published in 2021 by Raj Panasar and Philip Boeckman.

(47) Engineering and Sports Law

There is a work titled "The Ethics of Using Engineering to Enhance Athletic Performance", published in 2010 by David Mark James.

Another study is "Sports Engineering Rules" published in 2009 by Simon Choppin.

(48) Engineering and Tax Law

There is a work named "Tax Reform Considerations for Engineering and Construction Companies" published in 2017 by Michael Moore, Carol Conjura, Anjit Bajwa, and Josh Dunlap.

Another work is published in 2018 with the name of "Impact of the New Tax Law on Engineering Firms".

Another work is published by American Council of Engineering Companies ACEC in 2024 with the name "The RNC and Tax Law Implications for Engineering Firms.

Another work is "Sophisticated Financial Engineering and Tax Arbitrage: An Assessment of the European Fiscal Regime for Corporate Tax Mitigation" published in 2021 by Ronen Palan, Anastasia Nesvetailova, Hannah Petersen, and Richard Phillips.

(49) Engineering and Technology Law

There is a work named "Lawyers, Engineers and Technology: A Case Study" published by John Gregory in 2011.

(50) Engineering and Telecommunications Law

There is a work named “The Role of Telecom Engineers as Legal Counselors”, published in 2023 by Manuel José Fernández Iglesias.

There is a report named “Dispute Resolution in the Telecommunications Sector: Current Practices and Future Directions” published by Robert R. Bruce, Rory Macmillan, Timothy St. J. Ellam, Hank Intven, Theresa Miedema for ITU and the World Bank in 2004.

Another work is titled “Telecommunications Regulation Handbook—10th Anniversary Edition”, Edited by Colin Blackman and Lara Srivastava in 2011.

(51) Engineering and Tort Law

There is a study named “Engineering and Tort Law Legal Principles Impacting Engineering Practice”, published as course notes.

Another work is published by Sikander Shah in 2014 at the Engineering Leaders Conference with the name of “Engineering Ethics and Tort Law: The Need for an Integrated Approach”.

(52) Engineering and Travel Law

No studies have been found yet.

Interactions of Law with engineering and with other disciplines are important. Ultimately, such collaborations yield an innovative and synergistic knowledge base, fostering the development of new theories capable of explaining complex human phenomena from varied perspectives. These diverse vantage points will generate superior and more fitting outcomes than those achievable by the field of law operating in isolation.

Interactions Between Engineering and Justice

As result of the evaluation of the literature about the possible interactions or relationships between the “engineering” and “justice” disciplines/concepts, author noticed that most of scientists, thinkers, lawyers considered the interactions between the engineering and some types of justices only.

With this respect, author defined specific interactions, interconnection, or relationship between engineering and all 25 different types of justice separately below to specify the impact of engineering on justice discipline more generally/specifically.

Relationships/Interactions Between Engineering and Different Types of Justice

Author searched and evaluated the possible interactions between the “engineering” and all 25 “types of justice” given above separately.

Author defined 25 hybrid disciplines below to evaluate and emphasize the importance of all possible interactions and relations which will cause to realize the importance and effect of the engineering disciplines in human life and in world country systems. Author also informs that each of these interaction disciplines is another kind works to express the details of the related theories and concepts of justice (Ramiz, upcoming work).

Author expressed the works and studies he found for each of these 25 hybrid disciplines below. As result of the evaluation, author noticed that there are some kind studies which express the good interactions between engineering and the related types of justice. However, it is also noticed that there are not any interaction studies for 13 types of justice. On the other hand, there are one or two studies for some types of justice, where only studies on engineering and social justice interactions are most among others that express the possible interactions.

One specific example about the interaction between the engineering and justice is expressed in the article named “Re-Engineering Justice? Robot Judges, Computerised Courts and (Semi) Automated Legal Decision-Making” by John Morison and Adam Harkens (2019). This paper takes a skeptical look at the possibility of advanced computer technology replacing judges. Looking first at the example of alternative dispute resolution where considerable progress has been made in developing tools to assist parties to come to agreement, attention then shifts to evaluating a number of other algorithmic instruments in a criminal justice context. The possibility of human judges being fully replaced within the courtroom strictu sensu (in a narrow sense) is examined, and the various elements of the judicial role that need to be reproduced are considered. Drawing upon understandings of the legal process as an essentially socially determined activity, the paper sounds a note of caution about the capacity of algorithmic approaches to ever fully penetrate this socio-legal milieu and reproduce the activity of judging, properly understood. Finally the possibilities and dangers of semi-automated justice are reviewed. The risks of seeing this approach as avoiding the recognised problems of fully automated decision-making are highlighted, and attention is directed towards the problems that remain when an algorithmic frame of reference is admitted into the human process of judging.

All possible interactions between the engineering and 25 types of justice are given below in alphabetic order:

(1) Engineering and Comparative Justice

No studies have been found yet.

(2) Engineering and Corrective Justice

No studies have been found yet.

(3) Engineering and Criminal Justice

Engineering and criminal justice intersect primarily through Forensic Engineering, where engineering principles are applied to investigate incidents, reconstruct events, and analyze evidence in civil and criminal cases. Roles include forensic engineers, who analyze product failures, accidents, and structural collapses, and forensic biomechanics experts, who use engineering to reconstruct crime and accident scenes. Additionally, software engineers can apply computational thinking to address social issues within the criminal justice system, while detection engineers use principles from criminal justice to improve threat detection systems

Forensic engineering has been defined as “the investigation of failures—ranging from serviceability to catastrophic—which may lead to legal activity, including both civil and criminal.” The forensic engineering field is very broad in terms of the many disciplines that it covers and investigations that use forensic engineering are case of environmental damages to structures, system failures of machines, explosions, electrical, fire point of origin, vehicle failures, and many more. Forensic Engineering includes the investigation of materials, products, structures, or components that fail or do not operate or function as intended, causing personal injury, damage to property, or economic loss. The consequences of failure may give rise to action under either criminal or civil law including but not limited to health and safety legislation, the laws of contract and/or product liability and the laws of tort. The field also deals with retracing processes and procedures leading to accidents in operation of vehicles or machinery. Generally, the purpose of a forensic engineering investigation is to locate cause or causes of failure with a view to improve performance or life of a component, or to assist a court in determining the facts of an accident. It can also involve investigation of intellectual property claims, especially patents. In the USA, forensic engineers require a professional engineering license from each state.

(4) Engineering and Design Justice

There is an article published by Shuvra Das at the American Society for Engineering Education (ASEE)

2023 Annual Conference & Exposition, with the title of "Incorporating Design Justice Activities in Engineering Courses". He expressed there that one of the primary tasks that engineers have to undertake is design. Engineers design and develop solutions that are supposed to satisfy human needs. Engineers also, through their work, intend to change the life of everyone for the better. While all around us we see numerous examples of cases/design solutions that have improved our lives, there is also another side of this story. For example, development of nuclear weapons during the World War II led to its use to destroy cities and innocent lives, and a perpetual threat of the possibility of nuclear holocaust. Or, for example, how early in the USA history the growth of the country from its coastal colonies into the heartland was achieved through the development of the railroad. These same railroad projects ended up destroying the lives and livelihood of the indigenous people according to him.

Shuvra Das published another article named "Engineering Ethics Principles and Design Justice Principles: Are They Same or Different?" in 2024 at conference ASME IMECE 2024. Shuvra Das stated in his article that when we devise solutions to challenging design questions, quite often we do not consider the possibilities of the harms it may cause, and frequently exclude the voices of the very people who are affected by the design. The Design Justice movement is a network of design practitioners, artists, engineers, design educators, and others from a variety of different backgrounds who want to change the design landscape into a more inclusive ecosystem.

(5) Engineering and Distributive Justice

No studies have bene found yet.

(6) Engineering and Economic Justice

There is a discipline named engineering economics which guides engineers and economists to evaluate economic subjects via engineering principles.

(7) Engineering and Environmental Justice

There is a book named *Engineering and Environmental Justice* published by Benjamin R. Cohen in 2020.

Another study about this field is "Engineering Ethics, Environmental Justice, and Environmental Impact Analysis: A Synergistic Approach to Improving Student Learning" published by Roger Painter in 2012 at ASEE Annual Conference & Exposition.

There is a paper titled "Engineering & Environmental Justice: Protections, Hazards, and Technological Systems" published by Riley Fisher, Ernest Kee, David Johnson, Ha Bui, Zahra Mohageghegh in 2024. Here authors expressed that, citizens have become increasingly concerned about sharing risks and resources in a fair and equitable way—awareness is increasing that Environmental Justice (EJ) should play a greater role. Evaluating fairness in the design of different schemes involving exposure to harms is the domain of philosophy, psychology, and politics, well outside the domain of engineering practice—a discipline central in evaluation of potential for harms and cost of protections as dictated by requirements citizens place on deployed hazardous technological systems in laws. Still, engineers are often asked to support schemes with quantitative risk estimates for harms, such as in Cost Benefit Analysis (CBA). Within the narrow domain of deployed hazardous technological systems, engineers can provide limited support for EJ schemes when they ask for de minimis harm and thereby remove the need to make judgements on fairness (for harms). Empirical evidence with decades of Nuclear Regulatory Commission (NRC) regulation of risk management in the USA commercial nuclear power industry shows engineering practice can produce designs with effectively no risk for harm. The same experience indicates investors may be unwilling to fund such designs based on their expected return in competitive markets.

Another study is “Empowering Practicing Engineers and Planners to Advance Environmental Justice” published by Darshan M. A. Karwat, James R. Blakley, Elizabeth A. Castillo, Amy Squitieri, Alisa Oyler, and Madison M. Macias (2025). Here authors expressed that engineers and planners are central players in creating the built environments and shaping natural ones that make up our communities. They can be a force for creating environments that are just and equitable, and by doing so advance the ideals of environmental justice. But, too often, these professionals are not empowered to create or seize opportunities to advance environmental justice. In the face of economic, operational, and social barriers, professional engineers and planners can remain passive agents who move projects forward through planning, design, and construction with little regard to their community and environmental impact. According to the authors, to overcome these barriers and affect positive change, we see the pivot points of organizational change as (1) building skills in applying environmental justice and engaging communities, (2) adapting project development processes to include environmental justice, (3) defining the business case for environmental justice, and (4) driving the cultural and organizational change required to advance environmental justice. This paper describes the authors experience building, delivering, and evaluating a nine-week project-based learning professional development course focused on these four pivot points at Mead & Hunt, a leading architecture, engineering, and construction (AEC) firm. They find that their course not only enhanced participants’ awareness of environmental justice issues as they relate to AEC work, but also led to a measurable impact in Mead & Hunt related to winning bids, hiring staff, professional outreach, and corporate strategy. While future efforts will focus on strengthening the course to better achieve our stated learning outcomes and on collecting participant data more rigorously, their course suggests that a focus on environmental justice can add fresh value to the work of AEC firms, build new skills in AEC professionals, and lead to improved project outcomes.

Another work is “Introduction: Environmental Justice and the Transformation of Science and Engineering” published by Benjamin Cohen and Gwen Ottinger in 2011. In this work, there are case studies exploring how experts’ encounters with environmental justice are changing technical and scientific practice. Over the course of nearly thirty years, the environmental justice movement has changed the politics of environmental activism and influenced environmental policy. In the process, it has turned the attention of environmental activists and regulatory agencies to issues of pollution, toxics, and human health as they affect ordinary people, especially people of color. This book argues that the environmental justice movement has also begun to transform science and engineering. The chapters present case studies of technical experts’ encounters with environmental justice activists and issues, exploring the transformative potential of these interactions. Technoscience and Environmental Justice first examines the scientific practices and identities of technical experts who work with environmental justice organizations, whether by becoming activists themselves or by sharing scientific information with communities. It then explores scientists’ and engineers’ activities in such mainstream scientific institutions as regulatory agencies and universities, where environmental justice concerns have been (partially) institutionalized as a response to environmental justice activism. All of the chapters grapple with the difficulty of transformation that experts face, but the studies also show how environmental justice activism has created opportunities for changing technical practices and, in a few cases, has even accomplished significant transformations.

(8) Engineering and Global Justice

There is a work named “Does Global Justice Demand Solar Geoengineering?” published by Orri Stefánssona and Mac Willnersa in January 2025. They expressed in this study that this paper critically examines

the Global Justice Argument for researching solar geoengineering, which posits (considers) that global justice concerns support an obligation to research such technologies. The argument relies on two key assumptions: that anthropogenic climate change constitutes an injustice against the climate-disadvantaged and that solar geoengineering deployment is best suited to reduce climate harms befalling the climate-disadvantaged. The authors argue that even if the latter, empirical claim is true, the argument fails because it lacks a necessary consent requirement. Since solar geoengineering cannot rectify the injustices by restoring pre-injustice conditions, it can, at best, serve as compensation. Drawing on the concepts of ends-displacing compensation and duties of justice, authors demonstrate that a consent requirement is necessary for the global justice argument to succeed. Given evidence of explicit dissent from some climate-disadvantaged groups, they conclude that global justice does not currently demand solar geoengineering.

(9) Engineering and Informational Justice

No studies have been found yet.

(10) Engineering and Injustice

No studies have been found yet.

(11) Engineering and Interactional Justice

No studies have been found yet.

(12) Engineering and Legal Justice

No studies have been found yet.

(13) Engineering and Linguistic Justice

No studies have been found yet.

(14) Engineering and Occupational Injustice

No studies have been found yet

(15) Engineering and Open Justice

There is an article published in 2018 with the title “Information and Technology in Open Justice” written by Mila Gasco-Hernandez, and Carlos E. Jimenez-Gomez. In this work, they stated that the topic of open justice has only been little explored perhaps due to its traditionally having been considered a “closed” field. There is still need to know what open justice really means, to explore the use of information and technology in enabling open justice, and to understand what openness in the judiciary can do to improve government, society, and democracy. This special issue aims to shed light on the concept of openness in the judiciary by identifying and analyzing initiatives across the world.

Another work is “The Promise of AI in an Open Justice System” published by Adam R Pah, David L. Schwartz, Sarath Sanga, Charlotte S. Alexander, Kristian J. Hammond, and Luís A. N. Amaral in 2022. In this work, they expressed that to craft effective public policy, modern governments must gather and analyze data on both the performance of their public functions and the responses by the public. Federal administrative agencies such as the Patent Office and Centers for Disease Control routinely do this, as does the United States of America Congress. More importantly, they make such data freely accessible. Within the United States of America government, however, the judicial branch is a conspicuous outlier.

(16) Engineering and Organizational Justice

There is only one study named “Impact of Organizational Justice on Engineering Workers Job Satisfaction (a Research on 100 Engineering Workers, Are Working in Department of Electrical at Al-Arabia Sugar Mill, Noon Sugar Mill and Shakarganj Sugar Mill Manufacturing Plants in Sugar Industry of Pakistan)” published by

Kamran Nawaz, Mudassar Usman, Muhammad Nadeem, Fatima Nisar, Kashif Saleem. They stated that this research paper focused its aim to investigate the consequences of organizational justice and its components on the job satisfaction of engineering workers working in the three different organizations in same sugar industry. This work further contributed to examining the relationships of distributive, procedural, and interactional justice with the satisfactory feelings of electrical workers at manufacturing plants of three different organizations.

(17) Engineering and Poietic Justice

No studies have been found yet.

(18) Engineering and Political Justice

There is a master thesis titled "A Political Theory of Engineered Systems and a Study of Engineering and Justice Workshops" published by Dominic David Carrese in 2024. In this work, author expressed that since there are good reasons to think that some engineered systems are socially undesirable—for example, internal combustion engines that cause climate change, algorithms that are racist, and nuclear weapons that can destroy all life—there is a well-established literature that attempts to identify best practices for designing and regulating engineered systems in order to prevent harm and promote justice. Most of this literature, especially the design theory and engineering justice literature meant to help guide engineers, focuses on environmental, physical, social, and mental harms such as ecosystem and bodily poisoning, racial and gender discrimination, and urban alienation. However, the literature that focuses on how engineered systems can produce political harms—harms to how we shape the way we live in community together—is not well established. The first part of this thesis contributes to identifying how particular types of engineered systems can harm a democratic politics.

(19) Engineering and Procedural Justice

No studies have been found yet.

(20) Engineering and Racial Justice

There is a work titled "The Shadow History of Engineering & Racial Justice" published in 2022 by Kyle Davy. He expressed that in a narrative that is overwhelmingly positive, the history of engineering is commonly told as a story of progress and achievement. From the Brooklyn Bridge and the Hoover Dam to countless roadway and water projects across America, engineers designed and built an infrastructure that not only drove progress and growth, but also protected public health, safety, and welfare. From Edison's lightbulb and Bell's telephone to computers and the Internet, engineers created technologies that revolutionized the way we live and work. And, from mechanical and electrical devices to chemical processes, members of the Engineering Community were central to both industrial and consumer revolutions in the United States of America and across the world.

Another work is named "Manifestations of Racism in the Engineering Workplace" published by Gretchen A. Dietz, Randy D. Brown, Elliot P. Douglas, Erica D. McCray, and Paul G. Richardson in 2023.

(21) Engineering and Restorative Justice

There is a work named "Academic Integrity: A Restorative Justice Approach in First Year Engineering" published in 2024 at Proceedings of the Canadian Engineering Education Association (CEEA) by Marnie Jamieson and Pierre Mertiny. In this study, they expressed that academic integrity is a cornerstone of post-secondary education. Academic integrity violations disrupt the soundness of the assessment process, which is exacerbated in professional programs like engineering where accreditation hinges on the measurement of student proficiencies and graduate attributes. Engineering programs are typically challenging with demanding schedules and higher than typical workloads. Freshmen often face this challenge with deficient time management skills, which is coupled with increasing student mental health and wellness concerns. Combined with pressure to

perform, these systemic issues can create circumstances in which students rationalize opportunities that constitute potential code of conduct violations, especially in group situations. The academic misconduct investigation process can be resource intensive, time intensive, and stressful for students, instructors, and administrators. A restorative justice model was implemented as an alternative path to manage a large number of cases in first year engineering. The objective of using this approach was to educate students, emphasize the connection between academic integrity and engineering ethics, and prevent further occurrences. This paper describes the development and use of this collaborative approach for first year.

Another work is "Restorative Justice and Technology" published in 2016 by Pablo Galain Palermo and Pedro Freitas. Here they expressed that in civil law countries, criminal justice is beginning to experience a shift from retributive justice towards restorative justice. Amongst other goals, restorative justice aims to give the victim a pivotal role in the administration of justice, which until now, with the traditional criminal justice, has not happened at a desirable level. It covers very different processes, but victim-offender mediation is certainly the most established one. Although an online version of the victim-offender mediation model is yet to be implemented, the authors believe that it could be a relevant alternative to an offline setting. It is nevertheless clear that further studies are necessary to fully comprehend the extent of the structure and implications of an ODR system for criminal conflicts.

(22) Engineering and Retributive Justice

No studies have been found yet.

(23) Engineering and Social Justice

This interaction is also expressed as Engineering Social Justice where the term was used here to describe social justice through the efforts of engineers. Engineering Social Justice efforts typically center on product design, specifically designs for accessibility and sustainability due to one point of view.

There is a book named *Engineering Justice: Transforming Engineering Education and Practice* published by Jon A. Leydens, Juan C. Lucena in 2018. This book, part of the IEEE PCS Professional Engineering Communication Series, is a thoughtful examination of the role of social justice in engineering education and practice.

Another work is "Integrating an Engineering Justice Approach in an Undergraduate Engineering Mechanics Course" published by Daniel I. Castaneda, Joi D. Merritt, and Joel A. Mejia in 2021.

There is a work titled "Engineering, Social Justice, and Sustainable Community Development" which is the first in a series of biennial workshops on the theme of engineering ethics and engineering leadership. It is edited by Rachelle Hollander and Nathan Kahl, and published in 2010 at National Academies of Sciences, Engineering, and Medicine.

Another study is "Engineering and the Values of Social Justice" published in 2010 by Jen Schneider. She expressed that engineering and social justice, as a topic, is gaining increasing attention from engineers and scholars of engineering studies alike.

There is a work titled "Engineering Education and Social Justice" published in 2022 by Jon A. Leydens, Juan C. Lucena, and Donna M. Riley. They expressed that engineering education and social (in)justice are connected in complex ways. Research indicates that while issues of social (in)justice are inherent in engineering practice, they are often invisible in engineering education. The mechanism by which social justice is rendered invisible involves mindsets and ideologies in engineering and engineering education. Hence, innovative strategies and practices need to address these mindsets and ideologies, rendering social justice visible in engineering

education. According to the authors, imagined future scenarios for social justice in engineering education indicate how social justice could be readily marginalized or accentuated, with accompanying detriments or benefits.

There is a work named "Engineering and Society: Working towards Social Justice, Part II" published in 2009 by George Catalano.

Another work is "A Sociotechnical Approach to Engineering Education: Engineering Social Justice for Elementary Preservice Teachers" published by David Kimori. Here, he expressed that in this article, he describes an assignment that they have developed in their Engineering for Elementary Teachers course. The assignment was designed to address social justice within the engineering design process. In this course, preservice teachers (PSTs) develop an engineering project that integrates six criteria of engineering for social justice into their lesson plan as a way to make the social relevance of engineering more apparent. Beyond having teachers develop an engineering lesson plan, the goal is to increase awareness of the social justice dimension of engineering as a strategy for integrating culturally relevant pedagogies into engineering lessons. In this article, the author shares several lessons their PSTs have developed as well as insights that they gained about the relationship between engineering and social justice. The author also shares some of the challenges that the PSTs faced and the insights that they gained about integrating social justice criteria into engineering lessons.

There is a book named *Engineering Education for Social Justice* published by Juan Lucena in 2013.

Another work is "Engineering for the People: Putting Peace, Social Justice, and Environmental Protection at the Heart of All Engineering" published by Darshan M. A. Karwat in 2018.

There is a book titled *Engineering and Social Justice: In the University and beyond* edited by Caroline Baillie and Alice Pawley in 2012.

There is also a book chapter named "Institutionalizing Social Justice in Engineering Curricula" published by Diana A. Chen, Gordon D. Hoople, Jon A. Leydens, and Cindy Rottmann in 2023 as part of the Book *International Handbook of Engineering Education Research*.

Another book named *Engineering and Social Justice* is published by D. Riley in 2008. Author expressed that the profession of engineering in the United States of America has historically served the status quo, feeding an ever-expanding materialistic and militaristic culture, remaining relatively unresponsive to public concerns, and without significant pressure for change from within. This book calls upon engineers to cultivate a passion for social justice and peace and to develop the skill and knowledge set needed to take practical action for change within the profession. Because many engineers do not receive education and training that support the kinds of critical thinking, reflective decision-making, and effective action necessary to achieve social change, engineers concerned with social justice can feel powerless and isolated as they remain complicit. According to the author, utilizing techniques from radical pedagogies of liberation and other movements for social justice, this book presents a roadmap for engineers to become empowered and engage one another in a process of learning and action for social justice and peace

Another article is titled "Are Engineering and Social Justice (In)commensurable? A Theoretical Exploration of Macro-Sociological Frameworks" in 2012 by Jon Leydens, Juan C Lucena, and Jen Schneider. Here authors expressed that the degree to which engineering and social justice as fields of practice are (in)commensurable remains an open question. To illuminate important dimensions of that question, they explore intersections between those fields and two macro-sociological frameworks. Those theoretical frameworks—structural functionalism and social conflict—represent contrasting perspectives on how society should be organized. Specifically, the authors reveal conceptual alignments between structural functionalism and engineering/engineering education

and between social conflict and social justice. According to the authors, those alignments suggest some salient potential catalysts for tensions between engineering and social justice and provide a useful ideological mirror for reflection by all who are committed to the engineering profession and/or to social justice.

There is also a work named "Shows How the Engineering Curriculum Can Be a Site for Rendering Social Justice Visible in Engineering, for Exploring Complex Socio-Technical Interplays Inherent in Engineering Practice, and for Enhancing Teaching and Learning". Here they expressed that using social justice as a catalyst for curricular transformation, *Engineering Justice* presents an examination of how politics, culture, and other social issues are inherent in the practice of engineering. It aims to align engineering curricula with socially just outcomes, increase enrollment among underrepresented groups, and lessen lingering gender, class, and ethnicity gaps by showing how the power of engineering knowledge can be explicitly harnessed to serve the underserved and address social inequalities. This book is meant to transform the way educators think about engineering curricula through creating or transforming existing courses to attract, retain, and motivate engineering students to become professionals who enact engineering for social justice

(24) Engineering and Spatial Justice

No studies have been found yet.

(25) Engineering and Transformative Justice

There is a work titled "Engineering Justice: Transforming Engineering Education and Practice" published by Jon A. Leydens in 2017.

Another study is named as "Engineering Solutions for Justice: Transformative Approaches to Address Transportation-Related Disparities" published in 2022 by Regan F. Patterson. Here author expressed that when the problem statement accounts for the sociopolitical nature of the problem, opportunities emerge to reimagine and innovate systems toward equity and justice. How a problem is defined influences its possible solutions. Transportation is recognized as the largest contributor to greenhouse gas emissions (GHG) in the United States of America (28 percent), and most such emissions are from passenger vehicles (EPA, 2020). Technical problems call for technical solutions. When defining the problem of transportation GHG and health-harming pollutant emissions in technical terms, the focus of analysis is typically the tailpipe and the associated problem statement is: Tailpipes emit criteria air and climate pollutants that contribute to pollution exposure and climate impacts. But this strictly technical focus does not account for disparate exposures and impacts. For example, GHG emissions drive climate change, and the impacts and health risks of climate change disproportionately affect communities of color (Bullard & Wright 2012; Cushing et al., 2022; US GCRP, 2018), as evident in Jackson, Mississippi, and Puerto Rico.

There is a work titled "Transformative Justice through Social Engineering: Analyzing the Role of Legislation in Supporting the Rehabilitation of Drug Addicts to Become Productive Members of Society" published in 2024 by Siti Ngaisah, An Haryono, and Ruchan Sanusi. In this work they expressed that the research investigates law's role in promoting transformative justice through social engineering, focusing on rehabilitation and reintegration processes of drug addicts into society. This study applies a normative-juridical approach to evaluate Indonesia's legal frameworks for their effectiveness in handling addiction as a public health issue. Comparative analyses with international models, such as the decriminalization in Portugal and harm reduction policies in the Netherlands, show what a change of heart in legal philosophy might achieve. According to the authors, the findings put forward the major lacunas in the present legislation: undue punitive, lack of supportive infrastructure, and stigma among society. Recommendations offered by the study go on to include legislative

reform for rehabilitation, supportive infrastructure development, public-private partnership for effective reintegration. This paper advocates for a compassionate justice system that embeds transformative justice principles into legal frameworks, promoting societal productivity and inclusivity.

General Philosophy and Philosophy of Law

General Philosophy

Author evaluated most of the theories/perspectives of most of the experts/thinkers/philosophers about the meaning and definition of philosophy, and branches of philosophy (Ramiz, June 2016). With this respect, it is possible to define: (a) Philosophy due to Historical Period, (b) Philosophy due to Religious Perspective, (c) Philosophy due to Its Organized Categories, Branches, or Areas.

Since we considered the historical changes related with engineering, science, law, justice, and philosophy disciplines for searching and evaluating the possible interactions between the disciplines, here philosophy due to historical period is expressed generally below.

Philosophy due to Historical Period

Author divided the Philosophy into the following "historical periods" as follows by considering the general perspectives considered for the R-Synthesis: (1) Ancient philosophy; Egypt and Babylon, Ancient Chinese, Ancient Greco-Roman, Ancient Indian, Ancient Persian, (2) 5th-16th centuries; Medieval Europe, Renaissance, East Asia, India, Middle East, Mesoamerica, Africa, (3) Early Modern and Modern (17th-18th centuries), 19th century, 20th century, (4) New Era Philosophy (future).

Philosophy of Law*

Due to general point of view, philosophy of law, is expressed as the examination in a general perspective of what law is and what it ought to be. It investigates issues such as the definition of law; legal validity; legal norms and values; and the relationship between law and other fields of study, including economics, ethics, history, sociology, and political philosophy in some manner. Modern philosophy of law began in the 18th century and was based on the first principles of natural law, civil law, and the law of nations. Contemporary philosophy of law addresses problems internal to law and legal systems and problems of law as a social institution that relates to the larger political and social context in which it exists.

With regarding the Britanica, philosophy of law, is a branch of philosophy that investigates the nature of law, especially in its relation to human values, attitudes, practices, and political communities. Traditionally, philosophy of law proceeds by articulating and defending propositions about law that are general and abstract—i.e., that are true not of a specific legal system at a particular time (e.g., the United Kingdom in 1900) but of all legal systems in the present or perhaps of all laws at all times. Philosophy of law often aims to distinguish law from other systems of norms, such as morality (*or* ethics) or other social conventions. Views about the nature of law often depend upon, and occasionally have contributed to, answers to some of the most fundamental philosophical questions—for example, regarding the foundations of morality, justice, and rights; the nature of human action and intention; the relations between social practices and values; the nature of knowledge and truth; and the justification of political rule (*regarding political philosophy*). With this respect, the philosophy of law is therefore considered as an integral part of philosophy more generally.

Some of the Philosophers of Law and Their Interests

Author evaluated generally/specifically almost all of the following philosophers of law, and their works/interests below (due to date of birth): (1) Plato (428BC-348BC), (2) Aristotle (384BC-322BC), (3) Thomas

Aquinas (1225-1274), (4) Francisco de Vitoria (1483-1546), (5) Francisco Suarez (1548-1617), (6) Francis Bacon (1561-1626), (7) Hugo Grotius (1583-1645), (8) John Locke (1632-1704), (9) Montesquieu (1689-1755), (10) Jeremy Bentham (1748-1832), (11) Johann Gottlieb Fichte (1762-1814), (12) Georg Wilhelm Friedrich Hegel (1770-1831), (13) Friedrich Carl von Savigny (1779-1861), (14) John Austin (1790-1859), (15) Frederic Bastiat (1801-1850), (16) Julius von Kirchmann (1802-1884), (17) Rudolf Jhering (1818-1892), (18) Oliver Wendell Holmes Jr. (1841-1935), (19) Roscoe Pound (1870-1964), (20) Gustav Radbruch (1878-1949), (21) Hans Kelsen (1881-1973), (22) Carl Schmitt (1888-1985), (23) Emilio Betti (1890-1968), (24) Evgeny Pashukanis (1891-1937), (25) Alf Ross (1899-1979), (26) Lon L. Fuller (1902-1978), (27) Carlos Cossio (1903-1987), (28) H. L. A. Hart (1907-1992), (29) Norberto Bobbio (1909-2004), (30) Miguel Reale (1910-2006), (31) Francisco Elías de Tejada y Spínola (1917-1978), (32) Tony Honoré (1921-2019), (33) John Rawls (1921-2002), (34) Geoffrey Warnock (1923-1995), (35) Joel Feinberg (1926-2004), (36) Reinhold Zippelius (1928-cont), (37) William E. May (1928-2014), (38) Jürgen Habermas (1929-cont), (39) António Castanheira Neves (1929-cont), (40) Germain Grisez (1929-2018), (41) Ronald Dworkin (1931-2013), (42) Robert Summers (1933-2019), (43) David Lyons (1935-cont), (44) Upendra Baxi (1938-cont), (45) Joseph Raz (1939-2022), (46) John Finnis (1940-cont), (47) Neil MacCormick (1941-2009), (48) Carlos Santiago Nino (1943-1993), (49) Robert Alexy (1945-cont), (50) Catharine MacKinnon (1946-cont), (51) Francesco D'Agostino (1946-2022), (52) Martha Nussbaum (1947-cont), (53) Roberto Unger (1947-cont), (54) Jules Coleman (1947-cont), (55) Jeremy Waldron (1953-cont), (56) Pierre Schlag (1954-cont), (57) Robin West (1954-cont), (58) Robert P. George (1955-cont), (59) Leslie Green (1956-cont), (60) Scott J. Shapiro (1966-cont).

Table 1

Some of the Philosophers of Law and Their Philosophical Interests (due to Date of Birth)

	Philosophical Interests of Philosophers (in alphabetic order)						
Pioneer/Founder People	Philosophy of History*	Philosophy of Politics*	Philosophy of Religion*	Philosophy of Science*	Ethics*	Philosophy of Law* and Others	Life Period
Plato	X	X	X	X	X	PoL, E*, D	428BC-348BC
Aristotle		X	X	X	X	PoL, PoM, M, L, D	384BC-322BC
Al-Ghazali						PoL*, L*,	1058-1111
Thomas Aquinas	X	X	X		X	PoL*, PoM*, D	1225-1274
Francisco de Vitoria		X				PoL*	1483-1546
Francisco Suarez						PoL*, M*, D	1548-1617
Francis Bacon						PoL, E, L, D	1561-1626
Hugo Grotius		X				PoL, PoW	1583-1645
Thomas Hobbes		X			X	PoL*,	1588-1679
John Locke		X				PoL, E*, M*, Pedu	1632-1704
Montesquieu		X				PoL, D	1689-1755
David Hume		X	X	X	X	PoL, PoM, E, M, D	1711-1776
Immanuel Kant	X	X	X	X	X	PoL*, E*, M*, D	1724-1804
Jeremy Bentham		X			X	PoL, D	1748-1832
Johann G. Fichte		X			X	PoL, PoM*, M*,	1762-1814
G. W. F. Hegel	X	X	X		X	PoL, A*, L*, D,	1770-1831
John Stuart Mill		X		X	X	PoL*, D	1806-1873
Hans Kelsen		X				PoL, D	1881-1973
Carl Schmitt			X			PoL, D	1888-1985

Table 1 to be continued

H. L. A. Hart	X		PoL,	1907-1992
Norberto Bobbio	X		PoL, D	1909-2004
John Rawls	X	X	PoL,	1921-2002
Joel Feinberg	X	X	PoL,	1926-2004
Germain Grisez		X	PoL,	1929-2018
Jürgen Habermas			PoL, E*,	1929-cont
Ronald Dworkin	X		PoL, D	1931-2013
Joseph Raz	X	X	PoL,	1939-2022
John Finnis		X	PoL, E*, M*,	1940-cont
Carlos S. Nino	X	X	PoL,	1943-1993

Notes. (*) denotes that these branches are defined due to past philosophical branch perspectives; Here A*: Aesthetics, E*: Epistemology, L*: Logic, M*: Metaphysics, PoL*: Philosophy of Law, PoM*: Philosophy of Mind, PoN*: Philosophy of Nature, D: denotes some other sciences.

There are Martha Nussbaum (1947-cont), Roberto Unger (1947-cont), Robert P. George (1955-cont), and Leslie Green (1956-cont) who are interested in both Philosophy of Law and Philosophy of Politics at the same time, too.

As result of the evaluation, author determined that, some of the philosophers of law are being effective because they were interested in multi-disciplines at the same time and interested in more than one branch of philosophy, as shown in Table 1 above. Besides this, author noticed that some of these philosophers are/were lawyers, or jurist. While some of them adopted some religions such as Catholic, only few of them also are/were related with politics, most of them care about ethics, most of them consider philosophy of politics, only few of them are interested in philosophy of history, and few of them considered philosophy of religion and philosophy of science, some others considers(ed) epistemology, and almost all of them are interested in philosophy of politics*.

New Perspective of Philosophy

Author evaluated almost all subjects (see new synthesis; Ramiz, June 2016) and made a new R-Synthesis. As result of the synthesis author defined new perspective of philosophy (R-Philosophy) which includes all the new and/or re-constructed branches of philosophy due to that perspective. Also, R-Justice, R-Law, R-Science, R-Engineering disciplines are defined here as result of this new synthesis. Aim/purpose of R-Philosophy is defined in general/specific manner in the previous works (Ramiz, 2016; 2020), where some general information is given here as guide. In this context, these new disciplines can be expressed as follows:

R-Philosophy: New Perspective of Philosophy, New Era Philosophy, Basic Philosophies, Hybrid Philosophies, Branches of Philosophy, Ideal Philosophical System, History of Philosophy.

R-Science: New Perspective for Philosophy of Science, Ideal Scientific System, Basic Sciences, Hybrid Sciences, Multidisciplinary Sciences, Interdisciplinary Sciences, History of Science.

R-Justice: New Perspective for Philosophy of Justice, Justice, Sense of Justice, Science of Justice, Theories of Justice, History of Justice,

R-Law: New Perspective for Philosophy of Law, Law, Theories of Law, History of Law.

R-Engineering: Philosophy of Engineering, Engineering, Branches of Engineering, History of Engineering.
R-Religion: New Perspective for Philosophy of Religion, New Era Theory, Hybrid Religions, Theories of Religion, History of Religions.

With this respect, the following general/specific subjects are considered as guide for this work also.

New Era Philosophy, Branches of Philosophy, and Ideal Philosophical System

Author defined R-Philosophy discipline to express all subjects directly related with philosophy as it is given above. With regarding this, there are "xD" Hybrid Philosophies (x: 1 to 8), upper constructional philosophies, and lower constructional philosophies beside the concepts given above for R-Philosophy.

Due to new perspective of philosophy (Ramiz, June 2016), New Era Philosophy is defined as 8D Hybrid Philosophy of eight basic philosophies, and as a major philosophy branch, for the design, definition, etc., of all the subjects and to express some subjects due to the known perspective in daily life.

There is an Ideal Philosophical System defined by the author that includes all possible "xD" Hybrid Philosophy Categories and is given in previous work (Ramiz, June 2016). Here the number of categories is defined by the combinations (8;x)/(8;2), (8;3), (8;4), (8;5), (8;6), (8;7), (8;8) relevant to each basic philosophy considered together.

Upper constructional philosophies and lower constructional philosophies are given with more details in other works too (Ramiz, June 2016; December 2020) to express/explain the related subjects.

Basic philosophies, which are also defined by the author as new and/or re-constructed branches of philosophy, are as follows (Ramiz, June 2016) (in alphabetic order): (1) Philosophy of Administration®®, (2) Philosophy of Information®©, (3) Philosophy of Justice®®, (4) Philosophy of Politics®©, (5) Philosophy of Religion®©, (6) Philosophy of Science®©, (7) Philosophy of Social Science®©, (8) Philosophy of System®®.

Author defined new perspective for Philosophy of Science®© and its sub-branches in other work (Ramiz, July 2016). Also defined new perspective for Philosophy of Religion®© in other work (Ramiz, December 2020).

Also, important "sub-branches" of all these eight basic philosophies are defined by the author generally/specifically (Ramiz, 2016; 2020).

New Perspective for Philosophy of Justice

Theories of Justice are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of justice, (b) knowledge of justice, (c) nature of justice, (d) sense of justice, (e) purpose of justice; inspection of administration, inspection of information, inspection of judicial services, inspection of political services, inspection of religious services, inspection of scientific services, inspection of the systems, and others.

Here, sense of justice is generally/specifically defined in other work (Ramiz, September 2015; April 2016).

Sub-Branches of Philosophy of Justice are defined as follows (in alphabetic order):

(1) Philosophy of Defense®®: Theories of defense are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of defense, (b) knowledge of defense, (c) nature of defense, (d) purpose of defense.

(2) Philosophy of Equity: Theories of equity are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of equity, (b) knowledge of equity, (c) nature of

equity, (d) purpose of equity.

(3) Philosophy of Equivalence®®: Theories of equivalence are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of equivalence, (b) knowledge of equivalence, (c) nature of equivalence, (d) purpose of equivalence.

(4) Philosophy of Judgment®®: Theories of judgment are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of judgment, (b) knowledge of judgment, (c) nature of judgment, (d) purpose of judgment.

(5) Philosophy of Law®©: Theories of law are considered under this philosophy. These theories are proposed basically to have information about: (a) definition of law, (b) existence of law, (c) knowledge of law, (d) nature of law, (e) purpose of law.

(6) Philosophy of Protection®®*:* Theories of protection are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of protection, (b) knowledge of protection, (c) nature of protection, (d) purpose of protection.

(7) Philosophy of Punishment®®: Theories of punishment are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of punishment, (b) knowledge of punishment, (c) nature of punishment, (d) purpose of punishment.

(8) Philosophy of Rights®®: Theories of rights are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of rights, (b) knowledge of rights, (c) nature of rights, (d) purpose of rights.

(9) Hybrid Sub-Branches: R-Values, R-Information are kind of references to define and express the subjects of defense, equity, equivalence, judgment, law, protection, and rights. In some manner most of the concepts of existence, knowledge, nature, and purpose can be constructed regarding the interactions, relationships, and hybrid cases of the values and information.

Some New Branches of Philosophy and New Concepts/Systems Defined

It is important to define new branches of philosophy (sub-branches or hybrid branches) that supplies or satisfies the information and purposes regarding the theories of the related philosophy branches.

With this respect author defined the following new branches of philosophy that guides the theories and applications regarding engineering, technology, law, and justice:

(A) Philosophy of Engineering Law®®

Theories of engineering are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of engineering service, (b) knowledge of engineering service, (c) nature of engineering service, (d) purpose of engineering service, (e) control of engineering service, (f) inspection of engineering service, (g) administration of engineering service.

It is a 4D Hybrid Philosophy that contains information about Philosophy of Information, Philosophy of Justice, Philosophy of Science, and Philosophy of System.

(B) Philosophy of Information Technology Law®©

Theories of information technology are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of information technology, (b) knowledge of information technology, (c) nature of information technology, (d) purpose of information technology, (e) control of information technology, (f) inspection of information technology, (g) administration of information technology.

It is a 5D Hybrid Philosophy that contains information about the related basic philosophies.

(C) Philosophy of Telecommunications Law®®

Theories of telecommunications are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of telecommunications service, (b) knowledge of telecommunications service, (c) nature of telecommunications service, (d) purpose of telecommunications service, (e) control of telecommunications service, (f) inspection of telecommunications service, (g) administration of telecommunications service.

It is a 5D Hybrid Philosophy that contains information about the related basic philosophies.

(D) Philosophy of Security®®

It is a 4D Hybrid Philosophy that contains the information about the philosophy of justice, philosophy of science, philosophy of information, philosophy of system.

Theories of security are considered under this philosophy. These theories are proposed basically to have information about: (a) existence of security service, (b) knowledge of security service, (c) nature of security service, (d) purpose of security service, (e) control of security service, (f) inspection of security service, (g) administration of security service.

Hybrid Sub-branches are: (a) philosophy of informational securities, (b) philosophy of physical securities, (c) philosophy of political securities, (d) philosophy of monetary securities, (e) philosophy of personal securities, (f) philosophy of security law. On the other hand, author defined new concepts/systems by considering the new perspective of philosophy and by taking into consideration the new hybrid philosophies.

With this respect, author considered theories of eight Basic Philosophies together as hybrid case, and separately for specific purposes, and defined “general political administration system for each world countries” (Figure 1). This is a new political system where generally philosopher of law and philosopher of politics worked on it. However, here author deepens the interest on political systems by considering his theoretical and practical experiences, and defined an administration system where its content and system administration considers the all possible problems and solutions systematically through the answers to all questions of the theories of the eight basic philosophies of Philosophy of Administration, Philosophy of Information, Philosophy of Politics, Philosophy of Justice, Philosophy of Science, Philosophy of Social Science, and of Philosophy of System together and separately. This new political system also shows the possible interactions and relations between all disciplines.

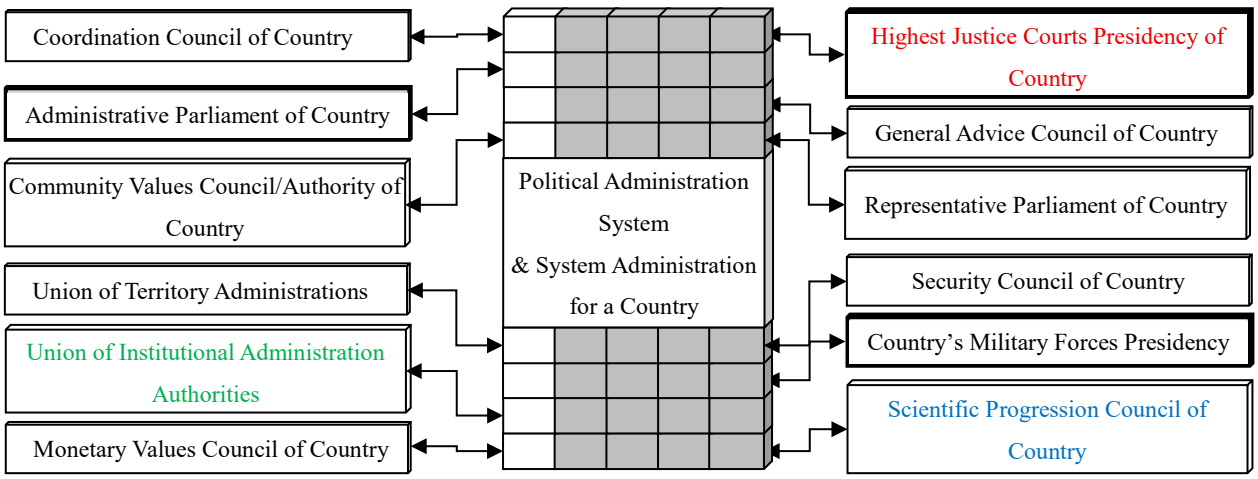

Figure 1. General political administration system for a world country.

Conclusion

In this article, the general definition of law and types of law are presented. Then general definition of justice and types of justice are explained.

Constructional and/or complementary theories are defined as general/specific, and interaction theories, relationship theories, and hybrid theories are specifically mentioned.

Accordingly, the interactions between the disciplines of law and justice are explained in more detail.

Then, the general definition of engineering and philosophy of engineering are explained.

The interactions between engineering and law are specifically evaluated, and interactions between engineering and 52 types of law are defined and case studies found in the literature are indicated for each.

Then interactions between engineering and justice are briefly mentioned. Relationships/interactions between engineering and 25 different types of justice were discussed and evaluated with specific examples.

Emphasis was placed on the historical development of the subject of philosophy in general, and philosophy of law was defined more specifically. Some of the philosophers of law and their areas of interest are presented in a table format and compared.

The new perspective of philosophy is defined and the disciplines of R-Philosophy, R-Science, R-Justice, R-Law, R-Engineering, and R-Religion were expressed with the relevant basic concepts.

New Era Philosophy, new and reconstructed Basic Philosophies and Ideal Philosophical System explained generally.

New perspective for the philosophy of justice is defined by considering the related new theories. Philosophy of defense, philosophy of equity, philosophy of equivalence, philosophy of judgment, philosophy of law, philosophy of protection, philosophy of punishment, and philosophy of rights are defined due to new perspective of philosophy of justice.

Also, philosophy of engineering law, philosophy of information technology law, philosophy of telecommunication law, and philosophy of security are defined by taking into account hybrid philosophies and general theories related to them. The interaction of engineering, law, justice, and basic philosophies has been generally expressed.

Since there are some engineering founding/inventions which are/were effective and interacting with human life and also affecting the science, social science, law and justice disciplines in some manner, author defined these above branches of philosophy to express the interaction/relation between these foundings and Ideal Philosophical System, and also to express the level of hybrid philosophy perspectives behind these engineering founding.

This study examines the meaning and significance of the disciplines of engineering, law, and justice, both individually and together. The general and specific philosophical and scientific approaches considered in the formation and application of these disciplines are defined. The indispensable relationship and interaction of these three disciplines, which influence and transform human life, is revealed through a new philosophical perspective, using hybrid sciences, hybrid engineerings, and hybrid philosophies.

These are some examples of how engineering, law, and justice are shaping the 21st century together or separately. It’s clear that as engineering continues to advance, and engineers will play an increasingly important role in addressing global challenges, having good and/or correct sense of justice, and improving the quality of life.

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