Cosmobiology Institute
Principles and Guidelines for Research
SHORT SUMMARY VERSION

As stated in the Mission Statement, the Cosmobiology Institute (CI) continues, and seriously advances, the spirit of the investigations brought forth by Reinhold Ebertin (who first used the term in the same spirit as we are) Johannes Kepler, Paul Choisnard, John Addey, Françoise and Michel Gauquelin, and others. *In this tradition, scientific principles and methods are used to study the relationship between celestial motions and human experiences and behavior. The Cosmobiology Institute adheres to high academic standards and to evidence-based practices, as do most modern professions. This process involves determining and evaluating levels of confidence, effect sizes, and a variety of other assessments of the integrity and value of the research results.*

Preface: This is a starkly abbreviated version of a much lengthier discourse version. It is intended to give readers the essence of the longer version, which provides a detailed set of research principles and guidelines with illustrative examples. Both versions are patterned after the Belmont Report (for healthcare ethics produced by the medical community) and the Menlo Report (for computer-related security and privacy, produced by Homeland Security).

This set of guidelines and principles is also inspired by recent work in developing trustworthy systems using formal mathematical-logic models for computer hardware and software, including formally proving that hardware specifications satisfy certain critical properties. Although that is not readily applicable to Cosmobiology (because of the absence of formal models, formal specifications, and formal analysis), it serves as an excellent example of evidence-based research.

In passing, we note that the current fads for artificial intelligence and huge data models are in many cases antithetical to evidence-based research. Applications of AI (Artificial Intelligence) to the subject matters concerning Cosmobiology should be taken with great suspicion, especially where are no well-defined complete specifications and models that can be seriously evaluated.

Principles and guidelines are discussed in two sections:

1. Goals of Evidence-based Research
2. Basic Principles and Guidelines

1. Perspectives: Goals of Evidence-based Research

Evidence-Based Research is a very broad topic that covers an ever-growing breadth of methods and procedures. The basic goal is simply to provide results that can be carefully scoped and documented, evaluated with high assurance, and can be reproduced by others.

There are some basic principles that are consistent among all forms of research conducted at a high academic level, which are outlined in the following paragraphs. A sophisticated research project consists of the following components:

(a) a reliance on trusted data, and

(b) a relentless pursuit of ways in which one's observations and conclusions from these observations may avoid being biased, limited, or distorted -- even when the researcher is trained and very careful.

Research implies that the end result may not be known in advance, but needs to be pursued methodically. Research needs to be peer-reviewed, especially from researchers with different relevant areas of expertise.

There is no simple linear way to conduct research starting at one point with simple, well-defined steps that lead to evidence-based results. Pitfalls and challenges that one researcher notices may be overlooked by others.

The Cosmobiology Institute seeks to establish a sound basis for research in order to provide excellent depth and breadth of understanding and expertise, to facilitate real progress in understanding relationships of cosmic phenomena to human behavior. We can provide consulting and guidance on finding resources,

and to conduct research that produces compelling actionable findings that can be applied in realistic applications.

This document summarizes some of the requisite principles and guidelines. In particular, the focus of the Cosmobiology Institute, as stated in the mission statement, is *"empirical verification of relationships between cosmic phenomena with organic life, and to the practical application of these observations and discoveries."* For example, sound methods are essential, along with well-defined goals that are relevant and actionable, open availability of results, the presence of a long-established definitive data collection where possible, and above all, evidence-based research. In general, we expect to avoid research without specific metrics for success that can be thoroughly evaluated.

How might we evaluate whether a research project assists in achieving this goal? The answer to this question is to determine:

> (a) whether the research addresses a question that is important at the time that the research is conducted, and
>
> (b) to what extent might the research increase our confidence that the relationship between the cosmic phenomena and organic life really exists.

2. Basic Principles and Guidelines

First, we discuss important components of evidence-based research, and identify various specific research methods that are appropriate for Cosmobiology research.

Some basic principles and procedures common to research, but specifically relevant here:

1. The research attempts to answer a question or set of questions. Questions vary in breadth from very specific to very broad. If the question is very broad rather than specific, exploratory research methods may be used. More specific questions are more of a confirmatory nature because you are attempting to

confirm that a particular celestial phenomenon correlates with particular behavior or personality traits. Alternatively, you may want to model outside the context of confirmatory research. You can ask yourselves a specific question, do exploratory research and, in the same breath, build a model to answer this question.

Exploratory research is used to build a model. Exploratory research provides us a way to see what Cosmobiology variables appear to be potentially important. The more that the researcher narrows down the question to be more specific, the more that the research can be of a confirmatory nature rather than merely exploratory. The more confirmatory the research is, the more confidence we have that the findings can be replicated with new data. However, exploratory research can alert us to potential variables that we would otherwise not be able to identify.

If there are sufficient resources to sustain research over a sufficiently long time, then building a model with exploratory research may eventually lead to the pinnacle of research: a strict hypothesis test. In such a test, researchers state very precisely the findings that they expect.

2. Appropriate data is required, as the quality of research is dependent on source data. Basic data errors are one issue, with precision and accuracy. Measurement error is another.

3. Research should be conducted with an awareness of unavoidable limitations. Researchers need to clearly state the limitations and constraints of the research and account for these weaknesses in drawing conclusions from the findings. Some examples of this are: Time constraints, Availability of Resources, Ethical Limitations, Researchers Involvements, Participants Involvements, etc.

4. Consider all relevant potential variables. Researchers need to have a good understanding of the chosen topic and the outcome. The outcome of research may be better understood in the light of what is already known about the subject matter.

5. A thorough literature review is important. Relevant information outside the limited focus of your question is necessary. Has anyone else conducted similar

research? If so, what did they find? A fundamental principle of research is to build upon previous research to advance knowledge – or to refute it.

6. Clearly articulate what the counterfactual is and how well the counterfactual can be considered in the research design. This also involves a carefully defined control group.

7. Explain clearly what the specific results are, and how the results are evaluated. Results may be quantitative or qualitative. The research design must specify how the results of the research are presented. These results are either quantitative or qualitative. Quantitative results are generally required for evidence-based research.

8. A relatively detailed abstract of the research should be written and carefully vetted *before* any research is begun. It should be reviewed after the research is completed.

9: Conclusions and discussion are an important part of the research paper.- A discussion of the relevance and impact of the research is equally important to the data collection, obtained results, and overall conclusions drawn from the research.

10. Potentials for follow-on or other subsequent research is another important part of any research study. Any particular research study is considered to be a stepping-stone in the ongoing quest for understanding.

11. Enthusiasm and perseverance: Discovering new insights that meet rigorous academic requirements is much more demanding than many people who are new to research anticipate. The researcher's burning interest in the question and the determination to make progress are often critical for success.

As mentioned above, evidence-based research covers a wide range of research procedures and techniques. Such research should be done in accordance with the principles of an evidence-based practice. Fields such as psychology and medicine are evidence-based practices that rely on research to determine approved methods and procedures for practitioners.

12. Relevant Ethical Principles

The following information is quoted from *The Menlo Report, Ethical Principles Guiding Information and Communication Technology Research*, August 2012 (https://www.dhs.gov/sites/default/files/publications/CSD-MenloPrinciplesCORE-20120803_0.pdf)

Principle	Application
Respect for Persons	Participation as a research subject is voluntary and follows from informed consent; Treat individuals as autonomous agents and respect their right to determine their own best interests; Respect individuals who are not targets of research yet are impacted; Individuals with diminished autonomy, who are incapable of deciding for themselves, are entitled to protection.
Beneficence	Do not harm; Maximize probable benefits and minimize probable harms; Systematically assess both risk of harm and benefit.
Justice	Each person deserves equal consideration in how to be treated, and the benefits of research should be fairly distributed according to individual need, effort, societal contribution, and merit; Selection of subjects should be fair, and burdens should be allocated equitably across impacted subjects.
Respect for Law and Public Interest	Engage in legal due diligence; Be transparent in methods and results; Be accountable for actions. Table 1: Proposed guidelines for ethical assessment of ICT Research.

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Table 1 is from The Menlo Report, page 8. Following Table in the Menlo Report is a detailed description of each of the above 4 principles. The Menlo Report is written as guidelines for Information and Communication Technology Research and some of the language is directed specifically for this context. The principles given in Table 1 above from the Menlo Report and nearly all detailed description of these principles applies directly to research conducted under supervision of

the Cosmobiology Institute.

The emphasis on Evidence-Based Practice places great focus on using the best evidence to determine the procedures and methods that practitioners should employ. It also demands that tool development be openly available as much as possible (rather than proprietary), and that all data used in the research be available for reuse by other researchers who might wish to duplicate specific research results, using their own tools. The integrity of the entire process is absolutely critical as a fundamental part of the evidence-based assurance process.

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