



Challenges of Multidisciplinary Issues in Litigation Technical Investigations

The increasing use of engineered materials such as plastics and composites in aircraft, automobiles, structures, building materials for floors and facades, spray foam insulation, and consumer products introduces multidisciplinary issues into technical investigations to establish the cause and origin of accidents and failures. Multidisciplinary issues are also encountered in chemical processes such as are used in water treatment, pharmaceutical and chemical manufacturing, and materials fabrication.

Multidisciplinary issues arise in these sectors because investigation of failures involving advanced (generally non-metallic) materials - such as composites, ceramics, and plastics - requires simultaneous consideration of structural loading relative to the design of the material and of the chemistry and processing used to make the material, which is a far more demanding situation requiring a different type of expert than a typical metallurgical investigation. The properties of metals are isotropic (i.e. non-directional) and this allows the selection of a metal to be independent of the design of the structure or part as long as the metal has the required properties. In contrast, the properties of non-metallic materials can often be designed to be highly anisotropic to provide superior performance or to reduce weight, in which case the fabrication of the material has to be considered as part of the design process of the structure or part. Also, a highly advantageous aspect of advanced materials is that their fabrication and installation can be merged into a single step, but this moves the factory to a home or jobsite and places a highly technical chemical process in the hands of untrained workers. Investigating an accident or failure in these situations requires simultaneous investigation of the design of the structure or part, the design of the material, and the chemistry of the materials fabrication process.

This type of investigation is different than one in which a material is selected for a design based on well-established and readily available generic properties, in which case the design and fabrication of the material can usually be ignored and only its selection based on its properties needs to be considered. The use of materials with anisotropic properties and the use of materials whose fabrication is merged into the installation process requires either use of multiple experts or the use of an expert with broader knowledge and experience than has typically been the case in litigation situations.

Multiple Experts or a Different Type of Expert with Broad Knowledge?

An obvious approach to investigating multidisciplinary issues is to employ multiple experts, one covering each domain of knowledge and experience needed. This approach allows the use of experts you already know and may have used in the past, but this approach also has important limitations, the most limiting of which is that someone has to handle the interface between the different disciplines. Another limitation is that someone would have to coordinate the work of the individual experts to ensure that the investigation covers all aspects of the accident or failure, but experts are expected to work independently and not have the scope of their work

Where do Multidisciplinary Technical Issues Arise?

Multidisciplinary technical issues arise when structural and mechanical performance depends on chemical factors that are unique to the situation under investigation.

- Composite aircraft skins, spars, and control surfaces.
- Helicopter blades.
- Building and roadway structures involving concrete, EFIS, composites, asphalt, chip seal, spray foams, FGRC.
- Wood laminates such as are used in flooring, trusses, and decorative structures.
- Building science issues such as moisture transport.
- Corrosion and failure of equipment used in chemical processes; corrosion of aircraft structures; corrosion in any situation where the chemical compatibility or the environment are an issue.
- Installation processes into which materials fabrication has been integrated.
- Friction, wear, and lubrication of surfaces moving relative to each other (tribology).
- Gas transmission, distribution, and utilization.
- Water treatment processes.
- Chemical processes.



channeled by someone else. The multiple experts would likely have to rely on data and analyses developed by each other, which poses substantial challenges to the independence of each expert’s investigation and to coordinating the timing of each expert’s investigation. Using multiple narrow experts makes an attorney a technical project manager, which is a demanding role for which they may have no training. Multiple experts testifying in narrow domains may also cause confusion and appear to be contradicting each other even if they are not. Importantly, but not readily apparent, is that the use of multiple experts precludes or severely limits the use of analytics to discover trends and insight in data that contains uncertainty and that is contaminated by unrelated factors and in datasets that are so large that it is hard to find trends and insight.

Litigation Technical Investigations Powered by Science & Analytics

Litigation technical investigations powered by science & analytics will differ in meaningful ways. The data that is available from an accident or failure is often limited in what it measures and in how often it is acquired, and it will likely be influenced by factors that involve the different disciplines that underlie the failure. An expert with broad knowledge can apply data mining techniques to uncover trends in the data and to identify which portions of data (such as data samples collected over time) are similar and which are different, which can help identify changes in the state of a complex system. An expert with broad knowledge can also augment the data that is available with data derived from models built on the scientific principles that underlie the accident or failure. Thermodynamics might be used to estimate chemical stability or corrosion susceptibility; chemical kinetics might be used to estimate evaporation rates, corrosion rates, or the rate of developing adhesion; chemical bonding might be used to estimate the strength of materials, their susceptibility to aging and attack by the environment, and their strength under loading and impact. Data estimated from models can also be used to fill gaps in the data that is available and to identify the scientific processes that are reflected in the data. Data estimated from models can also be compared to the available data to validate the models and to test hypotheses of the cause and origin of an accident or failure.

The cause and origin of accidents and failure involving multidisciplinary issues usually cut across the underlying disciplines and thus require a multidisciplinary perspective. Technical investigations of multidisciplinary issues by experts with broad knowledge and experience will produce results that are much easier to understand because the results will be related to the full spectrum of issues involved in the accident or failure and can be understood in the context of the accident or failure. Understanding narrow, isolated aspects of an accident or failure can be far more difficult because the context of the accident or failure is lost. This can be especially difficult for people who do not have technical training.

<p>Our gatekeeper approach provides:</p> <ul style="list-style-type: none"> ✓ <i>The quickest and best possible outcome.</i> ✓ <i>A unique opportunity for early resolution based on knowing 60% to 80% of what might ultimately be uncovered.</i> ✓ <i>Superior technical insight for even complex and multidisciplinary issues.</i> ✓ <i>A reliable basis for expert testimony that meets rules for admissibility established by the Supreme Court.</i> ✓ <i>A strategic advantage with corporate clients since they already appreciate that this approach improves outcomes and lowers costs through use of all existing knowledge and elimination of duplication.</i> 	<p>Our gatekeeper approach uses information research and analytics early in technically related cases and establishes the key MAKE OR BREAK technical issues and everything that is known about them. This approach requires someone who has the extensive experience with both contemporary R&D methods and litigation-related expert witness investigations so as to adapt the corporate R&D technical investigation process to the unique aspects of litigation expert witness investigations. Our experience to do this is reflected in our process to bring litigators the R&D technical investigation techniques that have revolutionized industrial R&D, providing litigators with the better outcomes and lower costs that industry has achieved in overcoming similar investigation challenges.</p>		
	<table border="1" style="width: 100%;"> <tr> <td data-bbox="529 1566 992 1923"> <p>1. Define the Technical Issues – Inspections, insight from litigation parties, and broad literature searching are conducted to gather information from prior related cases, trade association publications, patents, manufacturer’s marketing materials and reports, and Internet forums to establish the key technical issues.</p> <p>2. Use Analytics to Establish What is Known About the Technical Issues – The data gathered above is analyzed using contemporary tools for data mining and modeling to adapt the available data and fill the gaps that always exist in litigation investigations.</p> </td> <td data-bbox="992 1566 1490 1923"> <p>(3) Reliably Define the Testing Needed – The data that has been collected and analysis that has been done ensures that: existing knowledge is not recreated, the remaining work is properly focused, and all involved parties understand the challenges, methods, and progress.</p> <p>(4) Coordinate, Oversee, and Effectively Communicate – This approach ensures that the overarching technical concepts are effectively framed and communicated, and it eases report preparation. The results are well supported, clear, and compelling even to people not knowledgeable of science and engineering.</p> </td> </tr> </table>	<p>1. Define the Technical Issues – Inspections, insight from litigation parties, and broad literature searching are conducted to gather information from prior related cases, trade association publications, patents, manufacturer’s marketing materials and reports, and Internet forums to establish the key technical issues.</p> <p>2. Use Analytics to Establish What is Known About the Technical Issues – The data gathered above is analyzed using contemporary tools for data mining and modeling to adapt the available data and fill the gaps that always exist in litigation investigations.</p>	<p>(3) Reliably Define the Testing Needed – The data that has been collected and analysis that has been done ensures that: existing knowledge is not recreated, the remaining work is properly focused, and all involved parties understand the challenges, methods, and progress.</p> <p>(4) Coordinate, Oversee, and Effectively Communicate – This approach ensures that the overarching technical concepts are effectively framed and communicated, and it eases report preparation. The results are well supported, clear, and compelling even to people not knowledgeable of science and engineering.</p>
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