Envisaging a New Era in Interdisciplinary and Transdisciplinary Research: Presenting the COMPASS Model for Interdisciplinary and Transdisciplinary Research

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Abstract: We hope to leverage existing and novel methods and techniques in research by proposing the COMPASS model in this paper for interdisciplinary and transdisciplinary research, and one that we hope can usher in more dynamic and diversified research scenarios and outcomes. We begin this paper by defining what research in general is, and by bringing out the meaning, the contours, the nuances and intricacies of interdisciplinary, transdisciplinary and multidisciplinary research as well. We also propose and present the hallmarks and the boundaries of the COMPASS model as a series of well-laid out sequential steps so that anyone can appreciate it even at a cursory glance. Some of the proposed steps in our approach include, developing an objectivity in mindset, formulating robust research models to begin with, pre-identifying potential collaborators, reaching out and collaborating with all collaborators who are ready and willing to collaborate, adopting a dialectical mindset from the scratch, adopting a cross-cultural mindset from the scratch, developing touch points, developing evaluation criteria, developing metrics, seeking out revalidation. This is only a short list; readers are requested to read the contents of the paper in its entirety.

I. INTRODUCTION

"Breakthrough innovation occurs when we bring down boundaries and encourage disciplines to learn from each other" ― *Gyan Nagpal*

"In the longer run and for wide-reaching issues, more creative solutions tend to come from imaginative interdisciplinary collaboration" - Robert J. Shiller

"The main insight learned from interdisciplinary studies is the return to specialization" - George Stigler

We hope to leverage existing and novel methods and techniques in research in this paper by proposing the COMPASS model for interdisciplinary and transdisciplinary research, and one that we hope can usher in more dynamic and diversified research scenarios and outcomes. We naturally and logically begin this paper by defining what research in general is, and by bringing out the meaning, the contours, the nuances, the dynamics, the synergies, and intricacies of interdisciplinary, transdisciplinary and multidisciplinary research as well. We also propose and present the hallmarks and the boundaries of the COMPASS model as a series of well-laid out sequential steps so that anyone can appreciate it even at a cursory and a quick glance. Some of the proposed steps in our approach include, developing an objectivity in mindset, formulating robust research models to begin with, pre-identifying potential collaborators, reaching out and collaborating with all collaborators who are ready and willing to collaborate, adopting a dialectical mindset from the scratch, adopting a cross-cultural mindset from the scratch, developing touch points, developing evaluation criteria, developing metrics, seeking out revalidation. This is only a short list; readers are requested to read the contents of the paper in its entirety. The entire gamut of steps and activities are laid out here.

II. WHAT IS RESEARCH?

We must begin this paper by defining what research is, and what its different but nonetheless important elements, attributes and characteristics are in order to achieve a proper salience and completeness of understanding among readers, and producers and users of scientific research. To put it in a nutshell, research is nothing but a systematic, structured and a methodological process of launching a formal or a process-driven investigation into a given topic or area of study, with the explicit aim to discover new and previously unknown information or expand upon the existing body of

knowledge. Research also comprises a sequential set of steps such as gathering facts, analyzing them, and interpreting datasets in order to answer specific questions surrounding an issue, to solve seemingly complex or intractable problems, or even more simply to unearth more practical and workable solutions to problems that manifest themselves seemingly unsurmountably in everyday quotidian lives. We may therefore choose to define research as an activity that leads people to discovering or unearthing new facts, information, creating or producing a process to verify preexisting or readily available knowledge and in general to aid and assist in the process of knowledge creation. Therefore, some of the key characteristics of research are systematicity, objectivity, rigour, accuracy and precision. We had discussed some of the hallmarks and essentials of good and meritorious research in the paper, "Advocating output criteria based scientific and research methodologies: Why the reliability of scientific and research methods must be measured based on output criteria and attributes" published by us in the journal IJISRT in the year 2023. [1][2][3]

Research may therefore be viewed as a continuous and an unremitting stream of activity with common strands and threads running across a majority of disciplines and areas of research or study. Research plays an important role in many areas of public life, and often forms the bedrock of many fields of study. Research also plays its vital and foundational part in executing a critical assessment of the way people work, collaborate, research, study, formulate and execute policies, and give shape and direction to different areas and fields study. Research therefore involves a systematic observation and curation of data and information to in order to devise or find better and more accomplished ways of doing things and to reduce the effort put in order to achieve or accomplish an objective and to achieve concrete or tangible results. Research therefore has many practical and real world applications and uses. For example, we may want to understand the real world efficacy of a drug, or to evaluate, vet and validate a pre-existing hypothesis of body of knowledge. We may do this through experimental design and randomized control trials – with a random assignment of subjects to experimental and control groups – and the identification of placebos, too. [4][5]

Let us now proceed to evaluate some oft-cited definitions of research. According to noted author and researcher Clifford Woody, research comprises a well-defined set of sequential steps such as constantly defining and redefining problems, formulation of working or preliminary hypotheses, the formal and systematized collection, organization and evaluation of data; and the attainment of tangible conclusions.

Prominent and preeminent researchers D. Slesinger and M. Stephenson in the Encyclopedia of Social Sciences Research define research as follows: "Research is the manipulation of different things, concepts or symbols for the purpose of understanding and generalizing, and in order to extend, correct or verify knowledge, irrespective and regardless of whether that knowledge aids in construction of theory or in the practice of an art." Contrarily, John W. Best's definition of research seeks to bring out its inherent systematic, structured and formal nature. Best defines research as a systematic, iterative and a highly intensive process of executing a scientific method of analysis, that results in a formal record of documented procedures and findings. [6][7][8][9]

> ## What is Interdisciplinary Research?

Interdisciplinary research is a highly elaborate approach to study and research that involves drawing upon knowledge, data and methodologies from multiple and often diverse disciplines in order to address complex, real world and practical problems that span different fields of study. It may also be defined as a collaborative approach where researchers from various disciplines work together in unison and harmony in order to develop innovative solutions and gain a more comprehensive understanding of complex issues and problems. Therefore, the key anchors upon which interdisciplinarity rests is the integration of diverse disciplines, (thereby combining and synchronizing multiple perspectives, techniques, concepts, tools, and methods), collaboration, addressing complex and practical problems, and real world challenges, creativity and innovation. Interdisciplinary research is used in a wide variety of disciplines such as environmental science, anthropology and the social sciences, engineering and medicine, and urban and rural planning, to name a few. Interdisciplinary leads to

[1] Creswell, John W. (2008). *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River, NJ: Pearson

[2] Advocating output criteria based scientific and research methodologies: Why the reliability of scientific and research methods must be measured based on output criteria and attributes, Sujay Rao Mandavilli, IJISRT, June 2023

[3] Kara, Helen (2012). *Research and Evaluation for Busy Practitioners: A Time-Saving Guide*. Bristol: The Policy Press

[4] Cohen, N.; Arieli, T. (2011). "Field research in conflict environments: Methodological challenges and snowball sampling". *Journal of Peace Research*

[5] Talja, Sanna and Pamela J. Mckenzie (2007). Editor's Introduction: Special Issue on Discursive Approaches to Information Seeking in Context, The University of Chicago Press

[6] Colander, David C.; Hunt, Elgin F. (2019). "Social science and its methods". *Social Science: An Introduction to the Study of Society* (17th ed.). New York: Routledge. pp. 1–22

[7] Bunge, M. (1966). "Technology as Applied Science". In Rapp, F. (ed.). *Contributions to a Philosophy of Technology*. Dordrecht: Springer. pp. 19–39

[8] Bunge, Mario (1998). "The Scientific Approach". *Philosophy of Science: Volume 1, From Problem to Theory*. Vol. 1 (revised ed.). New York: Routledge. pp. 3–50

[9] Nickles, Thomas (2013). "The Problem of Demarcation". *Philosophy of Pseudoscience: Reconsidering the Demarcation Problem*. The University of Chicago Press. p. 104.

a deeper, foundational and a more comprehensive understanding of issues, new, improved or novel solutions, as well as an enhanced appetite for innovation. However, challenges in this form of research can include communication barriers, research at variance with one another and tangential objectives of collaborators, inability to find common ground, diverse interpretation, differing research language such as different assumptions and methods, etc. While the term "interdisciplinary research" is generally thought to have emerged sometime later in the twentieth century, the practice of integrating knowledge from different fields existed long before this and is often attributed, to early and ancient civilizations like Mesopotamia, Egypt, and Greece. The twentieth century however saw further development and rapid advances, spurred on by an explosion of scientific knowledge, an emphasis and focus on research and research methods, and the acknowledgment of the need to address complex problems across disciplines.

➢ What is Multidisciplinary Research?

Multidisciplinary research is represented by a process in which researchers from different fields collaborate with one another to investigate complex problems, integrate knowledge, experience or expertise from various disciplines in order to gain a comprehensive and a thorough understanding and develop innovative and practicable (i.e. workable) solutions. It acknowledges the fact that many real-world issues and problems are deeply and tightly interwoven and interconnected and require a multifaceted approach to address and tackle underlying issues effectively. The key aspects of multidisciplinary research are collaboration, integration of knowledge, holistic approach, and harnessing synergies by addressing interconnected issues. As such, multidisciplinary research is more diverse than interdisciplinary approach, though the two terms may be sometimes used synonymously.

➢ What is Transdisciplinary Research?

Transdisciplinary research is a multifaceted and a highly contemporary research approach that transcends or breaks across traditional and conventional disciplinary boundaries, by simultaneously engaging multiple disciplines and researchers (often belonging to diverse cultural backgrounds) in order to address and surmount complex real-world problems. It aims to generate solutions-oriented knowledge by integrating paradigms culled from a plethora of different perspectives and fostering real-world and real-time collaboration across sectors and disciplines. Transdisciplinary research is often very vast and more comprehensive than either interdisciplinary or multidisciplinary research, but is also nascent and very challenging to boot. It also seeks to maximize the impact of science on society by involving a large number of partners or social actors. To view it from a different perspective, interdisciplinary work involves bringing in knowledge from multiple disciplines, while transdisciplinary work attempts to go a step further by integrating and amalgamating these

disciplines into a unified and a cogent whole, for maximal efficacy and efficiency. [10] [11] [12]

III. WHAT IS A COMPASS?

A compass is a simple yet powerful device that shows the cardinal directions and is generally widely used for both navigation and spatial or geographic orientation. The components of a magnetic compass include a magnetized needle and other associated element, including but not limited to a compass card or compass rose, which can automatically align itself with the magnetic north pole. This instrument is of course different from the compass found in an instrument box. The word compass may also mean the breadth, the width and the span of something. It was also archaically used to mean a contrivance for accomplishment; From our perspective and point of view, a COMPASS model stands for comprehensiveness, objectivity, multidisciplinarity, precision, accuracy, stringency, and systematicity, i.e. the first letter of each word. Let us now review the COMPASS model below: [13] [14]

➢ Compass Model

The COMPASS model from our perspective stands for the following words, characteristics or attributes. The first letter of each of the words taken sequentially would stand for or spell out the entire word COMPASS, and this is what the model is named after. However, there are other characteristics and attributes of good interdisciplinary research that need to be taken into account and consideration too; As such, the name COMPASS only represents a handy moniker, and one that can be easily appreciated and understood. [15] [16]

➢ Comprehensiveness

Comprehensiveness refers to the state or condition of including all or nearly all elements or aspects of something, usually a very broad and an expansive framework, observation or paradigm, and identifying all the subservient elements of it by drilling down carefully and thoroughly. All the elements are then taken into account or consideration for further analysis, or are further probed and investigated as the

[10] Schuurman, F.J. (2000). "Paradigms Lost, paradigms regained? Development studies in the twenty-first century". *Third World Quarterly*. **21** (1): 7–20

[11] Sumner, A and M. Tribe (2008) International Development Studies: Theories and Methods in Research and Practice, London: Sage

[12] Peter Weingart and Nico Stehr, eds. 2000. Practicing Interdisciplinarity (University of Toronto Press)

[13] Williams, J.E.D. (1992) *From Sails to Satellites: the origin and development of navigational science*, Oxford University Press

[14] Ma, Huan (1997) *Ying-yai sheng-lan* [The overall survey of the ocean's shores (1433)], Feng, Ch'eng-chün (ed.) and Mills, J.V.G. (transl.), Bangkok : White Lotus Press

[15] Introduction to research methods: A hands on approach, Bora Pajo, Sage Publications, 2017

[16] The practice of qualitative research, SNH Biber, 2013, Sage Publications

case maybe. Comprehensiveness along with other factors such as systematicity play a major role in the success of any scientific activity or undertaking.

➢ *Objectivity*

Objectivity is the state of being objective or aiming to uncover the truth or the facts in a systematic or a controlled and a disciplined manner. The distinction between subjectivity and objectivity is also a very basic and central idea of philosophy, including the not so tightly interrelated fields of epistemology and metaphysics. An objective paradigm is one that holds up to critical scrutiny, and one that is not dependant on, or swayed by biases, prejudices, and emotions. Something is also said to be objective if it can be confirmed independently of the vagaries of a mind, and can satisfy all litmus and acid tests that are thrown at it. Objectivity in scientific research is said to materialize when there are no personal biases or opinions of any kind involved in the process of such research. Scientists must also consciously and conscientiously strive to reduce bias and subjectivity in their output, which may arise when personal judgments and beliefs override objective considerations. This is however, by no means always easy, and in many cases, only a gradual process.

➢ *Multidisciplinarity*

We have discussed and dissected multidisciplinarity in a previous section of this paper. Multidisciplinarity is said to take place when all the essential and the central prerequisites of multidisciplinary research are fulfilled and satisfied, and data from diverse disciplines are culled out and suitably aggregated or synthesized.

➢ *Precision*

The general concept of precision is a general yardstick of how close measurements of the same item or object are to one other. The idea of precision is considered to be somewhat different, though related to the ideal of accuracy. This is because accuracy is taken to mean how close observations are to a widely accepted or a standardized value. Therefore, it is interestingly possible in some cases to be highly precise without being extremely accurate, and vice versa. Both precision and accuracy are required in tandem for science to be considered high-quality science.

➢ *Accuracy*

Accuracy is a measure of how well an observed measurement tallies with a generally more widely accepted value or norm. In certain other cases, it may be taken to mean the degree or extent of overlap between the sample population and target population. Accuracy must also be distinguished and differentiated from precision, and we have discussed this previously. In addition to precision and accuracy, several other parameters such as data validity, data consistency and overall reliability are also necessary in order for research to be categorized as cutting edge and winning research.

➢ *Stringency*

Stringency as a noun in the English language refers to the quality of being very strict, severe, though not

necessarily always restricting or limiting. In sum and in essence, it is also about being rigorous and exacting based on the exigencies of the issue or situation at hand, while at the same time combining it with other closely allied attributes and parameters harmoniously and evenhandedly without compromising on the quality or the coherence of output.

➢ *Systematicity*

Systematicity from the general point of view of research output is a measure of the quantum of output has been arrived at through systematic and methodological analysis, and also suitably demonstrating that all logically untenable or improbable alternatives and hypothesis have been carefully and exhaustively eliminated from the list of possible and potential outcomes. This approach will also serve to indicate whether the research output is fair, equitable, objective, consistent, credible and reliable. This approach will however, not automatically or inevitably guarantee us success by itself, and other attributes and characteristics of a good research also need to be considered or taken into account in parallel or in tandem.

➢ *Steps in the COMPASS Model*

The following are the sequential steps in the COMPASS model from our perspective, and the order and the list of steps is mostly recommendatory in nature, not always mandatory or obligatory in the strictest possible sense of the term. If any scope for deviation or alteration present themselves, we would definitively warm up to it based on the merits of each individual case, and welcome it if necessary with open arms. Having said that, let us now proceed with the list, which is reasonably exhaustive at best, though more steps and meat may be added as required.

➢ *Objectivity in Mindset*

We had defined the concept of "Objectivity in mindset" in several of our previously published papers; simply put, this means that individuals, scholars and researchers are expected to possess a strong or even a fervent and a feverish desire and a quest for unearthing the truth against all odds, and under all circumstances – in other words, they must fulfill and satisfy all attributes and characteristics of dispassionate objectivity; This may be even though and even if, the truth itself proves to be elusive. In other words, it is the mindset and the temperament that counts. This will naturally lead to the truth being uncovered at some point in time.

IV. HIGH QUALITY RESEARCH – SATISFYING ALL ATTRIBUTES OF HIGH QUALITY RESEARCH

Readers may refer our previously published paper that was published by us way back in 2023: "Advocating output criteria based scientific and research methodologies: Why the reliability of scientific and research methods must be measured based on output criteria and attributes". In this paper we had provided the following attributes and characteristics of meritoriously applied research. While more elements can be undoubtedly and unquestionably be

added to the list, this list by itself can prove to be adequate and sufficient: Objectivity, reliability, validity, precision, accuracy, rigour, systematicity, verifiability, measurability, falsifiability, repeatability, reproducibility, credibility, coherence, comprehensiveness, holism, coherentism, transparency, abstraction, predictability, consistency, empiricism, ethics based research output, non-dogma and openness to research results, provisionality, output derived from controlled processes, non-excludability, universal applicability of research results, etc.

➤ Basic Interdisciplinary Research at the Outset

Researchers must begin with basic Interdisciplinary research at the outset. This must be done in the interests of time, and also to address the potential loopholes arising from the duplication of time energy and effort. We must also always bear in mind the fact that there will always be a paucity and death of time and resources, and that the researcher has to optimize his time and resources both judiciously and harmoniously. This must also be done by identifying literature in all relevant fields, and reviewing them thoroughly and exhaustively.

- Admission that interdisciplinary research is necessary: The entire process must naturally begin with the important realization that interdisciplinary, multidisciplinary, and transdisciplinary research are always necessary, and will produce a superior quantum of higher intellectual output as opposed to less than ideal stand alone approaches.
- Admission that collaboration with other specialists is necessary: There must be an admission that collaboration with other specialists is necessary, and that the research in question may also not always possess the wherewithal or the capacity to carry out a complex task unaided and unassisted.
- Admission that ratification from other experts is necessary: There must be an admission that ratification from other experts is necessary, to vindicate, or disprove assumptions and conclusions reached, and that touch points also need to be setup as necessary.
- Intellectual humility: The scholar must maintain a posture of intellectual humility at all times, and must be willing to learn and grow. Humility refers to an individual thinking he is not superior to other people.
- Willingness to learn and grow: The scholar or researcher in question must harbor a deep-rooted desire not only to learn and grow, but also to change with the times as necessary, and update himself from time to time.
- Comprehensive literature review: A comprehensive literature review will always be required both of primary literature as well as of secondary literature. A literature review may be merely a simple summary of the sources, but it typically includes both a summary and a synthesis. A summary is a recapitulation of the important and key information resident in the source, but a synthesis is an appropriate re-organization of that information.

➤ Identify all Allied and Interrelated Areas

The research will then need to identify all allied or interrelated areas and fields of study. Allied means united with each other or joined together for the realization or fulfillment of a common higher purpose or objective. If two countries are allied, they are on the same side as one another for all practical purposes and have common interests, or a shared bond of understanding. The researcher must identify all allied areas of study, and must make out an exhaustive list. For example, an archaeologist may wish to synthesize data with linguistics or genetics in order to achieve or accomplish a higher unity or understanding.

➤ Pre-Identify Potential Collaborators

Researchers must also strive to pre-identify potential collaborators at the very outset and at the very beginning. A potential collaborator may be used either in the short-term, medium-term, or in the long-term; often this is a highly productive and a mutually beneficial relationship with a high degree of harmony, bonhomie and camaraderie achieved and maintained for long-term mutual benefit. In simple English terms, a collaborator may be defined as a person who collaborates with another person, individual or group for maximum group benefit and coherence.

V. REACH OUT AND COLLABORATE WITH ALL COLLABORATORS WHO ARE READY AND WILLING

In the next step, the researcher in question reaches out to collaborate with all collaborators who are ready and willing to bite the bait and throw in the gauntlet. This is a not so popular idiom in the English language that means to say or show that one is ready to accept a challenge, to fight for a common cause, argue meaningfully, productively and beneficially, or to participate with someone in a higher order joint endeavour.

➤ Adopt a Dialectical Mindset from the Scratch

Dialectic thinking is an important method of higher order reasoning and critical analysis that involves examining and reconciling seemingly diverse or even opposing and contradictory ideas or perspectives. Dialectical thinking refers to the ability of an individual to view issues from myriad and different perspectives and to arrive at the most plausible and reasonable reconciliation of seemingly contradictory stances and data. The English word "Dialectic" which is sometimes attributed to the Ancient Greeks viz, Plato and Socrates, we believe and argue is not as widely used in daily life as it perhaps should be. This is because the method itself has not taken off in a big way. We had also spoken about autodialectics in a previous paper. In case of the latter, two distinct individuals need not necessarily be involved.

➤ Adopt a Cross-Cultural Mindset from the Scratch

The importance of cross cultural research design must be imbibed from scratch; the importance and benefits of this technique to scientific method are indeed many as it allows for an assortment of diverse perspectives to be culled and elicited. Selection of different cultures and participants who need to participate in a cross-cultural study may be made on the basis of any component of identity which could include ethnic, religious, national, class, caste, or linguistic identity. This is somewhat similar to a sampling technique; because it

may not be possible to include all representative and non-representative cultures in a cross-cultural research design, in the interests of time or cost. We had also spoken about horizontal collaboration versus vertical collaboration in a previous paper, and we believe that both are intrinsically necessary. The importance of all these concepts must be grasped thoroughly. Let us take the example of Harilal Gandhi, Mahatma Gandhi's eldest son. Mahatma Gandhi rebelled against what he believed were corrupting and polluting western influences in the education system, and in doing do threw the baby inadvertently out with the bathwater. As an unfortunate and tragic result, Harilal became a wretch. Denied a formal education by his father, and a chance to study abroad, he took to alcoholism and debauchery and led a dissolute life dying tragically at the relatively young age of sixty. He was by most accounts, a comprehensive failure. This is a sad story indeed, and we must not tread down this murky path under any circumstances. Therefore, we must not throw out western values completely to the extent they are good or meritorious, and replace them with non-meritorious indigenous ones. There is a fine balancing act we must seek to achieve, and sound and robust scientific method can help.

➢ *Revalidating all Used and Inherited Data*

Revalidation refers to a formal process of making something more completely acceptable through a process of rigorous testing and critical reexamination. This process essentially involves a re-evaluation or re-verification of of an object, attribute, framework, or a paradigm, completely, rigorously, thoroughly, or meticulously, in order to ensure it continues to meet preset or predefined standards or requirements, or does not otherwise deviate from them. Revalidation signifies the act of validating something often again and again, either because it has become badly obsolete or outdated or because new or additional criteria or standards have been put in place. Data are facts and statistics that are collected and are brought together for the purpose of a structured or detailed analysis. We must also distinguish between data and information at the very outset. While data is generally taken to mean raw, unprocessed facts or sometimes notational symbols, information refers to duly and properly processed and organized data that has been given a proper reference context and meaning to aid in future evaluation. We must also revisit the concept of strong and weak evidence at this juncture; we will argue at this point that strong evidence will result only where, when and if the event has been corroborated on multiple fronts; in other words, it satisfies the principle of multidisciplinarity.

➢ *Revalidating all Used and Inherited Assumptions*

An "assumption" is generally defined as a belief or statement of beliefs that are accepted as being true without absolute or complete proof or verification which may not even be possible at an early juncture. It is something that is taken for granted, often without a real basis for the assumption or belief. Making assumptions is a necessary and a central part of scientific methodology, though the assumptions must be realistic, verifiable at a later date, and kept to the barest minimum – in other words, they must not be superfluous or redundant. Occam's razor is a principle that is generally attributed to a famous fourteenth century friar by the name of William of Ockham. According to this principle if there are two competing ideas to explain the same phenomenon, the simpler one is the most powerful and efficacious, and the simplest and the most straightforward (or economical) of explanation is always the best.

➢ *Clarity of Conclusions*

Clarity is the quality of being coherent and intelligible. It also refers to the quality of being transparent and pure. An analogy we can draw here for visual clarity is a crystal pure glass that shines transparently through. The term clarity may also mean having a clear and a visual and mental grasp of something. This is an attribute that must be treasured and cherished at all times. Conclusions may refer to summarized results that stem from, or are the output of a study. We therefore need to have clarity of conclusions at all times (at least as far as practicably possible) – and this is what all researchers – of different hues and colours – and regardless of their area of focus or preferred field of study, but unwaveringly work towards.

VI. DEVELOP WORKING AND PRELIMINARY RESEARCH MODELS, FRAMEWORKS, AND PARADIGMS

Research models (also sometimes known as research designs) are simple and easily understandable representations or depictions (also frameworks and generic structures) of complex entities that are used to accomplish an easy and smooth understanding of complex issues within a research context. Models may also include a formal and va proper definition of independent and dependant variables, and the relationships between all these. Models may variously be physical, theoretical, or mathematical, qualitative, quantitative, or a combination of all these and they can indeed help researchers visualize and explore relationships between variables or concepts easily and seamlessly. Research models can guide the entire research process, right from formulating structured research questions to systematically analyzing data, and are mostly constant throughout the research process, with changes and improvements being made only as necessary. A research framework is a standard blueprint, template, or guide that defines the research process, ensuring clarity and coherence in defining the problem, guiding the methodology, and even interpreting results in due turn. A research paradigm is a philosophical framework that shapes how different researchers approach a study, and mold their attitudes towards it. It explains how research is bidirectionally influenced by researcher beliefs, values, and methods. It also serves to provide a comprehensive set of assumptions about reality (also known as ontology), knowledge (also known as epistemology), and methodology. All the three go hand in hand, and researchers must work towards making them workable and feasible for further operations.

VII. IDENTIFYING MORE INTERDISCIPLINARY AND TRANSDISCIPLINARY STAKEHOLDERS

The next step is identifying more and more interdisciplinary and trasnsdisciplinary stakeholders. This is generally done after the research process has been completed and carried out. A list of secondary, tertiary and allied researchers is systematically made, and these groups of people are formally and systematically contacted, and the output of the research is shared with them for further detailed validation and extrapolation.

➢ *Identifying end Users of Research*

End-users of research are commonly and generally defined as individuals, groups, or organizations that directly stand to benefit from or directly utilize the results and key conclusions of a research project. End users are those who will use the findings to make better and more informed decisions, improve research practices, or develop further new downstream ideas and concepts. Such end users must be proactively contacted by the researcher in question, and touchpoints and list of expectations established clearly and unequivocally. Likewise, identifying upstream users of research may also be necessary, though perhaps not as important. Upstream users focus on the fundamental or basic aspects of research and may develop their own frameworks or formulas in turn.

➢ *Identifying Expectations from Stakeholders*

The next step in the sequential process of events is identifying expectations from stakeholders so that research may be vetted, ratified or validated in the interests of more bullet proof reliability from stakeholders who may be other future and anticipated collaborators, or downstream users. Developing touch points is also extremely important. A touch point is a point of interaction or a handshake. There fore, researchers may prepare a "Golden hand shake" detailing how hypotheses must be further duly tested, and what additional data is required. The possible end uses of the research carried out to other stakeholders, and to society in general are also explained. As a part and parcel of this approach, researchers may want to prepare guidance notes, and additional explanatory notes as well to aid and assist in the process of smooth transfer of information. In other words, the researcher must develop evaluation criteria for other researchers to follow. Developing metrics and measurements (along with guidance values and threshold values) and revalidation criteria is also necessary.

➢ *Obtaining Revalidation*

Obtaining validation is the next natural step and revisiting and updating research if necessary and from time to time must be carried out as and when it becomes necessary in the interests of scientific progress. While this approach may align reasonably well with other approaches, we stress several other important concepts here such as objectivity in mindset, emic and etic perspectives, cross-cultural research design, dialectical approaches, and an interdisciplinary mindset baked into the entire research process right from the very beginning and start.

➢ *Modifications to the Basic Theme*

Modifications to the basic theme may be adopted and implemented wherever required for example, we may even use it in the design of educational materials. Wherever high-quality educational materials are proposed to be formulated, touch points must be established with other specialists, and other specialists must be directly roped in as far as practically possible. This will obviate the need for extensive rework, and will also lead to better quality research materials from the very outset. As a general and a heuristic metric, QEPIS or "Quantification of the effects of poor or Ideologically-driven scholarship" (i.e. Downstream and adverse effects of poor, ideologically-driven scholarship or the continued persistence of antiquated approaches) may be calculated from time to time including its bearing on other related or unrelated sciences and in general on the well-being of society. This can help us accomplish miraculous results, and has the potential to transform society near magically. Not doing so, may even lead us into a self-induced rut, and an endless cycle of stagnation and abysmal non-performance. The Author's additional concluding notes are as follows: The author has discussed and debated with many Indians on many aspects pertaining to science, and it is evidently clear that we still have a very long way to go to catch up with the west in terms of scientific temper. People are still conservative and orthodox, and it change may take a generation or two. We also need emic and people-centric approaches to change, and ethnic group and non ethnic group specific approaches as well. It is however, never too late to begin. Let the spirit of scientific temper and scientific inquiry live on! Let us create a new generation of scientific soldiers who can take the baton and the torch forward for all time to come!

VIII. CONCLUSION

We have hoped to leverage existing and novel methods and techniques in research in this paper by proposing the COMPASS model for interdisciplinary and transdisciplinary research, and one that we hoped could bring about more dynamic and diversified research scenarios and outcomes. We naturally and logically began this paper by defining what research in general was, and by bringing out the meaning, the contours, the nuances, the dynamics, the synergies, and intricacies of interdisciplinary, transdisciplinary and multidisciplinary research as well. We also proposed and presented the hallmarks and the boundaries of the COMPASS model as a series of well-laid out sequential steps so that anyone could appreciate it even at a cursory and a quick glance. Some of the proposed steps in our approach included developing an objectivity in mindset, formulating robust research models to begin with, pre-identifying potential collaborators, reaching out and collaborating with all collaborators who are ready and willing to collaborate, adopting a dialectical mindset from the scratch, adopting a cross-cultural mindset from the scratch, developing touch points, developing evaluation criteria, developing metrics, seeking out revalidation. As such, we hope that this paper will have a bearing and an impact on the way interdisciplinary, multidisciplinary and transdisciplinary research is carried out and conducted.