IHS ENGINEERING SOLUTIONS

Accelerate Innovation with Advanced Problem Solving & Idea Generation Tools

Problem solving is often a messy process. It requires information and insights, focus and definition, idea generation and concept validation. Shortcut the process and you'll merely solve symptoms, not problems.

It's estimated that 25% of failures are due to people trying to solve the *wrong* problems and that up to 70% of engineering talent is used to solve problems that should have been previously.

A cultural predisposition for quick action and fast results pushes problem-solvers along a "ready-fire-aim" paradigm. Without tools to structure and stimulate broader thinking, their efforts default to pursing familiar lines of thought with predictably lackluster outcomes. All too often the 'quick-fix' is inadequate and subsequent rework cycles will be needed.

Traditional methods for innovative problem solving typically suffer from a lack of clarity around the problem definition, a paralyzing psychological inertia that prevents 'fresh' thinking and an historical tendency to continue to accept limiting tradeoffs and constraints. These problem-solving efforts also fail due to an overload of technical information, yet a lack of relevant knowledge. Organizational experience is buried in project folders and departmental silos, or lost due to workforce turnover and contraction. And relevant information from other industries and engineering disciplines is invariably beyond reach. Without the benefit of knowing what has already been done, project teams continue to reinvent the wheel.

IHS Engineering Solutions give engineers and other technical professionals the ability to systematically and repeatedly:

- Gain a rapid and comprehensive understanding of the problem or opportunity at-hand
- Ask the right questions
- Get the right, relevant answers from across domains of expertise
- Generate and validate ideas and concepts quickly

BENEFITS:

IHS Engineering Solutions helps engineers and other technical professionals accelerate problem-solving and generate breakthrough new ideas:

- Through comprehensive problem definition and analysis, rework associated with solving the wrong problem is reduced.
- Through functional analysis and specialized innovation content libraries, the rate and quality of idea generation is increased
- Through rapid and precise retrieval of functional solutions from organizational knowledge and trusted, authoritative content such as patents and journal articles, cross-disciplinary scientific achievements are leveraged, expediting discovery and validation tasks, reducing redundant efforts and avoiding re-invention of the wheel.

COMPREHENSIVE PROBLEM DEFINITION & ANALYSIS

Whether remedying an operational failure or machine malfunction, or strategizing the next generation of products for new markets, the process of effective decision making should begin with a thorough definition and analysis of the current situation or problem-space.

The impact of solving the wrong problem, or solving a secondary or symptomatic problem, is easy to understand. The outcome yields only partial or temporary relief, and all too soon the pain recurs – often with increased visibility and urgency. Valuable resources are consumed as the task is reworked, hopefully to a final resolution. In the interim, the organization suffers cost-overruns, time-to-market delays, and lost opportunities or customer loyalty.

So why don't corporations solve the 'right' problem the first time? Why do they repeatedly spend time, money and resources treating symptoms, making only minor short-term improvements? The reasons are three-fold: organizational, procedural and technical.

Organizationally, a company's culture and politics can conspire to create an environment in which problem definition and analysis is given insufficient time, management support and cross-functional cooperation. Urgency and departmental narrow-mindedness cause individuals to solve the problem "as defined" as quickly as possible, and using only the resources and knowledge already at hand. This results in poor problem formulation and virtually assures that we will keep repeating strategies of the past, regardless of their applicability.

Procedurally, engineers often lack the disciplines needed to break through process inertia and approach a problem with fresh eyes, free from the myopic thinking caused by ingrained behaviors and too much deference paid to historical trends. And, technically, engineers lack the tools needed to effectively identify cause and effect relationships and narrow scope to the root causes.

Problem definition and analysis is classically performed through team brainstorming sessions to identify root causes. This often results in walls of Post-It® notes and complex Ishikawa-fishbone diagrams. The manual disciplines are hard to follow consistently; and the process is often at the mercy of dominant team member personalities.

IHS Engineering Solutions address these obstacles by providing proven problem-solving tools and methods for assuring that engineers are working on the *right* problems:

- Root Cause Analysis (RCA)
- Value Engineering, Function Modeling and Theory of Inventive Problem Solving (TRIZ)

Root Cause Analysis

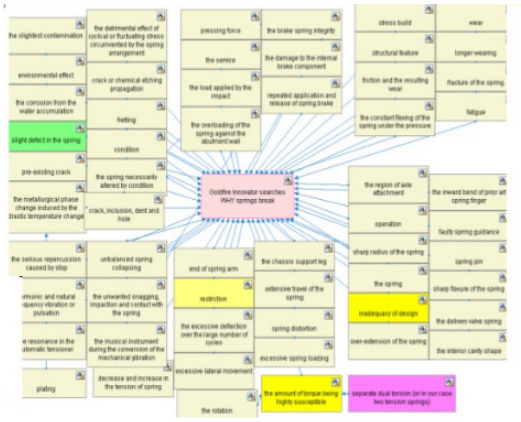
Root Cause Analysis (RCA) is a method of problem solving that aims to identify the root cause or source of a problem. A root cause is one that, once removed, prevents an undesirable event from recurring.

IHS Engineering Solutions use a 'Cause Formulation Guide' to ensure a thorough identification of events and conditions affecting the underlying problem or opportunity, and to properly sequence their cause-and-effect

"IHS Engineering Solutions replace a common problem-solving approach where engineers put their heads together and wait for a breakthrough. IHS eliminates the 'Eureka' method and elevates the concept of innovation into a very analytical process."

Global manufacturer of connectors and cables

relationships. The software then provides an auto-assist mechanism to help the user identify the minimum 'root causes' that need to be solved in order to resolve the symptomatic issue. This overcomes one of the shortcomings of manual fishbone diagramming – namely the difficulty in determining which causes are 'root' versus symptomatic.



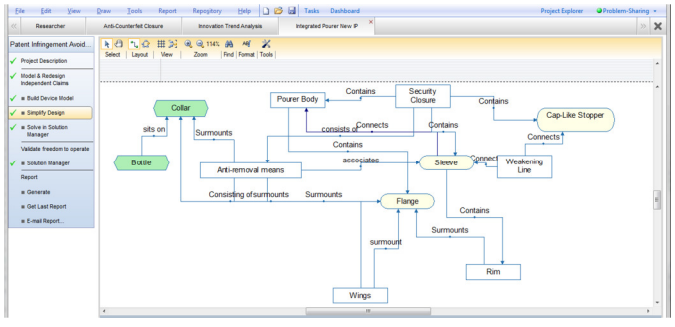
The complete analysis is captured in a persistent document to facilitate collaboration or future audit and review. As a further unique benefit, IHS Engineering Solutions automatically extract the description of each root cause and formulate it as a query into a set of user-defined knowledge bases – including technical websites and worldwide patent databases. Precise concepts relevant to the background and functional behavior of each root cause are automatically and immediately retrieved, thus further expediting a timely and effective solution.

TRIZ, Value Engineering and Function Modeling

Function modeling is another powerful problem definition and analysis capability provided integrated into IHS Engineering Solutions.

By automating the proven disciplines of Value-Engineering and TRIZ – both providing techniques and methods designed to improve the understanding of problems and increase the value of products/processes - function modeling provides a system representation that identifies the highest-value problem areas and the most effective points for introducing change.

How functions are identified determines the scope or range of solutions that can be considered. IHS Engineering Solutions make it easy to create a conceptual model of components and their functional interactions at a high level of abstraction. Through the process of sketching a simple model of the target product, process or system, the user is able to teach the software just enough about the system to be created or improved so that the software can then apply industry-standard (or user-defined) metrics to prioritize and/or justify problem areas, and suggest strategies for optimizing the design.



Through the metrics of Value-Engineering Analysis, IHS Engineering Solutions introduce measurability into the process of inventive problem solving. Such metrics – including quantitative analyses of system behavior - enhance the user's understanding of the problem, and of the positive and

“With production starting in just under 4 months, we needed to quickly find a solution to an urgent mechanical problem. Working with IHS, we were able to come up with a solution which incurred no additional tooling costs and avoided costly time-to-market delays. A patent has been filed for this new technology.”

Director Product

Engineering – Global Automotive Supplier

negative contributions of each component and function. The analyses guide the user to consider various strategies for innovative design or corrective action.

IHS Engineering Solutions reduce design cycles and rework costs, speed time-to-market, and improve ROI on technical investments and R&D.

Failure Modes & Effects Analysis (FMEA)

FMEA is a best-practice methodology for analyzing potential reliability problems early in the product or process development cycle when they are easier to correct. Integrated with Root Cause Analysis, IHS Engineering Solutions’ FMEA helps quality and reliability engineers ‘anticipate the unexpected’. The software’s FMEA capabilities provide support for standard Device FMEA and Process FMEA, helping engineers to automatically populate FMEA tables leveraging knowledge from prior FMEAs, patents and other technical content. As such, FMEAs can be completed more efficiently resulting in faster and higher quality product deliverables.

An FMEA project must begin with a clear understanding of what the system is intended to do, and what it should not do. Rarely is this design intent fully captured in a common language in a single point of reference. Function modeling capabilities integrated within IHS Engineering Solutions serve this purpose. The workflow interface captures essential interactions of each component by prompting for information related to system behavior. Then built-in Value Engineering formulas objectively evaluate and prioritize system functions, key product characteristics and critical-to-quality parameters. These function ranking formulas are easily customized to project specific criteria. The resulting device or process function model then automatically populates the FMEA Item/Component fields.

IHS Engineering Solutions leverage common sources of technical experience across the product lifecycle (such as warranty and field service reports, consumer and quality audit surveys, trade studies and tear-down reports) by semantically processing each sentence to understand, and then aggregate, related causes and effects into paired groups that are then stored in a Cause-Effect Experience Base. This Cause-Effect Experience Base provides users with an objective view of the categories of causes (and effects) across millions of events. The pick-list provides a bi-directional view of the Experience Base – given a Failure Mode, users can see both its causes and its effects. If desired, users can view the context of a cause-effect pair by clicking to retrieve source documents with the references highlighted.

By aggregating cause and effect experience from unlimited sources of digital content, including worldwide patents, IHS Engineering Solutions act as a virtual subject matter expert to accelerate problem resolution with comprehensive, cross-domain insights.

Precise delivery of concepts that are relevant answers to FMEAs’ most difficult questions facilitates reuse of corporate intellectual assets and extends the scope of insights well beyond current disciplines and industries, all while reducing reliance on critical subject matter experts.

IDEA GENERATION & THINKING OUT OF THE BOX

"We identified over 25 new concepts and approaches to improving the processes for manufacturing our products. We were dealing with some long term problems that had proven difficult to solve. Three of these solutions are currently under patent application review."

VP Design Engineering – Global Packaging Company

Defining the problem space and focusing one's efforts on 'root' or highest priority areas is just the first step in accelerating problem solving. Engineers will also need to think inventively and leverage available knowledge.

Even bright people are challenged to think about a problem in a new and fresh way. Thinking becomes a habit – particularly when applied to the same field of expertise day in and day out – and habits are hard to break. That's why the term 'psychological inertia' is used to describe the inherent constraint that inhibits people from thinking out-of-the-box. Besides this psychological inhibition, there is also the simple reality that one's vision is limited to the knowledge that's accessible and experience we have accumulated. These powerful barriers explain why the question "How to come up with good ideas?" remains the greatest challenge to delivering innovation in a timely, predictable and repeatable fashion.

Traditionally organizations have relied on team sessions using brainstorming, mind-mapping, lateral thinking or other psychological techniques to stimulate creative ideas. These techniques are highly unpredictable and fail to deliver the needed quality or quantity of ideas within the desired timeframe.

IHS Engineering Solutions provide an alternative – automated methods that consistently and predictably stimulate high-quality idea generation. This is accomplished through a combination of process-driven methodologies and access to relevant internal and external knowledge. This combination of tools and content stimulates paradigm-shifting modes of thinking.

Contact IHS to learn more

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ABOUT IHS

IHS is a global information company with world-class experts in the pivotal areas shaping today's business landscape: energy, economics, geopolitical risk, sustainability and supply chain management. We employ more than 8,000 people in more than 31 countries around the world.