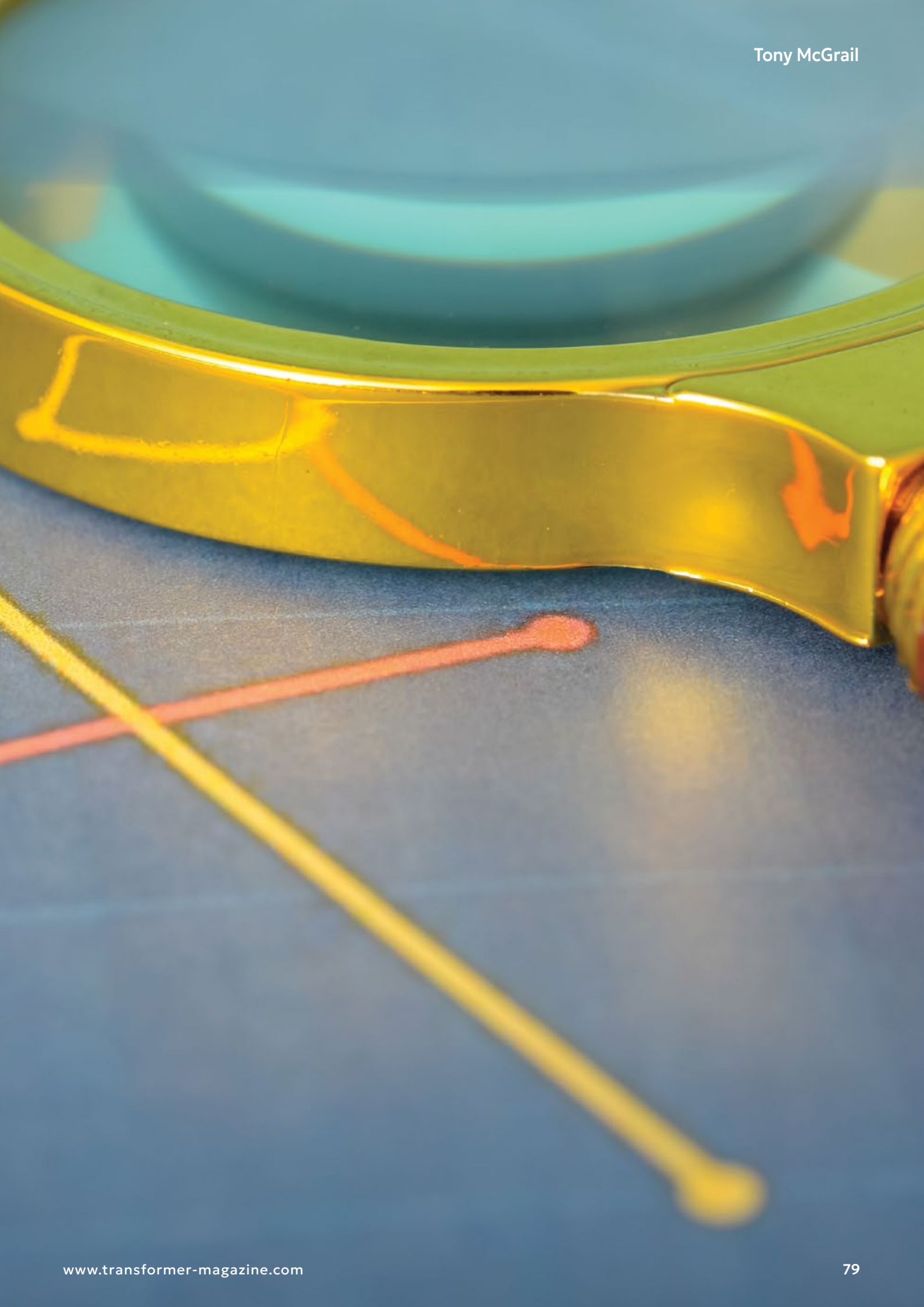




Spurious correlations...



A gentleman by the name of Tyler Vigen [1] started a website identifying correlations in apparently unrelated data, with just one early example from thousands available shown in Figure 1. He does state that the effort was for “fun first”, and “mildly educational” second.

AI explanation

Perhaps as people used less margarine, they became less slippery in their relationships. The lack of artificial spread may have kept the couples from buttering each other up, leading to a decrease in overall marital strife. That’s the reality when you can’t believe it’s not butter - it’s a recipe for marital success. Alternatively, it could be that as the margarine consumption decreased, so did the overall slickness in the state, leading to fewer instances of partners feeling like they couldn’t grip the marriage.

Looking at Figure 1, can we come up with a causal link between, bedsheet entanglement and nuclear power generation in billions of kW-hours? Could we make up such a causal link? Tyler Vigen’s latest website does just that using Large Language Models (LLM) AI tools to generate an explanation of why the correlation for each pair of data sets is causal. The resulting explanations are usually comical, as per the “AI Explanation” text box.

Vigen also uses the AI to generate realistic looking technical research papers which are, in fact, bogus. Figure 2 shows a very strong correlation between margarine consumption in the US, and the divorce rate in the US State of Maine; the AI analysis to explain the assumed causal relation is given in the text box, and the bogus R&D paper in Figure 3. It all looks very convincing, until you examine the detail: is there really a “Journal of Culinary Chemistry and Sociological Studies”?

One famous relationship is the strong correlation between the number of people in the USA who drown each year, and the annual per capita consumption of ice cream in the USA [2]. Does ice cream

consumption lead to drowning? Likely not, but we do have a likely 3rd factor which causes both: warmer weather leads to more people swimming, and also leads to a rise in consumption of ice cream [2].

If you’re not too careful, you can “invest” a lot of time finding interesting and entertaining correlations.

Given that AI can be quite convincing in the information it provides, it can be difficult to argue with the output, but you have to check! Earlier this year the High Court in the UK told senior lawyers to take action as: “...dozens of fake case-law citations were put before the courts that were either completely fictitious or contained made-up passages.” And the lawyers who presented them had not checked the sources and data given by the AI [3]! This is not limited to the UK, with hundreds of similar cases occurring in the USA [4].

In our industry we see growing use of AI systems, sometimes embedded in a Digital Twin (DT), which is a virtual abstraction (a model) of real assets [5], or other Asset Performance Management (APM) tools. At the same time there is a

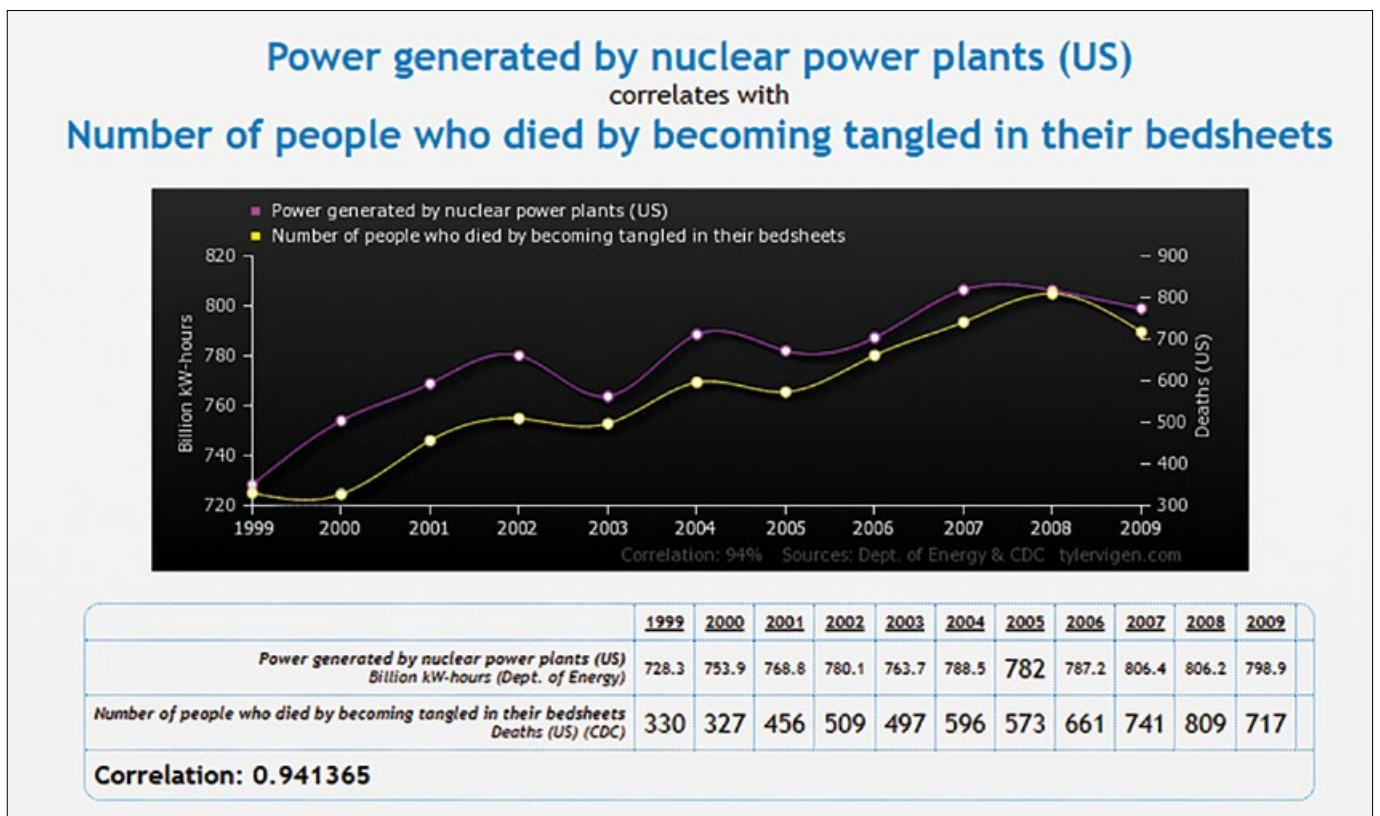


Figure 1. A strong correlation of 0.941365 (source: tylervigen.com)

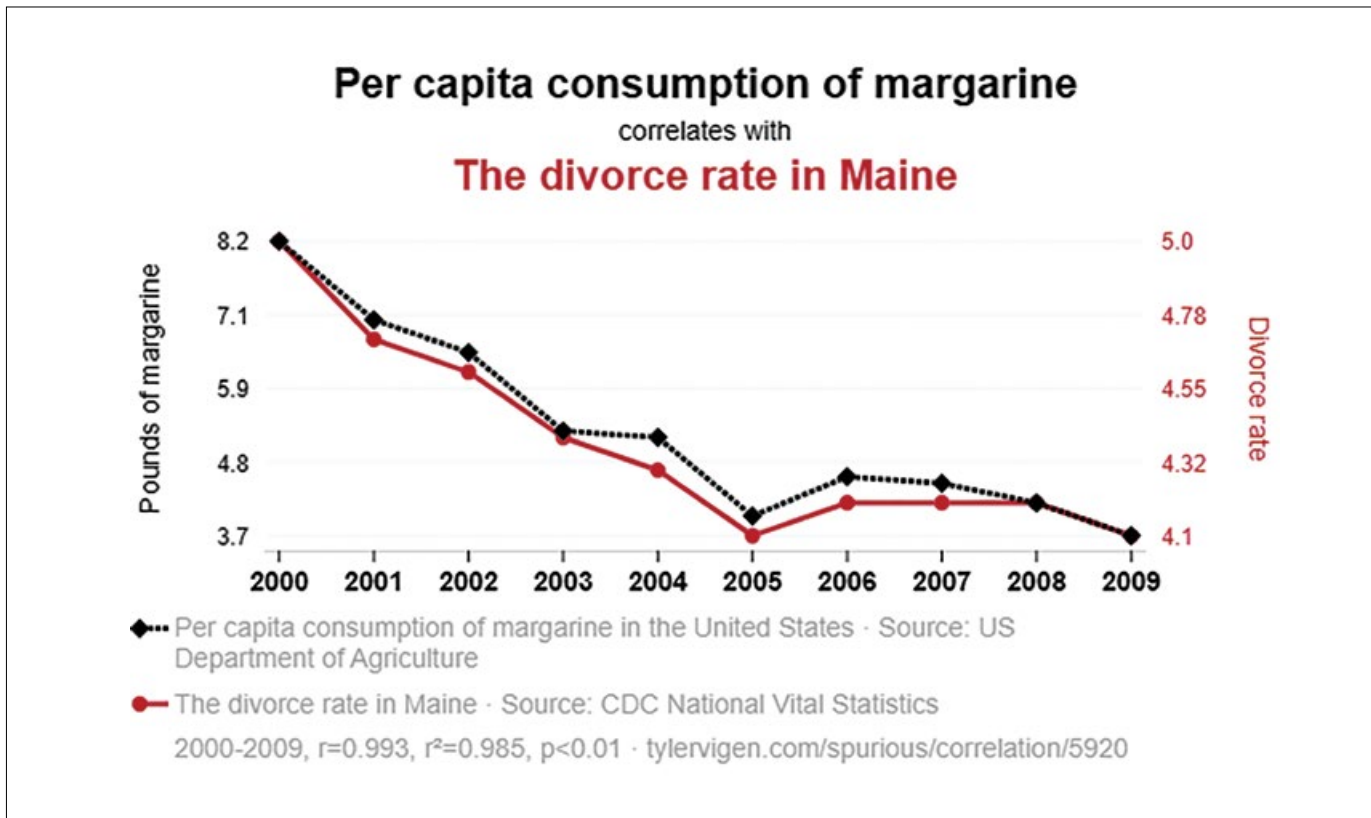


Figure 2. A strong correlation of 0.993 between margarine consumption and divorce rate (source: tylervigen.com)

growing skills shortage as identified in a T&D World article recently [6]:

"An IEEE study highlights a growing shortage of skilled engineers in the power sector, emphasizing the need for multidisciplinary expertise to support the shift to sustainable energy and the importance of industry-wide collaboration."

The article further noted:

"...450,000 to 1.5 million more power engineers will be needed by 2030, more than double today's workforce." and "... the industry does not just need more engineers;

Figure 2 shows a very strong correlation between margarine consumption in the US, and the divorce rate in the US State of Maine

it requires professionals with a broader range of technical and multidisciplinary skills."

Those "multidisciplinary skills" will include an ability to question data and information, and to communicate the urgency to decision makers.

It was Meredith Whittaker, founder of Google Open Research and current president of the Signal Foundation who noted that with AI, when it makes a determination (decision) [7]:

"there's an epistemic concern that we're trusting these determinations to systems

The Journal of Culinary Chemistry and Sociological Studies
Copyright 2024 by The Institute for Culinary and Sociological Studies
Spuriously published by Tyler Vigen

Vol. 267, No. 25, 2024
ISSN 2683-3862/10/\$43.00
PII S7446-8750(5920)6061-8

Spreading Love and Margarine: An Examination of the Butter-Splitter Correlation in Maine

Christopher Harris, Abigail Terry, Giselle P Truman

Cambridge, Massachusetts

Figure 3. A technical paper from the Journal of Culinary Chemistry and Sociological Studies

Given that AI can be quite convincing in the information it provides, it can be difficult to argue with the output, but you have to check

that will give a very confident, plausible-seeming answer... which we can't necessarily scrutinize as true or false, but they will have the power and authority of a final truth claim."

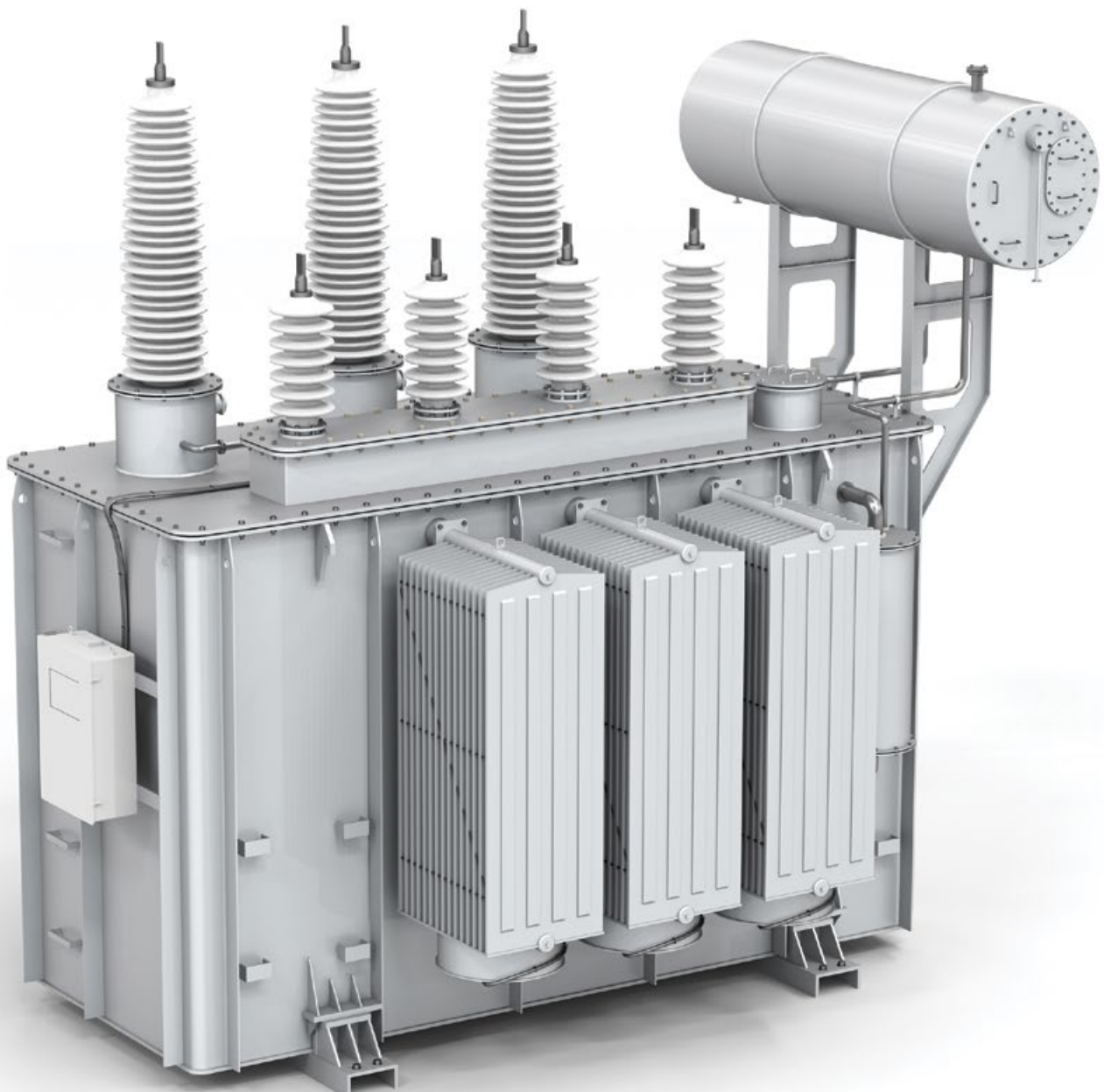
If we use a Digital Twin, we need to understand the limitations on the data supplied, the applicability of the algorithms and mathematical analyses, and be able to understand how the DT goes from data to a prediction or a status

or an output: we need a glass box, not a black box. DTs can be somewhat inscrutable, but it's worth remembering a line from Albert Einstein [8]:

"As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality."

Someone has to know what's going on. And if there is nobody in the organi-

zation who does, then we need to find someone who can and talk to them. I've been in the industry for some several years, but I still have contacts who I trust and will call on when I have a difficult problem – colleagues at Doble, certainly, but also people I've met and talked with at the annual International Conference of Doble Clients or the Doble Life of a Transformer (LOAT) Seminar and through IEEE and similar bodies. The sanity checks such folks can provide may be hugely valuable and, of course, there is a quid quo pro where I also get calls to discuss some convoluted test data or anomalous monitoring result or the details of a risk analysis calculation (it's usually the "edge cases" which cause concern!) But it's access to more than just data, more than just information, it's valuable knowledge and insights.





BTW: I do recommend not just attendance at events like the International Conference of Doble Clients, but participation: listen & learn, ask questions, share experiences, make contacts with some of the ~1500 people there. And bring the experiences back to share with colleagues at your organization.

And for those who wish to get very picky with statistics, there's an interesting discussion and slide-share by Aris Spanos which covers the various analyses performed [9].

With thanks to Richard Aguilar for his editing skills.

References

- [1] tylervigen.com
- [2] <https://www.scienceminded.org/post/ice-cream-linked-to-drowning>
- [3] <https://www.theguardian.com/technology/2025/jun/06/high-court-tells-uk-lawyers-to-urgently-stop-misuse-of-ai-in-legal-work>
- [4] <https://nypost.com/2025/11/12/business/lawyers-hit-with-fines-after-ai-flubs-fill-their-filings-they-should-be-ashamed/>

I do recommend not just attendance at events like the International Conference of Doble Clients, but participation

- [5] P. Picher et al, "Dynamic Thermal Digital Twin of Liquid-Immersed Power Transformer," *IEEE Access*, vol. 13, 2025
- [6] <https://www.tdworld.com/utility-business/news/55311234/global-study-warns-of-growing-engineering-talent-gap-in-energy-transition>
- [7] <https://www.wired.com/story/the-big-interview-podcast-meredith-whittaker-signal/>
- [8] <https://old.maa.org/press/periodicals/convergence/quotations-in-context-einstein>
- [9] <https://errorstatistics.com/2015/05/04/spurious-correlations-death-by-getting-tangled-in-bedsheets-and-the-consumption-of-cheese-aris-spanos/>

Authors



Dr. Tony McGrail of Doble Engineering Company provides condition, criticality, and risk analysis for substation owner/operators. Previously Dr. McGrail spent over 10 years with National Grid in the UK and the US as a Substation Equipment Specialist, with a focus on power transformers, circuit breakers, and integrated condition monitoring. Tony also took on the role of Substation Asset Manager to identify risks and opportunities for investment in an ageing infrastructure. Dr. McGrail is an IET Fellow, past-Chairman of the IET Council, a member of IEEE, ASTM, ISO, CIGRE, and IAM, and a contributor to SFRA and other standards.