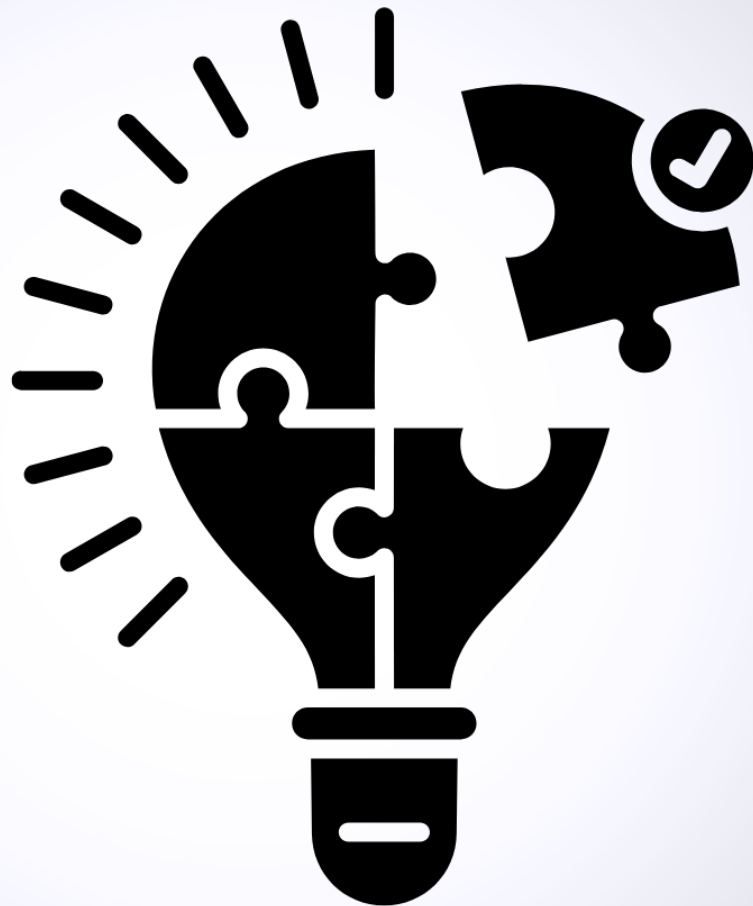# SmartQA Wisdom

ON

PROBLEM SOLVING

Thiruvengadam Ashok

STAG Software

Problem-solving is fundamental to software testing, where clarity, precision, and structured thinking determine success. *SmartQA Wisdom on Problem Solving* delves into the essential principles and strategies that empower test practitioners to solve challenges effectively and intelligently.

Key Insights:

- **Structured Thinking:** Break down complex problems using frameworks, models, and heuristics.

- **Experience vs. Logic:** Understand when to rely on expertise and when to apply systematic techniques.

- **Problem-Solving Toolbox:** Leverage techniques, principles, and guidelines to refine test strategies.

- **Creative Exploration:** Use visualisation, experimentation, and discussion to unlock innovative solutions.

- **Adaptability & Continuous Improvement:** Cultivate a problem-solving mindset that evolves with changing contexts.

This edition in the *SmartQA Wisdom* series provides actionable knowledge tailored for test practitioners. It is designed to enhance analytical capabilities, refine test methodologies, and foster a mindset of continuous learning—turning obstacles into opportunities for smarter testing and high-quality assurance.

About the author

Thiruvengadam Ashok is the CEO of STAG Software Private Limited & Co-Founder of Pivotrics, based in Bengaluru, India. Ashok has dedicated his career to the pursuit of quality assurance in software, continuously evolving his approaches to match the needs of modern systems. He is the creator of HyBIST, an innovative approach to SmartQA that has revolutionised how teams approach hypothesis-driven testing.

Ashok's professional life is deeply intertwined with his personal philosophy. A passionate ultra-distance runner and long-distance cyclist, he applies the principles of endurance and exploration to his work, constantly seeking out new ways to improve software quality. He is also an avid wordsmith, using his love of language to weave both poetry and technical innovation into his life's work.

He holds an M.S. in Computer Science from the Illinois Institute of Technology, a Bachelor's degree in Electronics and Communication Engineering from the College of Engineering, Guindy, and a Postgraduate Diploma in Environmental Law from the National Law School of India University, Bangalore. His life maxim—"Love what you do & Do only what you love"—is reflected in everything he undertakes, from professional projects to personal passions.

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THE FOUNDATIONS OF PROBLEM SOLVING

We frequently use terms such as philosophy, mindset, framework, models, process, practice, and techniques in software development and testing. This article aims to simplify these concepts and illustrate how they interconnect, fostering clear thinking for effective problem-solving.

Since software development is fundamentally about solving problems, we encounter a plethora of related terms—Deming philosophy, CMM Model, Scaled Agile Framework, Lean process, White-box techniques, and more. Are these just industry jargon that complicate our understanding? Not really. They are different facets of problem-solving, each serving a distinct role. Below is a concise definition of these key terms, sourced from dictionary.com:

Philosophy	a set of ideas about how to do something
Culture	the set of shared attitudes, values, goals, and practices that characterises an institution or organization
Mindset	a mental attitude or inclination
Model	a simplified representation of a system or phenomenon, as in the sciences or economics, with any hypotheses required to describe the system or explain the phenomenon, often mathematically
Framework	a skeletal structure designed to support or enclose something
Methodology	a set or system of methods, principles, and rules for regulating a given discipline, as in the arts or sciences
Process	a systematic series of actions directed to some end
Procedures	a particular course or mode of action
Guidelines	a principle put forward to set standards or determine a course of action
Principles	an adopted rule or method for application in action
Techniques	a way of accomplishing
Heuristics	a rule of thumb for solving a problem without the exhaustive application of an algorithm
Tools	anything used as a means of performing an operation or achieving an end
Templates	anything that determines or serves as a pattern
Checklists	list of items that aid in doing, checking

Effective problem-solving requires a philosophy supported by a well-defined mindset, cultivated within a strong organisational culture. This is structured through models, frameworks, and methodologies, applied via systematic processes and procedures, guided by principles, techniques, and heuristics, and ultimately enhanced by tools, templates, and checklists.

COMBINING EXPERIENCE AND LOGIC

Every moment in life presents an opportunity to tackle new challenges. Some problems have been encountered before, making solutions readily available, while others are entirely new, requiring fresh approaches. The question is: how does one solve any problem?

One straightforward answer is "Based on experience." Having faced a similar issue before, the solution—or a variation of it—can be applied again. This concept is widely accepted, particularly in professional fields. A common question often asked is: "Do you have relevant experience in this domain or technology?" The underlying assumption is that familiarity with a similar system ensures competency in handling the current one.

Another approach is "Based on sound logic or technique." Even if the problem is unfamiliar, a structured method, an algorithm, or a logical framework can be applied to solve it. While this is a strong and systematic approach, skepticism often arises unless one is "certified" in the technique. Techniques stem from scientific thinking and the application of logical reasoning, providing a structured way to navigate uncertainty.

BUILDING A PROBLEM-SOLVING TOOLBOX

Problem-solving can be approached in different ways, each with its own implications. Experience-based problem-solving requires time to develop and is often costly, while logic-driven approaches are more efficient as they can be taught and systematically applied. But are there other methods? Yes—principles and guidelines also play a crucial role.

Principles are not rigid formulas but conditions used to make informed decisions. For instance, a simple principle states that if someone walks eastward and their shadow falls behind them, it is still morning; if the shadow is in front, it is evening. When presented with a problem—such as determining the time of day based on shadow direction—applying this principle yields the answer.

In cases where neither a fixed formula nor clear conditions exist, guidelines offer structured directions based on available information. Guidelines help identify different situations and suggest appropriate actions. For example, in software testing, selecting a test technique depends on the type of fault being investigated. Complex logic requires code coverage techniques, while intricate behavioural conditions call for decision tables.

To visualise these concepts:

- Experience-based problem-solving relies on the skill of an individual.

- Logical and scientific problem-solving is rooted in structured methodologies, making use of scientific principles and systematic processes.

These approaches can be categorised further:

1. Technique-based approach – A structured, algorithmic method akin to a formula.

2. Principle-based approach – A decision enabler that outlines key points to guide choices.

3. Guideline-based approach – A broad strategy that suggests potential actions in different scenarios.

Ideally, the technique-based approach is the most effective, as it provides a predictable and teachable framework rather than relying solely on individual experience, which takes time to develop. However, a well-rounded problem solver benefits from integrating all three approaches.

The core of Hypothesis Based Immersive Session Testing (HyBIST) is built on a structured set of thinking disciplines that incorporate techniques, principles, and guidelines, forming a comprehensive problem-solving toolbox.

CREATIVE PRACTICES FOR PROBLEM SOLVING

Over the years, a few consistent practices have been followed to solve both technical and business problems. The process is almost magical—watching the larva of an idea transform into a fully realised solution, much like a butterfly emerging from its cocoon. This article presents these practices as eight key approaches, captured concisely in a collection of posters with crisp text.

Explore

The problem is explored by puttering around, gaining a deeper understanding, and experimenting with small potential solutions to spark ideas. The path to solving a problem is never a straight line. Focus shifts, movement continues, and careful observation helps form a clear mental picture. After all, great clarity is the key to brilliant problem-solving.

Picturise

As one explores, they visualise different facets of the problem and solution using doodles, mind maps, or diagrams. They think non-linearly, incorporating colors to stimulate thoughts and enhance creativity.
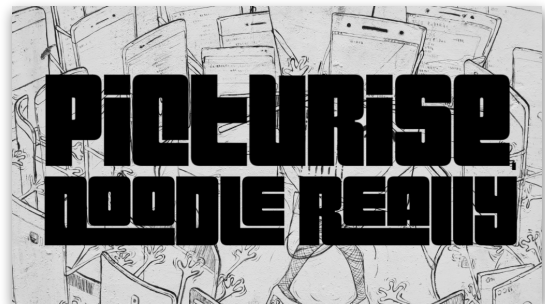
Experiment

Experiment with the problem, identifying similarities to prior challenges and making connections to gain a better understanding. This approach allows for a more structured grasp of the issue, enabling a vigorous pursuit of possible solutions.

Document

As exploration continues, experimentation follows. Noting interesting observations, ideas, and solution possibilities helps capture key insights. Keeping notes brief ensures focus remains undisturbed. After all, quick notes aid in better assimilation and capturing ideas as they arise.
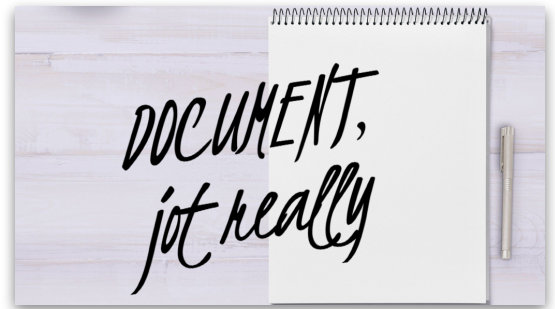
Discuss

Describing the problem and explaining ideas or solutions to a willing listener is a crucial step. It clarifies thoughts, helps identify solutions that may have been elusive, and provides a structured way to refine understanding. Beyond just articulating ideas, the process often brings additional insights and suggestions from the listener, enriching the problem-solving approach.

Do nothing

When the mind is overloaded with information, struggling to process, and unable to generate ideas or solutions, the best approach is to pause. Stepping away, clearing the mind, and embracing stillness create the space for clarity. In this calm, ideas and solutions often emerge effortlessly.

Do something else

During moments of frustration, when no solution seems to emerge, stepping away from the problem can be invaluable. Shifting focus to something else allows the mind to reset. With time, clarity often returns, and suddenly, ideas begin to surface.

Immerse yourself

Once a solution takes shape, full focus is devoted to it—implementing, refining, and continuously polishing with intense dedication. Total immersion sharpens every sense, fully attuned to the act of execution. It is a magical transformation, watching the larva of an idea evolve into the beautiful butterfly of a solution.

THE JOY OF PROBLEM SOLVING

The joy of being an engineer lies in encountering challenges and crafting solutions. The next time a problem arises, take a moment to reflect—was a Technique, Principle, or Guideline applied? Recognising these patterns refines the problem-solving toolbox, making it sharper with every use. And there's nothing quite like having a well-equipped toolkit—a Swiss Army knife for tackling any problem.

But what about solving problems at home, particularly with a spouse? None of the above applies! The ultimate solution: accept whatever they say—problem solved!

The HyBIST Approach to SmartQA - MASTERCLASS

Testing is deep probing to seek clarity and in the process uncover, preempt issues rapidly. The HyBIST approach enables designing smart probes and probing the system smartly.
https://smartqa.academy/courses/smartqa-using-hybist

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