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An Incomprehensible Event

It is a rare event that truly reverberates around the world. Geopolitical and financial developments, military actions, earthquakes, tsunamis, and other large-scale natural or man-made calamities are the usual things capable of attracting global attention. One fairly recent legal development has attracted the attention of the entire scientific community and the instrumentation and measurement

community possibly more than many others. This event had its origins in an earthquake which struck L'Aquila, Italy, on 6 April 2009. The loss of life and property was considerable, regrettable, and unfortunate. The consequences of a recent legal decision arising from the L'Aquila earthquake are, for most of us involved in the sciences, almost incomprehensible.

Most *Magazine* readers are aware that on 22 October 2012, an Italian court handed down a decision finding six scientists and one government official (the former deputy head of Italy's civil protection agency) guilty of manslaughter. Each defendant was given a six-year sentence for purportedly providing incomplete information about the potential danger of the tremors detected prior to the major earthquake. While this trial's result is known with certainty, the reasoning behind the verdict is a matter of concern and intense speculation.

Responses to the guilty verdict and the associated sentences have been widely varied. Some writers immediately invoked the image of Galileo Galilei before the Inquisition, others insisted the verdict reflects and punishes political manipulation of the scientific message, and yet another claimed the verdict reflects not bad science but "a failure of science communication." This lack of uniform understanding is evident in even a small sample of articles released shortly after the verdict was handed down [1]–[4]. Many gallons of ink have been consumed since then, and without a doubt, a good deal more will be consumed in the months to come.

The Instrumentation and Measurement community is well aware that measurement and interpretation are two very different things. The *Magazine's* Editor-in-Chief is aware of no suggestion that the various measurements made before the L'Aquila earthquake were in any way at fault. The question then remains: what is it about the interpretation of the available data or, as some writers suggested, the communication of the findings that compelled a sentence of manslaughter? The ability to predict the time, place, and severity of an earthquake is acknowledged to be an extraordinarily difficult and inexact task. Why, then, was the sentence so severe?

The I&M Society is truly international in scope, and we are fortunate to have a number of Italian colleagues who, in turn, have access to other well-informed colleagues in other disciplines. Many readers will remember the excellent article on forensic

metrology which appeared in the February 2013 issue of the *Magazine*. One of the authors of that article, Veronica Scotti, is an Italian attorney who spends a good deal of time on engineering-related legal issues. She has indicated that in Italian law, there are "...two steps in a trial; the sentence that inflicts punishment is issued at the end of the trial. Then, after 90 days (this is a deadline) the motivations are lodged and made public." Veronica has agreed to read the motivations document when it is made public, and she will then prepare an article for the *Magazine* to explore the thought processes behind the verdict and explain those points of Italian law that are at issue.

This will be no small effort, for she indicates these motivations documents are often hundreds of pages long. It is fair to assume that a case having the notoriety and scope of the L'Aquila decision will be carefully and thoroughly explained by the judge. We are fortunate to have a capable attorney and author prepared to guide us through the legal reasoning behind a decision that, superficially, appears to punish individuals for making an inaccurate prediction. I find myself thinking – or possibly simply hoping – that the decision cannot possibly hinge on the matter of an inaccurate prediction, for we all know only too well that inaccurate predictions, inaccurate calculations, or inaccurate measurements are risks we all face in the sciences. Infallibility is a very high standard indeed, and I am sure many of us nurture the hope there is more to this decision than meets the eye. We will publish Veronica's article as soon

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[12] A. S. W. Tan, "Machine condition monitoring technique used to detect the failure of rolling element bearings for ISMECA machines in manufacturing line," *Engineering e-transaction*, [Online] Available: <http://ejum.fsktm.um.edu.my/ArticleInformation.aspx?ArticleID=884>.

Iñigo Bediaga (ibediaga@ideko.es) achieved the Industrial Engineering degree at University of Deusto and the PhD degree from the University of the Basque Country with the thesis "Regenerative Chatter Suppression through Spindle Speed Variation Strategy." He started working with IK4-IDEKO in 2003 and is currently a Project Leader in the Dynamics and Control Engineering Department. His research work is related to machine-tool chatter and machine condition monitoring.

Xabier Mendizabal received a Dipl. Eng. from EPFL and has worked at SORALUCE S. Coop. since 1997. The company focuses its activity in the design and manufacturing of medium to large milling and boring machines. Over the last ten years, he has worked as the chief engineer for the milling head design. Currently, he is responsible for mechanical design in the R&D department.

Aitor Arnaiz received a M.Sc. degree in Applied Artificial Intelligence from Aberdeen University and a Ph.D. from Sunderland University with the thesis "Development of Artificial Intelligence Technologies to support automation of condition monitoring tasks." He began at IK4-TEKNIKER in 1991 and is now the head of the Intelligent Information Systems unit. He has participated in and led more than fifteen international projects. During the last five years, he has also been the head of the Diagnostics and Prediction Unit and is responsible for the research line in maintenance and reliability at TEKNIKER.

Jokin Muñoz received a Mechanical Engineering degree from the University of Navarra. He joined IK4-IDEKO in 1999, and he has been working in the design of machine-tool structures assisted by FEM and in the resolution of vibration problems in machine tools. In 2007, he received a PhD degree from Mondragon University. He has taken part in SMARTOOL and DYNXPERS European projects in the field of eliminating chatter vibrations with active damping devices. His fields of interest are machine-tool chatter, Mechatronics, cutting force modeling, modal analysis and FEM modeling of machine-tool structures.

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as possible, although it most likely will be mid-year 2013 at the earliest.

We now depart from promises of future material to consider the present issue of the *Magazine*. The April issue contains six articles with a variety of topics, details of the I²MTC venue, and several regular columns. José Rivera Mejía and colleagues give numerical examples of techniques to linearize reconfigurable sensors; Iñigo Bediaga and colleagues present two articles dealing with ball bearing damage detection; Keijo Ruotsalainen and colleagues discuss a wireless system for continuous vehicle vibration measurements; Wei Fu, et al. discuss 60 GHz indoor channel measurements; and Krzysztof Duda and Tomasz Zieliński present a tutorial of frequency and damping estimation methods with examples in MATLAB code. As always, it is our intention to present material that

will inform you about technology, report the behind-the-scenes business, educational, publishing, and planning activities of the I&M Society, inform members about new devices and instruments, and present new conference and workshop opportunities for personal and professional development. We hope you will find this issue to be useful and enjoyable. Happy reading!

More later,



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References

- [1] N. Nosengo, "L'Aquila verdict row grows," 30 Oct. 2012, [Online] Available: <http://www.nature.com/newes/l-aquila-verdict-row-grows-1.11683>.

- [2] D. Murphy, "Earthquake predictions and triumph of scientific illiteracy in an Italian court," 22 Oct. 2012, [Online] Available: <http://www.csmonitor.com/World/Backchannels/2012/1022/Earthquake-predictions-and-a-triumph-of-scientific-illiteracy-in-an-Italian-court-video>.
- [3] D. Ropeik, "The L'Aquila verdict: A judgment not against science, but against a failure of science communication," 22 Oct. 2012, [Online] Available: <http://blogs.scientificamerican.com/guest-blog/2012/10/22/the-aquila-verdict-a-judgement-not-against-science-but-against-a-failure-of-science-communication/>.
- [4] T. Kingston, "L'Aquila's earthquake-scarred streets see battle between science and politics," 27 Oct. 2012, [Online] Available: <http://www.guardian.co.uk/world/2012/oct/27/laquila-earthquake-battle-science-politics>.