The Role of Consensus in

Science, Public Policy and Problem Solving

for

Onsite Wastewater Recycling Professionals

Presenter: Robert Sweeney, MS,

OR REHS / WA Professional Onsite Wastewater Treatment System Designer

This Presentation Represents the Opinion of the Author and Does Not Reflect the Opinion of NOWRA, its Members or Sponsors of the 2023 Mega-Conference.

TRUST

- Trust seems to be our shortest commodity lately.
- Who do you trust?
  - Where do they get their ideas?
- Who can trust you (Our Industry)?
  - Where do we get our ideas?
  - Do you understand your own opinions?
  - Can you support your own opinions?
- Are you Really “Following the Science? Let’s Review

What is STEM? Science Technology Engineering & Math

- What is the difference among these areas?
  - Math, is a Useful Set of Tools, but Not Science.
  - Technology and Engineering are Inherently Biased toward Achieving Objectives.
  - Science is Supposed to Search for Truth wherever it leads.
  - Bias Subverts Science
  - Science Supports Problem Solving, Technology and Engineering
  - Problem Solving, Technology and Engineering Lead to Questions for Science
- How about this Sequence Instead? These all use various math tools:
  - Observation
  - Problem Solving
  - Technology
  - Engineering
  - Science

Problem Solving and the Scientific Method

- While problem-solving and the scientific method share elements of critical thinking, analysis, and solution generation,

- Problem-solving is a broader approach applicable to a wide range of challenges in various fields.

- the scientific method, on the other hand, is more specialized and focused on systematic investigation and the acquisition of scientific knowledge.

What is Science?

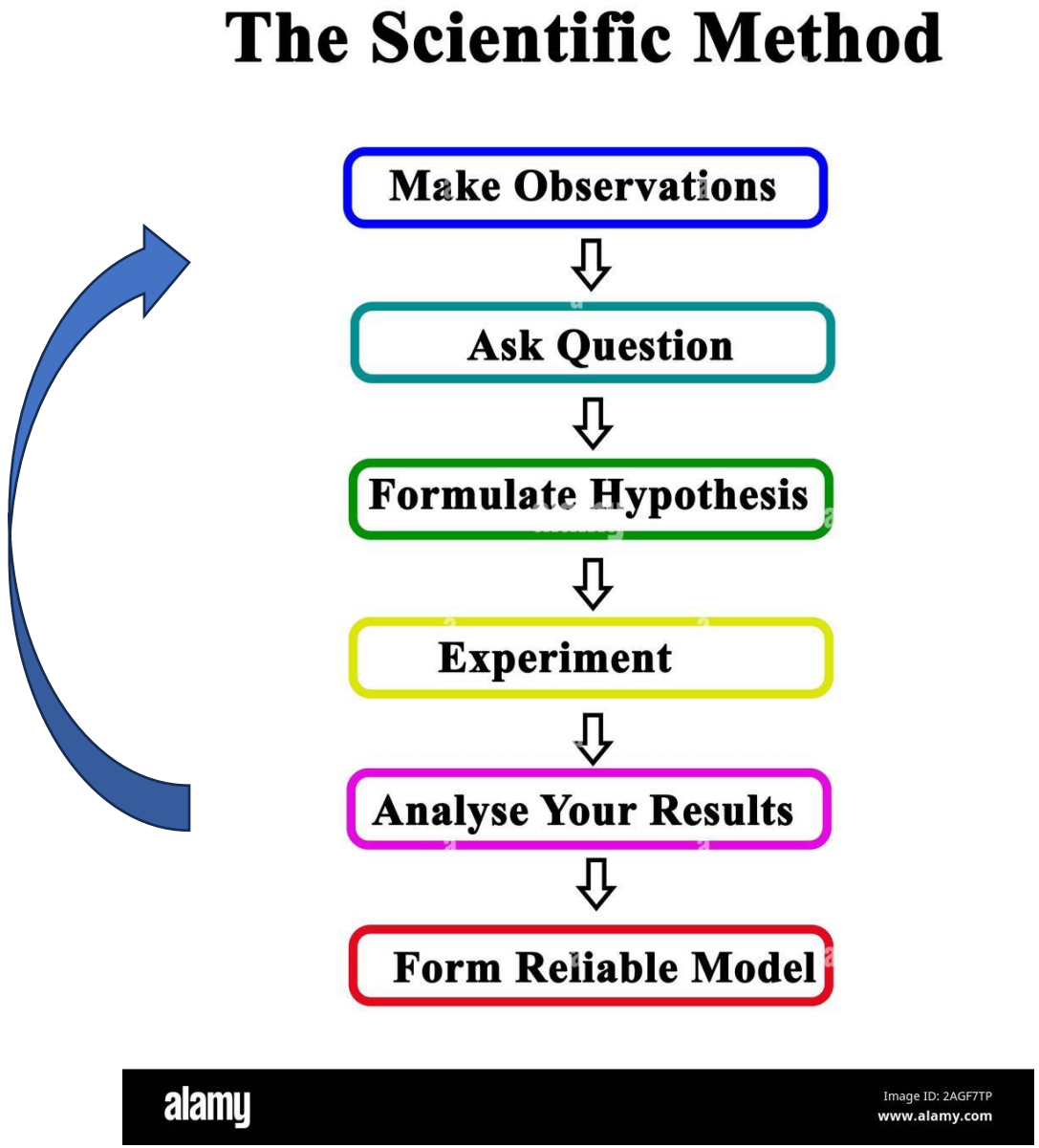
MEASURABLE

REPLICATABLE

INDEPENDENTLY VERIFIED

SHOWS CAUSE & EFFECT

NOT A POPULARITY CONTEST
NOT SPECULATION
NOT ANECDOTAL
NOT PRELIMINARY RESULTS
NOT FULL OF WEASLE WORDS
NOT BIASED



Scientific Laws

- **Law of Conservation of Mass:** Matter cannot be created or destroyed; it can only change forms.
- **Law of Conservation of Energy:** Energy cannot be created or destroyed;
- **Laws of Thermodynamics:** Extensively used in Environmental Science to explain energy transfers, transformations, and efficiency in natural systems.
- **Law of Biotic Potential:** Under ideal conditions, organisms have the capacity to grow exponentially.
- **Law of Tolerance:** Abundance and distribution of a species are determined by the levels of environmental factors within its range of tolerance.
- **Law of Minimum:** Growth and development of a population or organism is limited by the availability of the essential resource that is in the shortest supply.

Observe: The Sun Rises in the East, Crosses the Sky & Sets in the West.

You can plan your life around this self-evident, incontrovertible FACT!

ANCHIENT PEOPLE HAD NO WAY TO COMPARE THE SIZE AND DISTANCE OF THIS MOST IMPORTANT FACT OF LIFE.

Scientific Theories

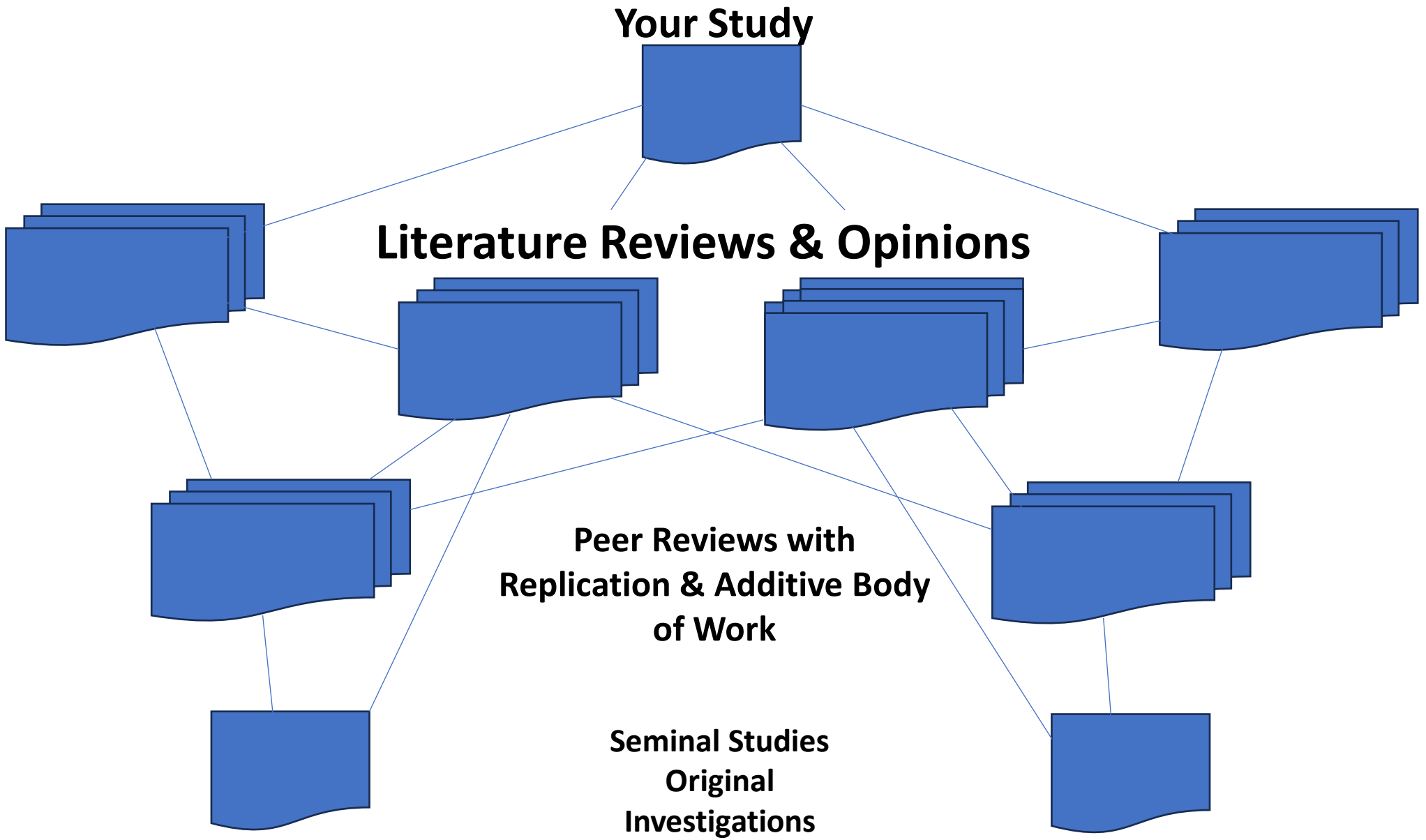
Even Newton's Laws & Einstein's Theories are under constant scrutiny.

- Quantum Physics Theory. Theoretical Basis for Modern Physics to explain Matter and Energy at the Atomic & Sub-Atomic Level.
- Atomic Theory. This is not considered a scientific law because it does not describe a fundamental relationship or regularity in nature.
  - Ancient Greek Philosophers, Aristotle & Democritus thought there must be something that is so tiny yet still characteristic of its larger version. They called these "Atoms".
  - Today, 2400 years later, we still have this concept and still haven't actually seen an Atom.

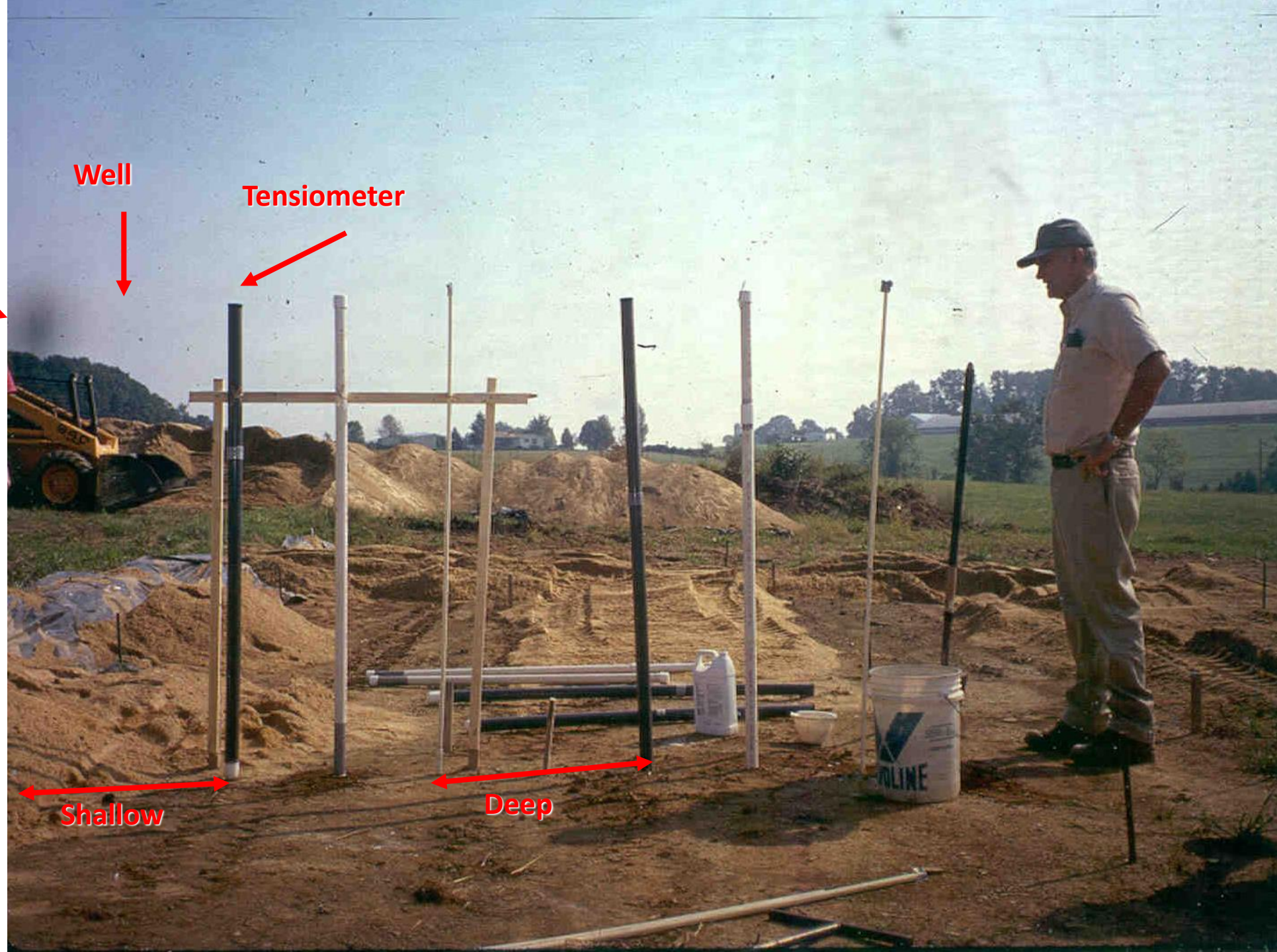
- Theory of Relativity. Early humans observed the sun rise in the east & set in the west. Now we know that the earth rotates on its axis. It only looks like the sun flies across the sky.
- For most folks, this mis-perception works for planning your day. They couldn't imagine that the surface of the earth travels at around 1,000 miles per hour under the sun!
- If you could travel back in time – you would never get them to believe their Lying Eyes.

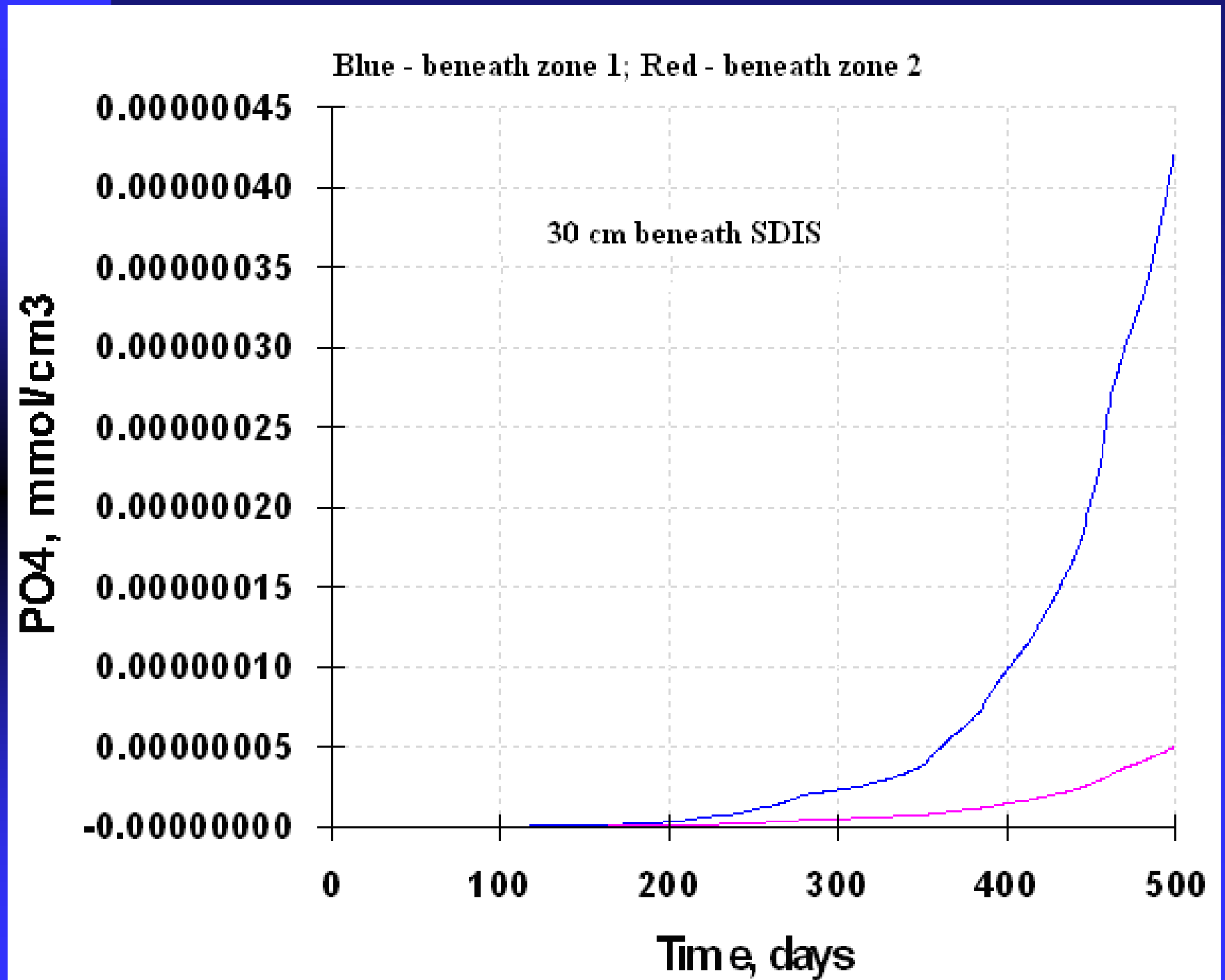
Scientific Principles

- **Principle of Falsifiability:** scientific hypothesis or theory must be testable and potentially falsifiable. Falsifiability ensures that scientific claims are subject to new evidence, empirical testing and scrutiny.
- **Principle of Parsimony (Occam's Razor):** the simplest explanation that adequately explains the observed data should be preferred.
- **Principle of Reproducibility:** Scientific findings should be independently verifiable . Reproducibility ensures the reliability and validity of scientific results and allows for the confirmation or refutation of scientific claims.
- **Principle of Objectivity:** investigations should be conducted impartially and without bias. Objectivity promotes the pursuit of objective truths about the natural world.
- **Principle of Systematic Observation:** Systematic observation ensures that data is reliable, consistent, and suitable for analysis.
- **Principle of Empirical Evidence:** foundation for scientific knowledge allows for the evaluation and validation of scientific claims.
- **Principle of Provisional Nature of Scientific Knowledge:** Science recognizes that knowledge is tentative and subject to revision based on new evidence. Scientific theories and explanations are continually evaluated and modified as new data and observations emerge. **Science is Never Settled.**


Your Study
Literature Reviews & Opinions
Peer Reviews with Replication & Additive Body of Work
Seminal Studies Original Investigations

Demonstration Projects in Virginia (1997 - 2003)




Blue - beneath zone 1; Red - beneath zone 2
30 cm beneath SDIS
PO4, mmol/cm3
0.00000045
0.00000040
0.00000035
0.00000030
0.00000025
0.00000020
0.00000015
0.00000010
0.00000005
-0.00000000
0
100
200
300
400
500
Time, days

SUMMARY & CONCLUSIONS

- The Aquarobic Maxi-Plant produced a highly treated effluent with fecal coliform counts (<4000 CFU/100mL), >95% of the N was nitrified, low BOD_5, and high DO.

- Water potentials showed the soil remained unsaturated.
  - However, potentials show the proximal end of the SDIS were wetter. Perhaps a combination of runon and effluent distribution.

- Fecal coliforms were absent 30 cm beneath the SDIS.

Onsite Wastewater Studies

- "An Investigation for the Need of Secondary Treatment of Residential Wastewater when Applied with a Subsurface Drip Irrigation System." Aug 2010. Master's Thesis, Univ of Tennessee, Knoxville. Authored by Boone S. Hillenbrand. Faculty Advisor: J.B. Buchanan, PhD.
- Compared both Primary (Septic Tank Effluent) and Secondary (Aerobic or Sand Filter) Treated Residential Effluent underneath Subsurface Drip Irrigation (SDI) fields at two systems.
- This study investigated and compared two alternative decentralized wastewater treatment systems using subsurface drip irrigation (SDI) to apply the effluent to the soil instead of a conventional gravel filled trench system. Ksat, NO3, TN, TP and TC were measured at 12" & 24" below the SDI emitters

Hillenbrand Study (cont.)

- **Hypothesis** The primary hypothesis of this study is that: Secondary treatment is not needed to adequately purify residential wastewater, with Subsurface Drip Irrigation.
- This study sought to prove or disprove this hypothesis by analyzing the soil and soil solution below SDI emitters. By looking at the saturated hydraulic conductivity (Ksat), it can be seen how secondarily treated effluent and primary effluent change the soil's physical properties.
- Nitrate-nitrogen ($NO3^-$), total nitrogen (TN), total phosphorus (TP), and total carbon (TC) were evaluated to determine effects of wastewater dispersal on the soil.
- These are the main constituents in residential wastewater that may be of concern in the environment. Nitrate making its way into drinking water is of concern because of the potential for disease like methemoglobinemia (blue baby syndrome). Phosphorus runoff into bodies of water can result in eutrophication, destroying habitat for local fish and water wildlife. Measuring TC will provide information on how much oxygen demand the wastewater is adding to the system.

Hillenbrand (Horizontal Array of Core Samples)

Figure 3.6 – Sample Site, Crescent Glen, RSFE, September 1, 2009

Hillenbrand (Vertical Location of Core Samples)

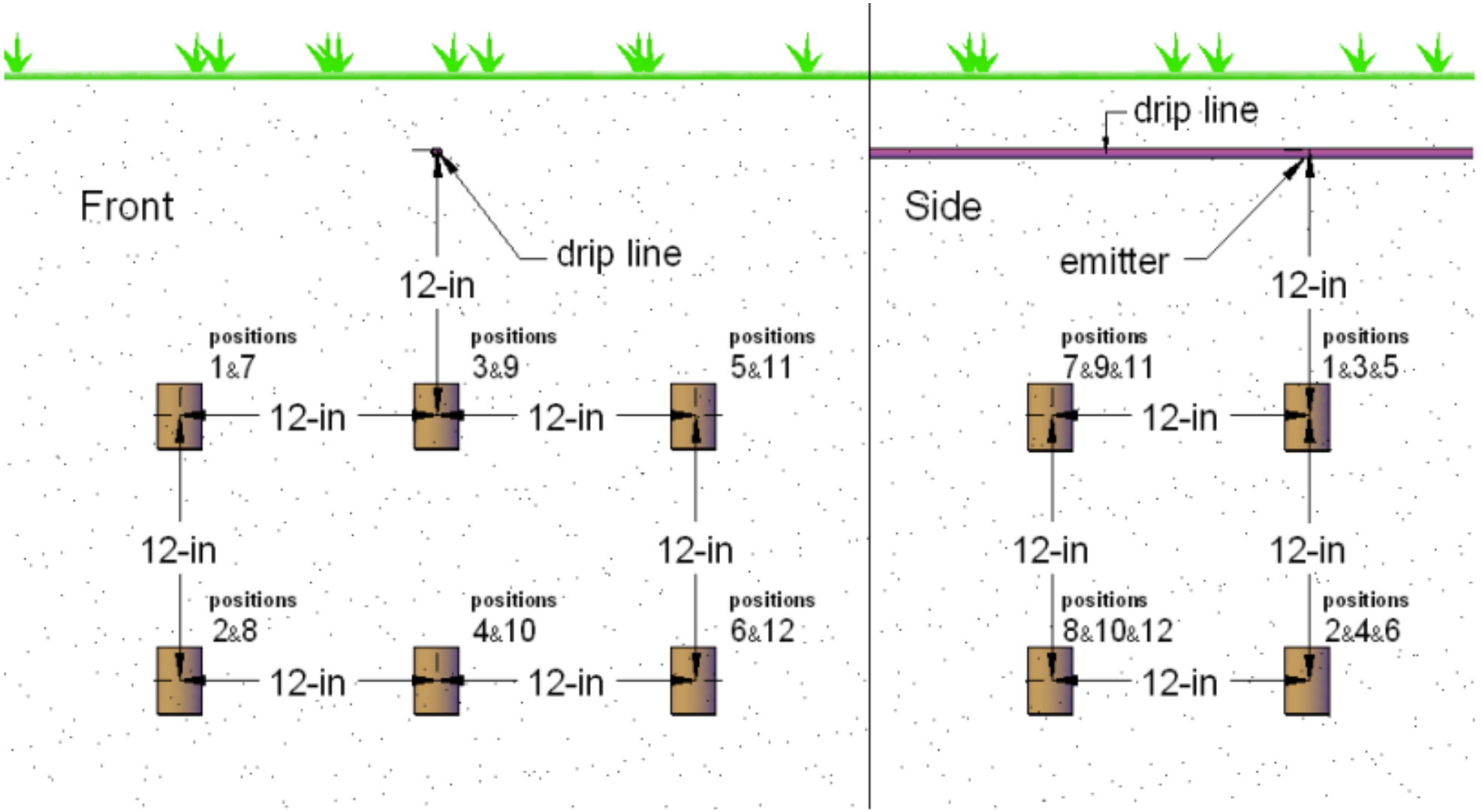


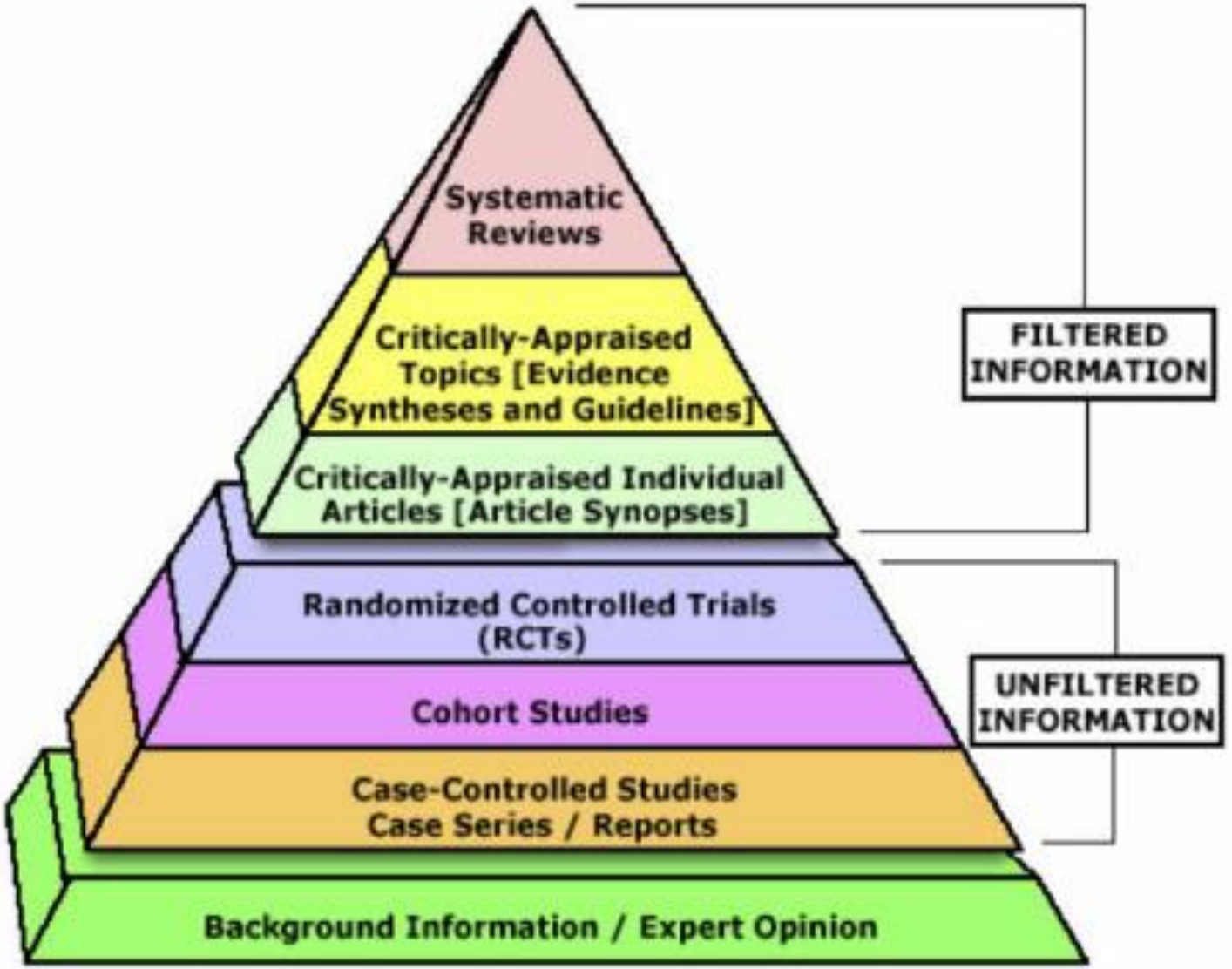
Figure 3.5 – Front and Side View of Sample Placement

Studies of Fate of Onsite Wastewater In Soil

1. **Introduction to Secondary Treatment**: is designed to substantially degrade the biological content of the sewage. This treatment usually involves processes like activated sludge or trickling filters to remove organic materials, which helps in producing wastewater suitable for reuse or discharge to natural waters.
2. **Subsurface Drip Irrigation System**: involves delivering water directly to the root zone of plants using a network of tubes, pipes, valves, and emitters placed below the soil surface. This method is highly efficient as it avoids saturated conditions, reduces evaporation losses and ensures that water is directly available to the plant roots.
3. **Benefits of Secondary Treatment for Subsurface Drip Irrigation**:
    1. **Reduced Contamination Risk**: Properly treated wastewater reduces the risk of soil and groundwater contamination.
    2. **Clog Prevention**: Helps in removing solid particles and other organic matter which can clog the emitters of the subsurface drip irrigation system.
    3. **Enhanced Soil Health**: By reintroducing certain nutrients back into the soil, while removing harmful contaminants to ensure that only beneficial elements are added.
    4. **Economic Benefits**: Wastewater can be a reliable and sustainable source of irrigation water, especially in water-scarce regions.
4. **Implications**:
    1. **Initial Investment**: Secondary treatment facilities can prove economical due to the benefits they offer.
    2. **Regular Performance Monitoring and Maintenance** of the treatment facility are essential to ensure that the treated wastewater meets the desired quality standards.
    3. **Regulations**: Using wastewater for irrigation is subject to regulations depending on the region. Proper treatment ensures that these regulatory standards are met.
5. **Conclusion**: Using secondary treated wastewater for subsurface drip irrigation presents a sustainable and efficient method to conserve water resources, especially in regions facing water scarcity. It ensures that water is used efficiently, soil health is maintained, and the risks associated with untreated wastewater are mitigated.

Hillenbrand Study (cont.)

- Hillenbrand relied on previous research where studies showed that pathogens can be reduced 99% to 99.9% through 2-3-ft of unsaturated subsoil (Kristiansen, 1981; Van Cuyk et al., 2004).
- Results from these studies demonstrated that with unsaturated flow wastewater is forced into contact with the biofilm attached to the soil particles resulting in better treatment of Viruses and Bacteria. Therefore, this study did not attempt to replicate those findings.
- Standing alone, this study is very interesting, but is not validated until others Replicate and Validate the Findings. That should be done.



Scientific Peer Review Levels of Systematic Scrutiny

NSF/ANSI Standard 40
(National Sanitation Foundation / American National Standards Institute)

1.Class I Systems: Treating & disposing of septic tank effluent to subsurface soil absorption systems.

2.Class II Systems: Intended for treating and disposing of septic tank effluent to evaporation/transpiration (ET) beds or systems that use advanced treatment processes.

The standard sets requirements for the treatment efficiency and capacity of these systems, ensuring that they effectively reduce contaminants in wastewater and protect public health and the environment.

It helps ensure that these systems function reliably and safely in areas without access to centralized sewer systems.

<u>However, NSF/ANSI testing does not address the efficacy of Soil Treatment Units.</u>

NSF/ANSI 244 and NSF/ANSI 350

1. **NSF/ANSI 244 - Residential Wastewater Treatment Systems:**
    1. sets standards for residential wastewater treatment systems that are designed to treat and reuse wastewater for non-potable applications within residential properties.
    2. outlines requirements for the design, construction, and performance of these systems, ensuring that they effectively treat wastewater to a level suitable for reuse.
    3. covers systems such as graywater treatment and reuse systems and other decentralized wastewater treatment technologies for residential applications.
2. **NSF/ANSI 350 - Onsite Residential and Commercial Water Reuse Treatment Systems:**
    1. expands on the concept of water reuse to both residential and commercial applications.
    2. covers a broader range of systems, including those used in commercial, institutional, and industrial settings.
    3. establishes criteria for design and performance of on-site water reuse treatment systems, ensuring that treated water meets appropriate quality standards for reuse in various non-potable applications, such as landscape irrigation and toilet flushing.
    4. includes provisions for monitoring and maintenance to ensure ongoing performance.

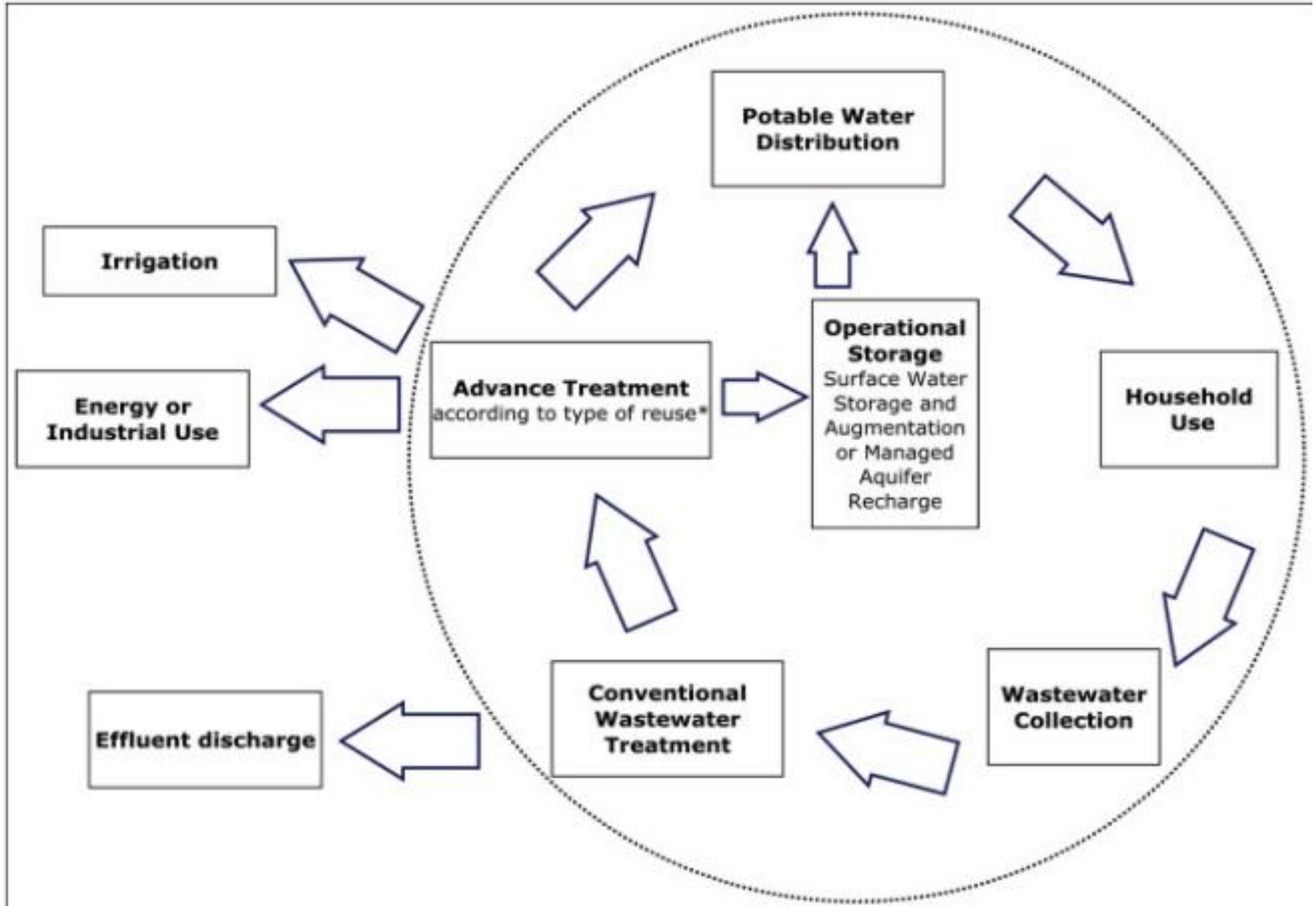
Other NSFI/ANSI Standards

- Here are some of the key standards related to water and wastewater treatment products that NSF International has been associated with:

1. **NSF/ANSI 42 - Drinking Water Treatment Units - Aesthetic Effects:**
2. **NSF/ANSI 53 - Drinking Water Treatment Units - Health Effects:**
3. **NSF/ANSI 55 - Ultraviolet Microbiological Water Treatment Systems:**
4. **NSF/ANSI 58 - Reverse Osmosis Drinking Water Treatment Systems:**
5. **NSF/ANSI 61 - Drinking Water System Components - Health Effects:**
6. **NSF/ANSI 62 - Drinking Water Distillation Systems:**
7. **NSF/ANSI 401 - Emerging Compounds/Incidental Contaminants:**

Water and Wastewater Standards

1. **Environmental Protection Agency (EPA):** Establishes regulations and guidelines for water quality and wastewater treatment in the United States. EPA sets standards for drinking water quality, wastewater discharge, and water pollution control.
2. **Each State & some Municipalities.** Based on EPA and other standards**.**
3. **American Water Works Association (AWWA):** develops standards and guidelines for water supply and treatment, including drinking water quality, distribution, and water infrastructure.
4. **Water Environment Federation (WEF):** is an organization that provides technical expertise and resources related to wastewater treatment and management. They offer various publications and standards related to wastewater.
5. **International Organization for Standardization (ISO):** develops international standards for a wide range of industries, including water and wastewater management. ISO 24510 and ISO 24511, for example, provide guidelines for wastewater monitoring and sampling.
6. **American Society for Testing and Materials (ASTM):** ASTM International develops standards for various industries, including those related to water and wastewater. ASTM standards cover water quality testing, treatment technologies, and more.
7. **United Nations World Health Organization (WHO):** WHO sets global guidelines and standards for drinking water quality and sanitation. Their guidelines serve as a reference for many countries in establishing their own water quality standards.
8. **National Onsite Wastewater Recycling Association (NOWRA):**
    1. **Model Code**
    2. **Training Modules**
    3. **Forums for Practitioners**
    4. **Annual Conferences & MEGA Conferences**



*Ultra filtration, reverse osmosis and ultraviolet disinfection for direct potable reuse.

Current Opinion in Environmental Science & Health

Water and Wastewater Testing

1. **National Institute of Standards and Technology (NIST):** NIST, part of the U.S. Department of Commerce, provides standards and measurement protocols for various industries, including those related to water quality and analysis.
2. **State and Regional Environmental Agencies:** In addition to federal regulations, many countries have state or regional environmental agencies that develop and enforce water quality standards and regulations specific to their areas.
3. **Private Testing Laboratories:** Numerous private testing laboratories offer water and wastewater testing services. These labs may provide a wide range of testing, from basic water quality parameters to specialized contaminant analyses.
4. **Academic and Research Institutions:** Universities and research institutions often conduct research on water and wastewater treatment technologies, and they may have their own testing facilities and protocols.
5. **Consulting Firms:** Environmental consulting firms often perform water and wastewater testing and analysis as part of their services to clients in various industries.

BIASES

- Citation & Publication Bias.
  - Fear Sells!
  - Journals are businesses that need to attract readers & can’t be Boring!
  - Selective Use of Supportive Studies.
- Precautionary Principle
  - Better Safe than Sorry.
- Data Sets that have
  - Too many results to validate.
  - Self-Selected Participants
  - Researchers with stake in the Outcomes
  - Rely on Anecdotes
  - Reports that Have Weasel Words (Linked with, Reportedly, Studies In Progress. .)

Flies Eat Sewage and Vomit on your food

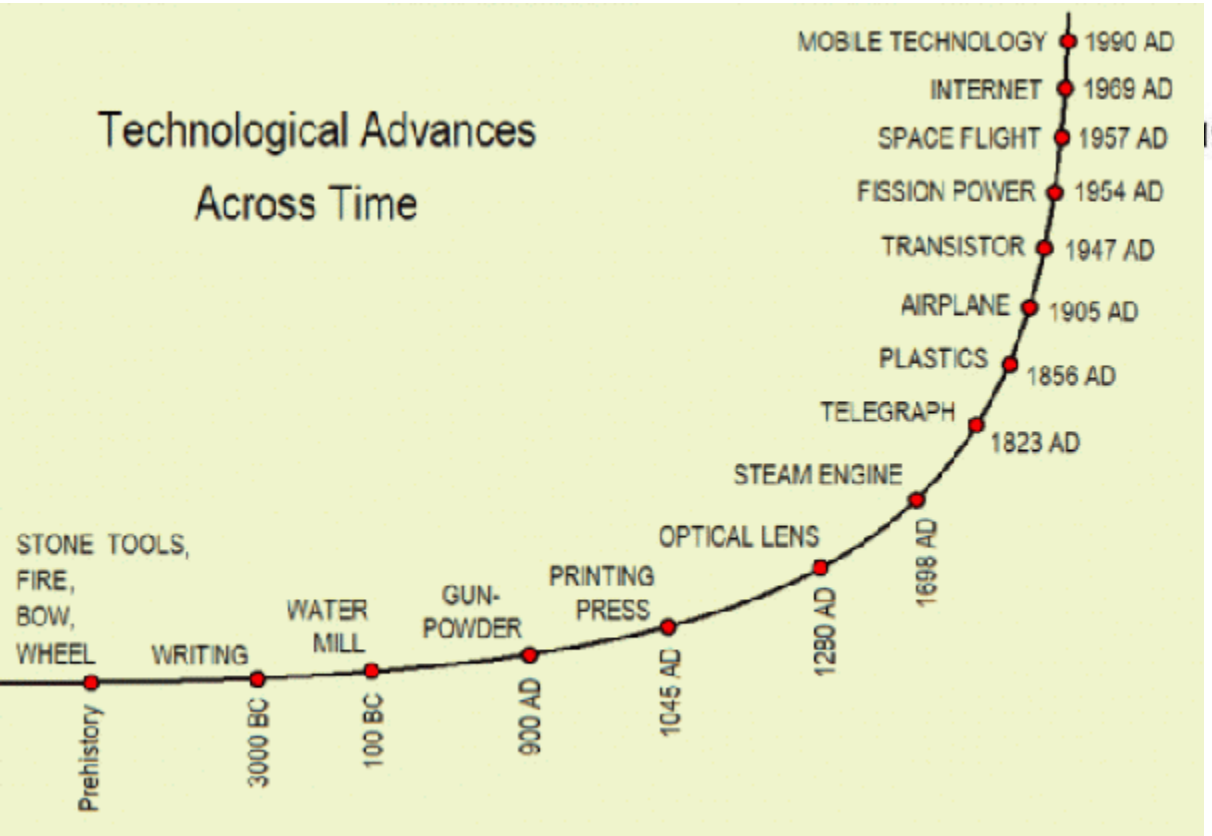
- **My Public Health Professor Told about Advising Indigenous Tribes about Food Protection.**

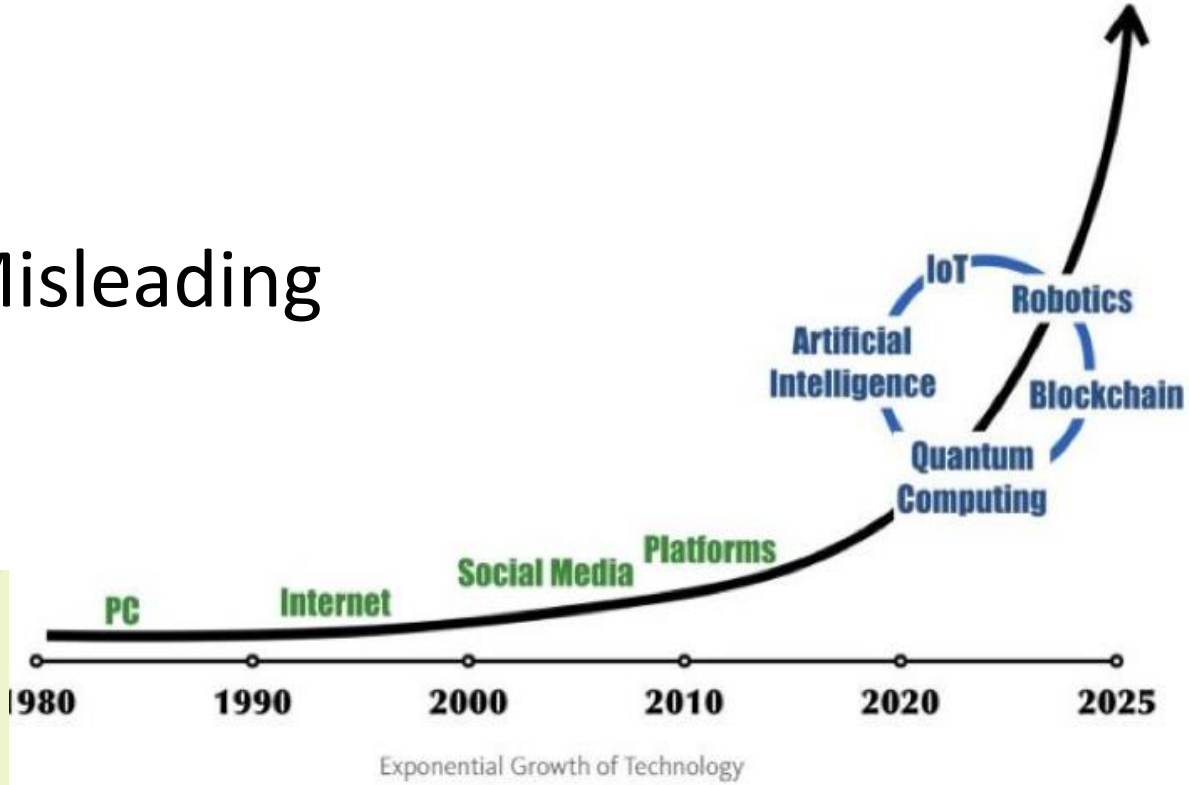
He used with a Big Image of a Domestic Housefly.

How to Lie with Statistics

- **Cherry-picking:** Selectively choosing data that supports a desired conclusion
- **Correlation vs. Causation:** Asserting a cause-and-effect relationship between two variables without proof.
- **Misleading Graphs:** Manipulating the scale or axes on a graph to exaggerate or downplay differences.
- **Misleading Sample Sizes:** Presenting results based on small or biased samples without acknowledging the limitations.
- **Statistical Significance vs. Practical Significance:** Statistical significance refers to the likelihood of an observed result occurring by chance, while practical significance refers to the actual impact or importance of the result in real-world terms.
- **Base Rate Fallacy**: Ignoring the base rate or prior probability of an event when assessing its likelihood. Focusing solely on new or specific information without considering the context or the overall probability can lead to distorted perceptions.
- **Data Misrepresentation**: Manipulating data by selectively choosing time frames, using inappropriate statistical measures, or altering the presentation format to mislead readers. Presenting data out of context.
- **Loaded Language and Framing:** Using emotionally charged language or framing statements in a way that influences perception or biases interpretations.

Different Chart Scales Can Be Misleading

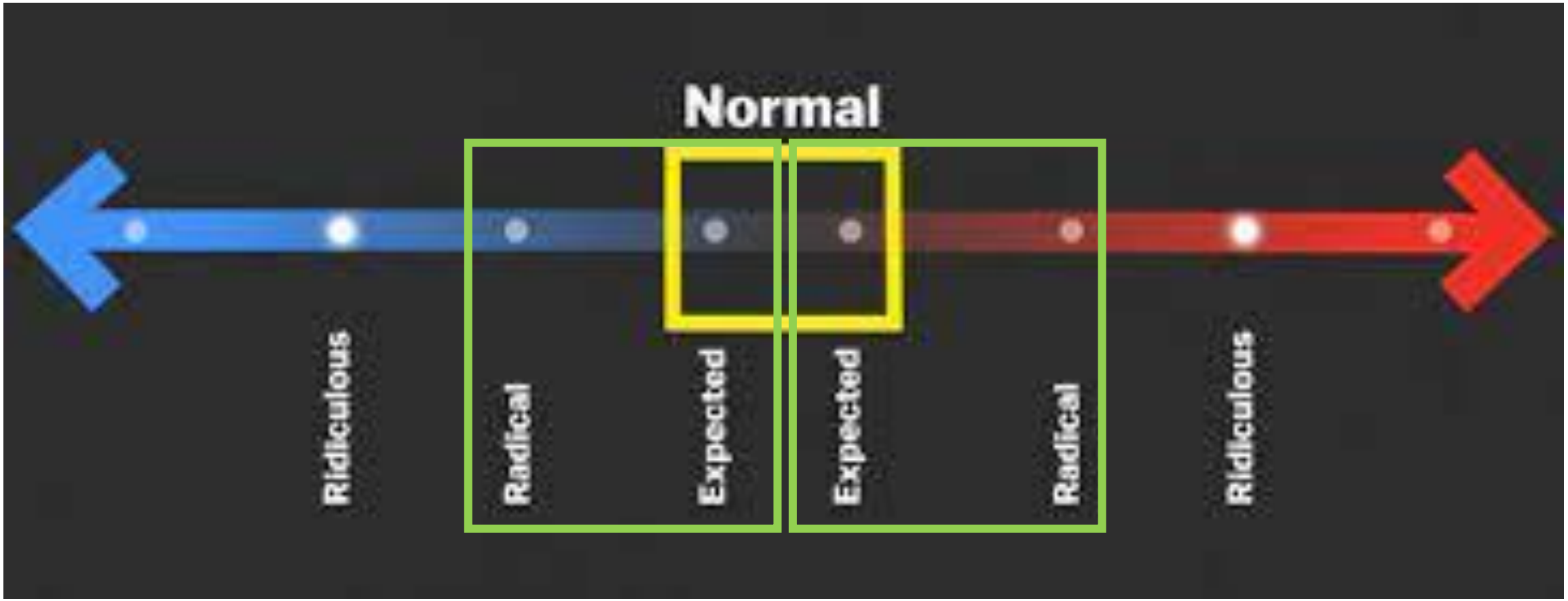




AI Singularity

Consensus is Maleable

- Shifting the Overton Window by Promoting Ridiculous Ideas First, Thereby Making Radical Ideas Seem More Mainstream.



Magic or Science?

- When you believe in things that you don't understand, then you suffer. Superstition Ain't the Way! Stevie Wonder
- Any sufficiently advanced technology is indistinguishable from magic.
  Arthur C. Clark
- Correlation vs Causation
  - The Sun Rises in the East and Sets in the West.
  - Sunrise Comes First, but does it Cause Sunset?
- Nitrate in Drinking Water
  - Does it Cause Methemoglobinemia? Where are the Cases?
- Contaminants of Emerging Concern?
  - Search for Zero Contaminants?

Prescriptive Rules are Dependable: Like the Rising & Setting of the Sun.

- Prescriptive Rules are Based on Time-honored Results from Trial & Error
  - Work most of the time:
  - Regulatory Convenience, and
  - History of Success w/ minimal Site characterization.
- Setbacks:
  - USPublic Health Service 1957 - 69: Setback to Streams: 50 ft
  - Typical States / EPA Setback to Streams: 50ft with Sand Filter
  - USPublic Health Service 1957 - 69: Cess Pool Setback to wells: 150 ft

  - Multiplying the setbacks by 2 or 3, hardly amounts to Science. Upslope well?
  - Coarser Soil v Denser Soil
  - Same for Dug Well / Driven Well / Drilled & Sealed Well
  - Cess Pool / Seepage Pit / or Highly Treated Effluent with Disinfection.
  - Professional Monitoring or none?

- Trenches need Volume?:
  - With Gravity Septic Tank Effluent – Anaerobic Conditions Cause BioMat. Part of the Treatment.
  - Do Pressure Trenches with High Level of Treatment Create BioMat?

- Drip – Pressure Distribution with Time Dosing to the soil matrix / capillary action.
    - Avoids Saturated conditions.
    - Makes better use of the soil to interact with the effluent
    - Can be used for beneficial uses

Prescriptive Rules:

- **Definition:** Establish specific, detailed requirements and standards that must be met by entities seeking permits. These rules leave little room for interpretation or flexibility.

- **Specific Requirements:** Outline specific actions, technologies, or limits that must be implemented or adhered to by the permit holder. They provide clear guidance on what needs to be done to comply with environmental regulations.

- **Uniformity and Consistency:** Promote uniformity in permit requirements, ensuring that all permit holders follow the same set of rules. This helps maintain consistency in environmental protection measures.

- **Ease of Implementation:** Are relatively straightforward to implement as they provide clear instructions and standards. Permit holders can easily understand what is expected of them and take the necessary actions to comply.

- **Limited Adaptability:** May not adapt well to changing circumstances or technological advancements. They may not account for site-specific conditions or innovative approaches that could achieve better environmental outcomes.

PERFORMANCE BASED RULES

- **Focus On Results:** Rather than prescribing specific actions or technologies, these set standards that permit holders must meet but allow flexibility in how those standards are achieved.

- **Environmental Outcomes:** Prioritize the desired quality improvements and allow permit holders (Designers) to choose the methods that best suit the circumstances.

- **Flexibility and Innovation:** Designers have the freedom to explore and implement new technologies, approaches, or management practices that can deliver desired outcomes.

- **Site-Specific Considerations:** Recognizes that different locations may require different approaches to achieve the desired results. Requires Robust Site Characterization.

- **Accountability and Monitoring:** Requires robust monitoring and reporting systems to ensure that permit holders meet the specified environmental performance standards.

EPA Manual 2002 1.6 Performance-based.

- The site evaluation process is becoming more refined and comprehensive.
- New technologies that incorporate lightweight media, recirculation of effluent, or disinfection processes have been developed
- Program makes use of recent developments to select and size system technologies appropriate for the estimated flow and strength of the wastewater at the site where treatment is to occur.
- Sites with inadequate soils, high seasonal water tables, or other restrictions require alternative approaches that can achieve performance objectives despite restrictive site features.
- Selecting proven system designs that are sized to treat the expected wastewater load is the key to this approach.

EPA Manual 2002. 1.6.2 Hybrid Programs

- The National Onsite Wastewater Recycling Association (NOWRA) was founded in 1992 to promote policies that improve the market for onsite wastewater treatment and reuse products.
- NOWRA has developed a model framework for onsite system management that is based on performance rather than prescriptive regulations.
- The framework endorses the adoption and use of alternative technologies that achieve public health and environmental protection objectives through innovative technologies and comprehensive program management

Explain Your Great Ideas to Others.

Your Pretty Pet Project Should be Loved by All

What you Intend

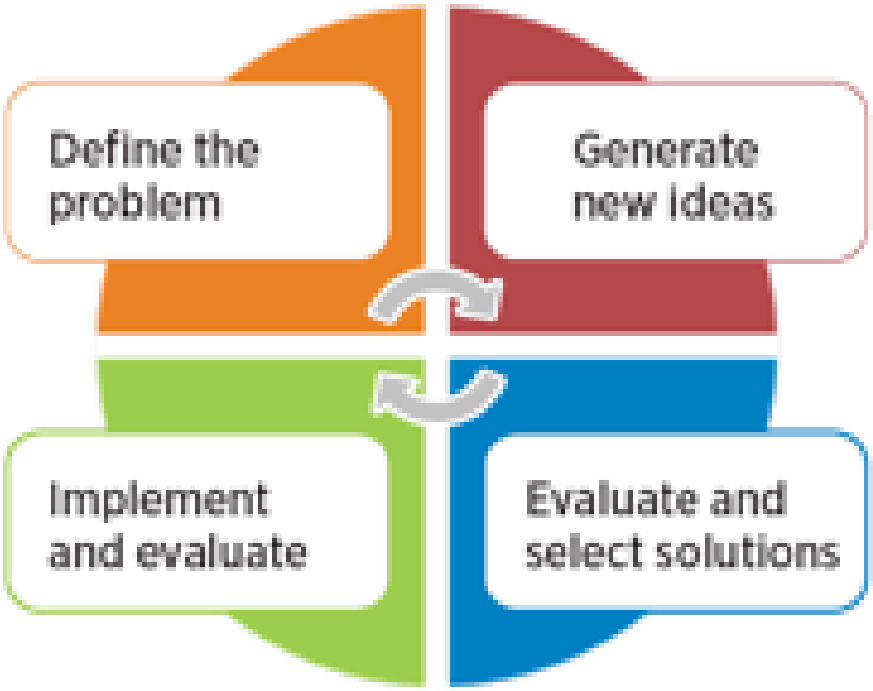
What they see

Achieving Consensus

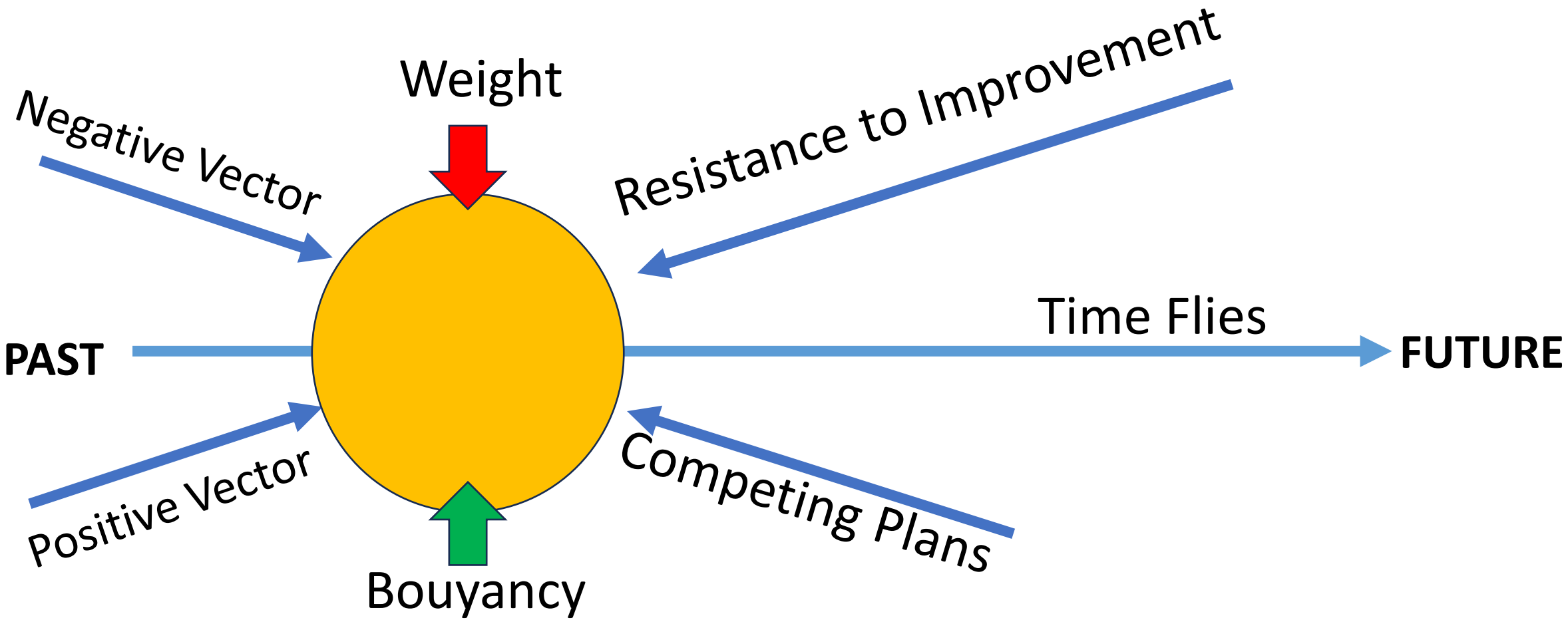
- Great Ideas = Dead Skunk on the Table without prior consensus
- Peer Review = Exact Replica to Verify Findings of the Study.
- Staff Study => Decision Paper. Put it in writing.
- Problem Solving (Time & Quality)
  - ID Existing Conditions (Everything is EXACTLY as it belongs at all times)
  - ID Desired Outcome (= Bias = Not Scientific)
  - ID Obstacles
  - Plan Route & Way Points
  - Act, Observe and Adjust

WHAT IS PROBLEM SOLVING?

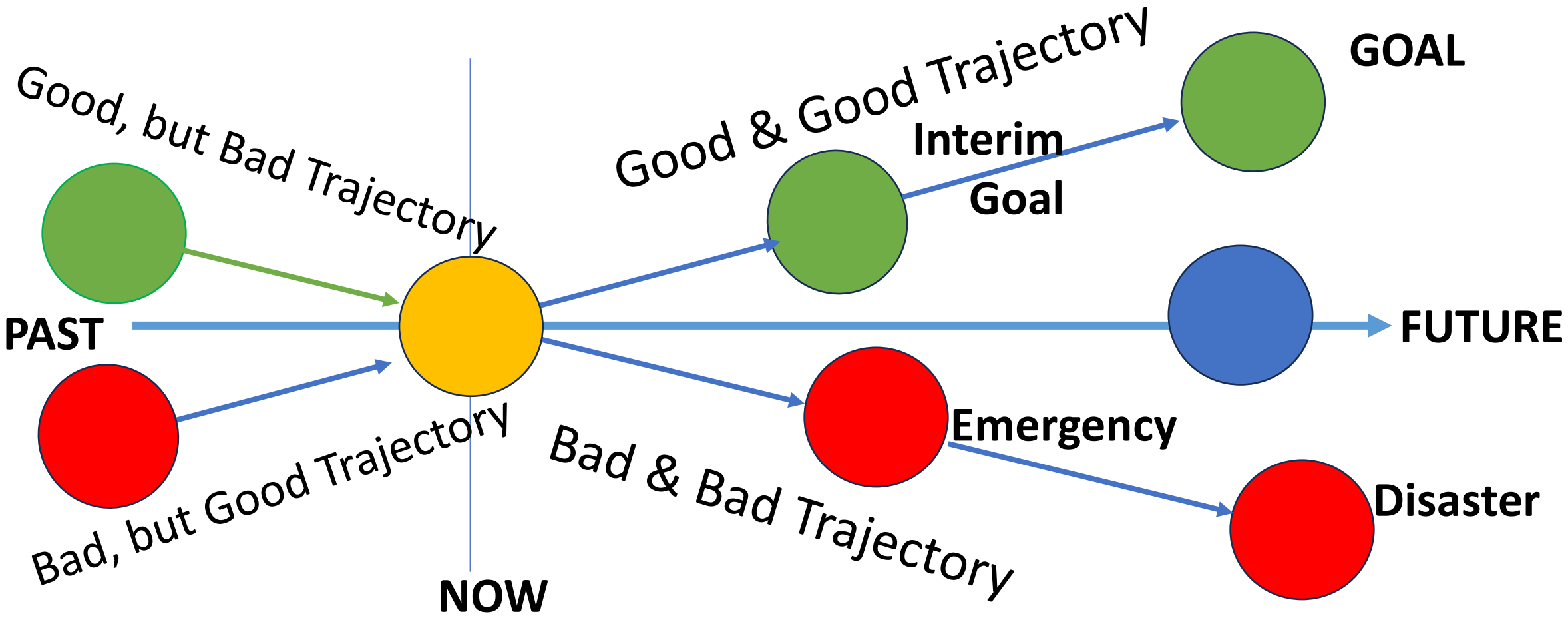
Problem solving is the act of defining a problem; determining the cause of the problem; identifying, prioritizing, and selecting alternatives for a solution; and implementing a solution.



Everything, Everywhere is Exactly Where it Belongs



Getting Better or Worse? So What Do You Do?



PROBLEM / OPPORTUNITY WORKSHEET

PROBLEM STATEMENT ➔ **OPPORTUNITY**

- *1A.*
- *Identify the Root Problem and describe:*
- Who, What, When & Where?

- *Review your facts and assumptions and update your understanding of the problem. Re-state it based on your new understanding.*

3A. Evaluate Initial Problem Statement & look for ways to convert the situation from a negative problem to a positive opportunity.

Remember: *None of us would have careers without problems.*

1B. Ask Why is this the case?" Why? Why? Why?

1. Why does this happen ? Answer 1
2. Why does Answer 1 happen ? Answer 2
3. Why does Answer 2 happen ? Answer 3

3B. Describe a better new reality: Can we learn & innovate from this?

1. Communicate better ?
2. Improve Processes ?
3. Invent a New Device ?

ASSUMPTIONS

PROVEN FALSE?	2A. WHAT DO YOU THINK YOU KNOW (How do you know this to be the case? If you have no way to prove it – Admit your assumptions.	PROVEN TRUE?

EVALUATION OF OPTIONS

OPTION	PRO	CON
1. MINIMUM ACTION: If it Aint Broke – Don't Fix it, Continuing with current practices	Comfort with status quo Easy to Complain and to blame others for problem	Issue will continue to raise its ugly head … The world will end in cataclysm …
2. MAXIMUM ACTION: (eg: Cost is no concern) Describe the reasonably possible, full no-holds barred solution.	PRO	CON
3. MIDDLE ROAD ACTION: (Often the Preferred Solution) Compromise solution that takes into account various interests . 4. CONSIDER OPTIONS AS A ROAD-MAP FOR LONG TERM SUCCESS.	PRO	CON

Recommendation: Option ___

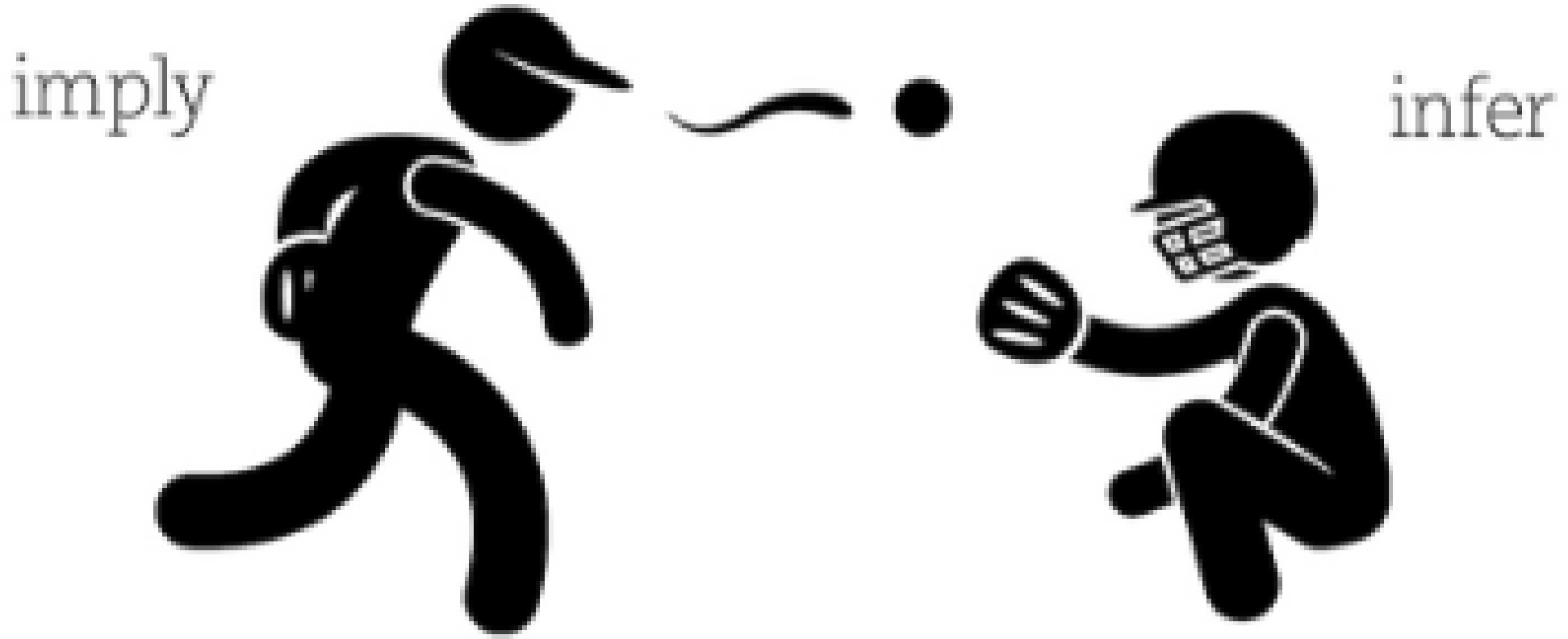
Name:_____Signature_____Date:_____
_

COORDINATION ENCLOSURE

- (This is an enclosure to a Decision Paper. Coordination with affected / knowledgeable parties is indicated by circling "CONCUR" or "NON-CONCUR", Initialing and indicating whether comments are attached by checking "CMT ____" and the date of the coordination response.

- **COORDINATION**

NAME, TITLE	**RESPONSE**	**INITIALS**	**√**	**ddMonyy**
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____
_____	CONCUR / NON-CONCUR	_____	CMT ___	DATE: _____



I told him what I found!

Mis-Communication? Takes You & them

To be Trusted: Be Trustworthy.

Just Say What you Mean & Mean What You Say

Effectiveness

- 80 – 20 Rule (Pareto Principle)
  - 80 % of your results come from 20 % of your efforts
- Focus on the Results from your most productive effort
  - What is the 80 / 20 Rule for that 20 % & that 20 %, etc.
  - Some Suggest Doing Less & Less to Achieve More & More!
  - Delegate Less Important Tasks.
  - Fill Time Voids with Less Important Items??
  - Stop Doing “Unimportant” Items Altogether??

Recommendations to Support Performance

- Breaking free from the limitations of prescriptive codes and fostering the acceptance of innovative solutions involves a combination of strategic approaches, collaboration, education, and policy changes. Here are several strategies to consider:

1. **Collaborative Research and Development:** test, validate, and refine emerging solutions.
2. **Demonstration Projects:** showcase the viability and benefits of newer technologies to dispel skepticism.
3. **Performance-Based Regulations:** Advocate for performance-based regulations that focus on the desired outcomes rather than prescribing specific methods.
4. **Incentives and Recognition:** Offer incentives, grants, or recognition to entities that adopt and successfully implement newer technologies. Positive reinforcement can encourage the adoption of innovative solutions while acknowledging efforts to improve environmental and public health outcomes.
5. **Education and Outreach:** Conduct educational campaigns to inform regulators, industry professionals, and the public about the benefits and potential of newer technologies.
6. **Collaborative Regulation Development:** Engage stakeholders, including technology developers, researchers, industry representatives, and regulatory authorities for a balanced understanding of both traditional and newer technologies.
7. **Flexibility in Compliance:** Allow for flexibility in compliance pathways. For instance, provide options for using newer technologies alongside established methods, especially during transitional periods. This approach accommodates both innovation and gradual adaptation.

Recommendations to Support Performance

6. Regulatory Sandboxes: Create pilot programs that provide a controlled environment for testing and implementing newer technologies. These sandboxes allow for experimentation while minimizing risks and uncertainties.

7. **Updating Codes and Standards:** Advocate for regular review and updating of codes and standards to accommodate emerging technologies& new solutions that meet rigorous performance criteria.

8. **Case Studies and Data Sharing:** Promote the sharing of case studies, research findings, and data related to the performance of newer technologies. Accessible data can help build a body of evidence supporting their effectiveness.

9. Engage with Regulatory Authorities: Engage in dialogue with regulatory authorities, presenting evidence-based arguments for the adoption of newer technologies. Advocate for the inclusion of alternative solutions in regulatory guidelines.

- Breaking free from the rigidity of prescriptive codes requires a concerted effort from multiple stakeholders. By demonstrating the benefits, safety, and effectiveness of newer technologies and fostering a collaborative approach to regulation, it's possible to shift the regulatory landscape toward more innovative and adaptable practices.

The Role of Consensus in

Science, Public Policy and Problem Solving

for

Onsite Wastewater Recycling Professionals

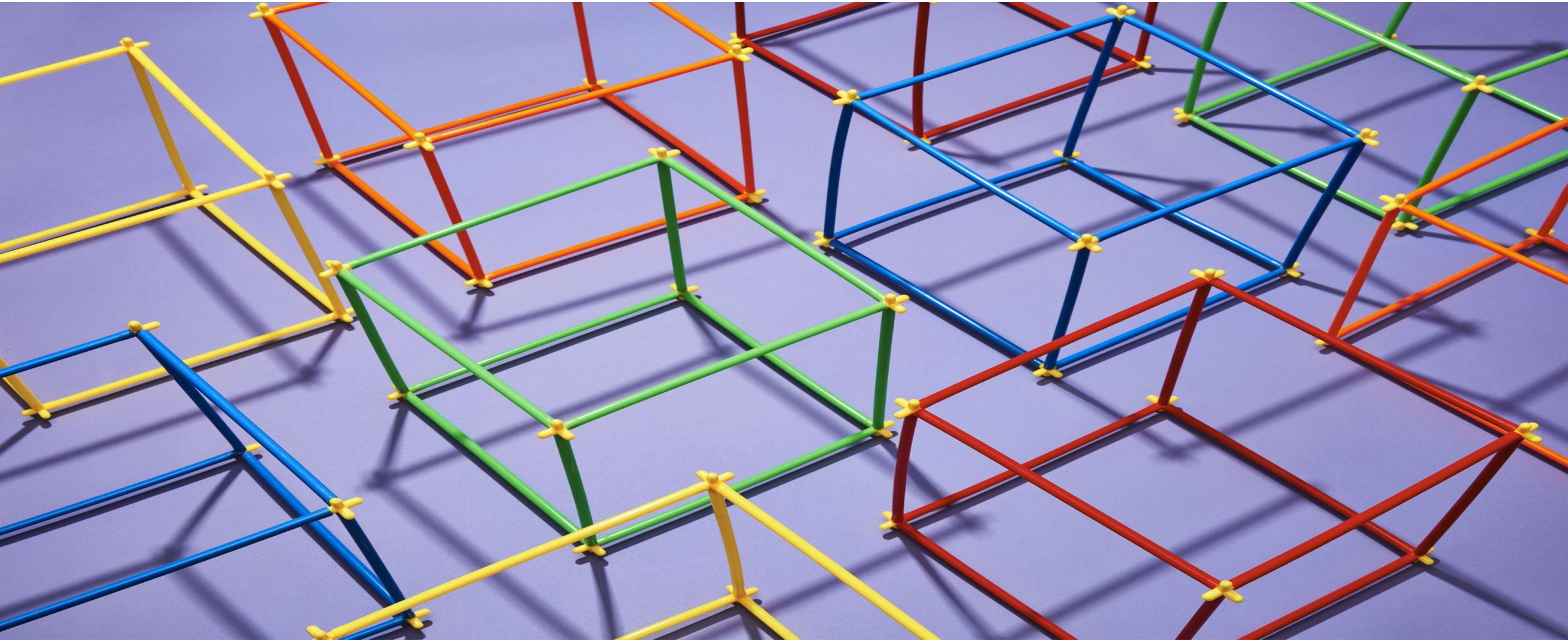
Presenter: Robert Sweeney, MS,

OR REHS / WA Professional Onsite Wastewater Treatment System Designer

This Presentation Represents the Opinion of the Author and Does Not Reflect the Opinion of NOWRA, its Members or Sponsors of the 2023 Mega-Conference.

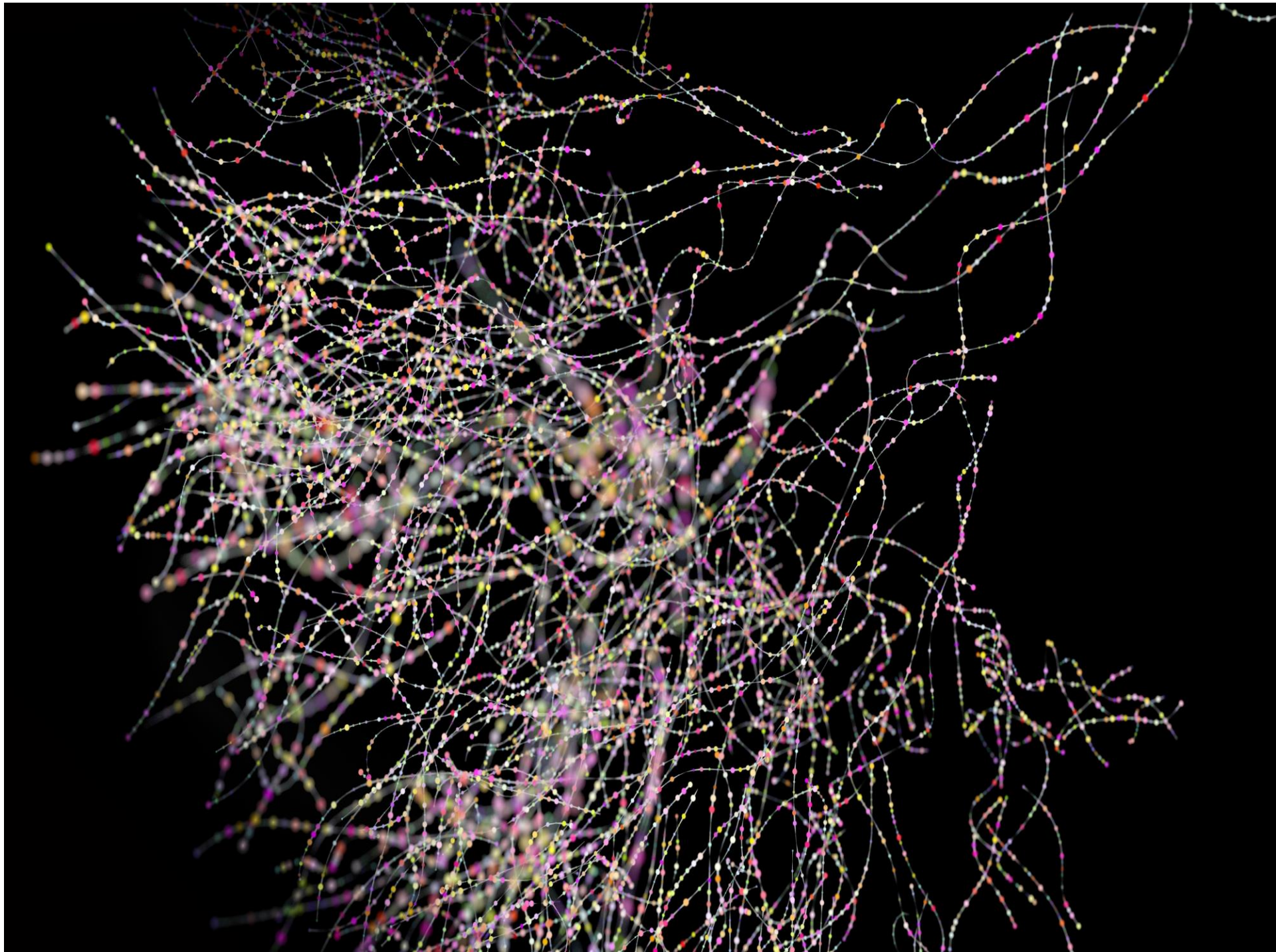
FRAMEWORK FOR TECH PRACTICES

Breaking Down Barriers Inherent in Siloes of Information / Regulatory Controls



Interaction in the Real World ?

Comments & Questions



The Role of Consensus in

Science, Public Policy and Problem Solving

for

Onsite Wastewater Recycling Professionals

Presenter: Robert Sweeney, MS,

OR REHS / WA Professional Onsite Wastewater Treatment System Designer

This Presentation Represents the Opinion of the Author and Does Not Reflect the Opinion of NOWRA, its Members or Sponsors of the 2023 Mega-Conference.

Definitions

- Science (Scientific Method).
  - Observation
  - Hypothesis
  - Testing
  - Replication
  - Review
  - Adjust
- Technology
  - Applied Engineering
- Engineering
  - Applied Science
- Math (Counting, Arithmetic, Algebra, Geometry, Trigonometry, Calculus & Statistics)
  - Not Science, but a Tool.
  - Statistics is a Tool for Developing Patterns
  - Can be misused to obfuscate
- Problem Solving
  - Is The Scientific Method Problem Solving on Steroids? NO: Problem Solving is a Larger Group of Activities, including Biases.

Definitions (continued)

- Risk-Based Approach
- BMP
- AKART
- Adaptive Management
- Cause and Effect
- Point of Compliance
- Precautionary Principle
- 80-20 principle

Law of Diminishing Returns

Zero Contaminants

Dose-Response

Benefits of Stress

Toxicity is in the Dose

Toxicity is upto the Recipient

Questions on Science or Policy?

- Regulatory Focus or Fee for Service?
- Real Public Health & Environmental Protection?
- Training & Certification?
- Standards for the Receiving Environment?

This Presentation Represents the Opinion of the Author and Does Not Reflect the Opinion of NOWRA, its Members or Sponsors of the 2023 Mega-Conference.

Presenter: Robert Sweeney, MS,
OR REHS / WA Professional Onsite Wastewater Treatment System Designer
bob@envmgtsys.com

Questions on Science or Policy?

- Horizontal Setbacks
  - Surface Water / Wells / Property Lines / Drainfields / . . .
- Undisturbed Soil
  - Structural Disruption (Good or Bad ?)
  - Uniform Movement ?
  - Dispersal or Disposal ?
- Separation between Sources
  - Sewage, Stormwater, Drinking Water, Erosion Control, Agriculture, Surface Water . . . Why are these Regulated by Separate Agencies or Programs ?

Questions on Science or Policy?

- Basin Approach
  - Holistic Multi-Disciplinary Teams
  - Professionalism
  - Quality
  - Measure Results v Activity
  - Is the Water, Air or Food Safer?

- Sampling and Lab Testing
  - What Tests?
  - How Often?
  - How Costly?
  - Where & What is the Point of Compliance?