

SPE Review London



The official e-magazine of the Society of Petroleum Engineers' London branch

The iceberg problem in business intelligence gathering

Also in this issue:

- ◎ C-Level talks: Adrian Southworth
- ◎ Contributions of computational intelligence to petroleum reservoir characterisation
- ◎ SPE YPs: Energy transition and new technologies
- ◎ SPE Imperial College Student Chapter
- ◎ London Net Zero: Financial sustainability



LETTER FROM THE CHAIR

LETTER FROM THE EDITOR

SPE Review London

The official e-magazine of the Society of Petroleum Engineers' London branch

ABOUT US

The Society of Petroleum Engineers (SPE) is a not-for-profit professional association whose members are engaged in energy resources, development and production. SPE is a non-profit professional society with more than 156,000 members in 154 countries, who participate in 203 sections and 383 student chapters. SPE's membership includes 72,000 student members. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry and provides services through its global events, publications, events, training courses and online resources at www.spe.org. SPE London section publishes SPE Review London, an online newsletter, 10 times a year, which is digitally sent to its 3000+ members. If you have read this issue and would like to join the SPE and receive your own copy of SPE Review London, as well as many other benefits – or you know a friend or colleague who would like to join – please visit www.spe.org for an application form.

The views expressed herein are not necessarily those of the SPE. Extracts may be reproduced subject to a clear acknowledgement of the source.

CONTACTS

Communications: spelondon@spemail.org

CHANGE OF ADDRESS?

Go to: <https://www.spe.org/member/access/MyAccount>

SPE encourages open and objective discussion of technical and professional subjects pertinent to the interests of the Society in its publications. Society publications shall contain no judgmental remarks or opinions as to the technical competence, personal character, or motivations of any individual, company, or group. Any material which, in the publisher's opinion, does not meet the standards for objectivity, pertinence, and professional tone will be returned to the contributor with a request for revision before publication.



In this issue

- 03 Behind the Scenes
- 04 Letter from the Chair
- 05 Letter from the Editor
- 06 News Digest
- 46 SPE London Board

FEATURES

- 07 C-Level talks: Adrian Southworth
- 10 SPE Imperial College Student Chapter activities
- 11 The iceberg problem in business intelligence
- 15 SPE YPs: Energy transition/ new technologies
- 16 Contributions of computational intelligence
- 21 Evolve and thrive with SPE
- 22 Financial sustainability

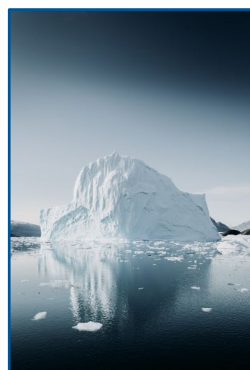


Photo by [Annie Spratt](#)

Share your experiences and stories online

<https://www.spe-london.org/>



Behind the Scenes: SPE Review Editorial Board



Elizaveta Poliakova, Editor in Chief

Elizaveta is a Reservoir Engineer at Trident Energy. She has an M.Sc in Petroleum Engineering from Imperial College London and a B.S. in Petroleum Engineering from the University of Leeds. Elizaveta has been with SPE for more than five years. She was the President of SPE Imperial College Chapter and the President of SPE Leeds Chapter. Previously, she was also on the committee of SPE YP.



Josh Beinke

Graduated from University of Adelaide in 2008 with a Petroleum Engineering degree. After several years with Chevron moved to Europe in 2016, now working as an Exploitation Engineer with Vermilion Energy.



Ffion Llwyd-Jones

Business editor and writer. Extensive experience in writing and editing (digital and print). International experience in technology, health, and the environment.



Mark Beleski

Experienced engineer, with deep understanding of industry practices, trends and challenges. Energy Loss Adjuster with AqualisBraemar, in London.



Shalom Amakhabi, Editorial volunteer

MSc Petroleum Engineering student (Imperial College London); BEng in Petroleum and Gas Engineering from Nile University of Nigeria. SPE member 5+ years, and membership chairperson for the SPE Nile University of Nigeria student Chapter.

A big Thank You! to all the organisations that support the SPE London section



Letter from the SPE London Chair



Dear SPE London members and colleagues,

The recent months are putting the energy industry to the forefront of news. Our mission of sharing technical knowledge is as important as ever, and I would like to thank all the volunteers and members that allow that to happen. I would like to bring your attention to a number of initiatives and events that you could value from or add value to yourself.

On the Technical Evening Lectures we have had two fantastic nights dedicated to the Energy Transition, Geothermal Energy and Innovations in Drilling. I expressed our intention to move to a Hybrid setting, however, both of the events have been conducted fully online due to covid restrictions resurfacing and low attendance. We have sought your feedback and it is clear to us that for this material, online setting to give the most value to our members - as such we will continue online till the end of the current session. Thank you all for sending your thoughts - it is extremely valuable for our decision process. Additionally, thanks to the Communication Committee - majority of our events are hosted on YouTube. You can find them by searching for "SPE London" channel - hopefully that would allow you to catch up on an event you have missed or reflect upon the information at a later date.

We will continue to work on an alternative for the networking opportunities in another form.

As a section we have co-organised and as members took part in the GeoHackathon organised jointly by European SPE Sections. It was a great opportunity to gain new digital skills to the engineering toolkit that we wield. In aftermath of that, one of our Volunteers Raghd Gadrboh has proposed a Digital Transformation Committee to permanently embed a digital aspect into our SPE Section offering. She is still looking for volunteers to help her build and sustain that offer. I would search our LinkedIn page and get in contact with Raghd if you would like to be part of that effort - I am very excited to see what the new Digital Transformation Committee brings in terms of new events and workshops.

Finally, I would like to bring focus to the work that the Young Professional Committee and Student Chapter officers are doing. On the YP front, I would encourage you to explore their events in person or through the aforementioned Youtube Channel - they continue to deliver high quality presentations and workshops that will allow you to explore new ideas and skills, that you might not be currently familiar with - such as the recent Introduction to Well Modelling Workshop. On the Student front, SPE Student Chapters are facing one of the most difficult years through a combination of covid impact, industrial downturn and changing perceptions - I would like to thank all the Student volunteers for their continues work to sustain the Student Chapters through activities, recruitment and running the "invisible" admin associated with that!

Our Section is dedicated to providing value to the membership! Thank you for attending our events and please feel free to share with us your thoughts post events or through social interactions. As volunteers our focus is to bring value to our fellow members.

Kind Regards,

Adam Zalewski, SPE London Section Chair





Letter from the Editor

Dear SPE Readers and Colleagues,

Welcome to the first SPE London Review of 2022. We hope you had a lovely winter break!

As the United Kingdom is slowly removing all Covid-19 restrictions, we are moving to the new 'normal'. At the same time, crude Oil Brent prices have passed 100\$/bbl, a high which it only previously reached in 2008 and in 2011-2014.

In this publication, on **page 07**, Adrian Southworth, who founded Oleum Ventures and has experience in the Oil Industry of over 35 years. He is also the past Chair of SPE London.

On **page 10** and **page 15**, SPE Imperial and SPE YPs respectively have shared their Chapters updates and recent events with us.

Manish Verma, Dominic Launder and Balasubramanian Chandrasekaran shared their latest article 'The iceberg problem in business intelligence gathering' on **page 11**.

On **page 16**, you will find an article 'Contributions of computational intelligence to petroleum reservoir characterisation' from Fatai Anifowose.

Last but not least, please refer to **page 22**, for our eighth article from SPE London Net Zero committee, by Adrian Gregory, on 'Financial Sustainability – responsible investment through sustainable financial institutions'.

I would like to thank our Editorial Team for the support, ideas and advice!
We hope you enjoy this edition.

Sincerely Yours,
Elizaveta Poliakova

[Click here to access past issues of the SPE Review London!](#)





Offshore green hydrogen development project collaboration between Neptune Energy and RWE

Both companies signed an agreement to develop a green hydrogen project 'H2opZee', which is expected to be demonstrated with an electrolyser of 300-500 MW capacity at the Dutch North Sea to produce green hydrogen using offshore wind. Existing offshore pipelines with 10-12 GW capacity will be used to transport the hydrogen produced.

[Read more](#)

Energy prices surge amid invasion tension

With the escalating tension between Ukraine and Russia, energy markets have been unstable with Brent oil prices heading towards \$100 per barrel.

Possible sanctions could disrupt energy flows, which will further increase gas prices. Currently, there is an 8.4% increase in the Dutch gas futures, 6.6% increase in German Power and a rise of 7.9% in European coal because of the current tensions.

[Read more](#)

CCUS subsea injection venture projects by Aker Solutions and Dril-Quip

A collaborative agreement between the subsidiaries of Aker Solutions and Dril-Quip will provide subsea injection systems, which is the infrastructure needed to aid CCUS projects.

Dril-Quip will provide the technology designed for CO₂ injection while Aker Solutions will provide associated control systems, electrification components, etc.

[Read more](#)



Oil (Brent) 98.43 -0.09 (+0.09%) – 28/02/2022 (Credit: Market Insider)

MoU between Aker Carbon Capture and Northern Lights

Through the non-exclusive MoU, the two companies plan to cover the full value chain of carbon capture and storage (CCS) standardise ship-shore interfaces, and optimise logistics.

This agreement provides industrial emitters with access to full services at favourable locations for using Aker's carbon capture technology and Northern Lights' CO₂ transport and storage capabilities.

[Read more](#)

Opportunities, purpose, diversity... and fun!



Adrian Southworth is a Chartered Petroleum/Reservoir Engineer with more than 35 years of oil & gas industry experience gained with a major integrated oil & gas company, and in consulting to oil & gas companies in the UK and internationally. He is the Technical Director at OGL-Geothermal.

Adrian's background includes technical and leadership positions covering petroleum, reservoir, and operations within the gas value chain from exploration and appraisal through to asset management.

Who is Adrian Southworth? Tell us about yourself.

I've been in the oil and gas industry since 1977 when I first started working with bp as a drilling engineer straight out of university when the North Sea was in its infancy. By chance, I ended up working for bp as they had such demand for engineers. At that time, the civil engineering industry was in a decline due to the current recession, so it was difficult for new graduates to get opportunities. I was lucky the oil industry within the UK was booming and was looking for engineering talent.

Since then, I've never looked back, although I haven't done any civil engineering – it's been drilling engineering or subsurface engineering, reservoir petroleum, production facilities. It's allowed me to visit different parts of the world, a fantastic opportunity and something I was keen on doing. I'm from a working-class family in a shipyard town. I had no interest in going into the shipyard, so the international feel of the oil and gas industry suited me. I'm married, with two children, a dog and two cats, and working with a group of ex-oil and -gas people in the revitalized geothermal space. This business opportunity is in its infancy, in terms of our business and in the geothermal world.

My lifelong interests in engineering and science are so diverse, and I'm keen on younger people coming into engineering and technology. There's so much going on in terms of technical development, new tools, new ways to communicate and design. When I was at university, we used punch cards to do any computer coding – that concept is now a museum piece. The speed of development in teaching engineering and science is so different now. It's a fascinating evolution.

You studied Civil Engineering and started your career as Senior Petroleum Engineer Unconventional Exploration & Development with

bp. Tell us about your time with bp and the changes you saw during those 14 years.

Well, those years were a bit of a bp sandwich, with bp as bread and the consulting work as the filling. Sometimes, it was a really nice filling, and other times it was pretty meagre.

I started with bp in 1977, which sounds a desperately long time ago! It was an analogue age, practical and hands-on. I went straight offshore to the Forties Oil Field, doing stuff I never dreamed of doing. The oil and gas industry was new to me, and the bp culture was such that I met people from different backgrounds, different countries. It was a steep learning curve in personal and technical development. I was thrust into that environment and expected to make something of it. It's a testing environment to be flown 130 miles offshore in a helicopter and then dumped on this place where you're meant to be for two weeks – but you get fogged in, and suddenly you're there for three weeks. It was a case of just getting on with it. So I stayed with bp doing drilling engineering, then moved into petroleum and travelled to the Middle East and to Europe on short assignments. I stayed with bp until the late 1980s when I felt it was time for a change, so I consulted for about 11 years. Then I was invited back to bp as I'd worked with them as a consultant in the southern North Sea for a couple of years. I spent the rest of the time with bp in Aberdeen, the Middle East, and SE England.

You support education in STEM subjects with a special interest in the UK oil and gas sector. What advice would you give to young professionals starting their careers in Oil & Gas?

I took on a career-development function at a senior level within bp, and it was enlightening to see the available talent – the quality of that youthful talent still astounds me. I enjoyed helping them, guiding



Opportunities, purpose, diversity... and fun!... continued

them, giving some advice. They didn't always have to take it, of course. It was just allowing them to feel they had someone to bounce off their career ideas. In the latter stage of my time at bp, there was a sense that a technical career can be rewarding in a financial sense rather than just going up the commercial ladder. My intake thought that was the only way to get on, but I think that has changed so that people who do the science and the tech can contribute as significantly to a business as people who manipulate the money side of things. I do have a slight concern that the word 'engineer' is used too widely and broadly, and doesn't convey the depth of respect you see elsewhere. If you go to Germany or the Middle East, for example, you'll see that being an engineer conveys a certain amount of respect – of course, with that status comes the legal and technical responsibilities. I hope that perspective could happen here in the UK. If we want to attract additional great talent into engineering, and the engineering status was perhaps similar to a medical doctor, it would help create a conveyor belt of talent. Maybe it's a contributing factor that people don't look at engineering necessarily as a first career of choice. That's just my perspective.

As a member of the SPE London Net Zero committee, what do you see as the major new challenges facing the industry as it navigates its way forward within the Energy Transition?

In 2022, it's an increasingly hard sell. Petroleum engineering courses are diminishing: our SPE student population is diminishing and it's the same in Europe. It's concerning that we have to be less focused on oil and gas and be more aware of the wider energy demands and opportunities. Oil and gas provide energy and will be needed for many years. It can be challenging to get that message across while also trying to find a balance between responsible extraction of the raw materials that are in demand for everyday life. My approach to the younger generation is that it's not just about oil and gas, rather it's about energy. So let's talk about energy, including wind, solar, and geothermal, and tackling a problem from an engineering point of view through innovation, finding a solution to a problem. It's more of a rounded conversation rather than the specific

conversation that you would've had 10 years ago. Understanding the way the subsurface behaves would be equally relevant for geothermal energy production and carbon dioxide storage. The question is how do we utilise that understanding effectively and sustainably without causing too much damage? So that's the opportunity for young people to be part of technical engineering solutions.

The London section is trying to share that opportunity through its Net Zero committee and the Arkwright scholarship scheme, along with providing an understanding of SPE and its future. Trying to give an alternative dialogue to what may be in the media and the social networks, which can be one-sided. We'll still need oil in 2050. And probably gas, although maybe the hydrogen topic may be solved by then. They all have a role to play. That combination gives people the opportunity to develop different skills, rather than being focused on one industry or one segment of the industry. When I was growing up, the town I lived in was a working-class with one employer and one industry, as were many towns in the UK. So the opportunity to work remotely on different businesses is great. We should be supporting it, while also recognising it isn't everything. Whichever way you look at it, there will be winners and losers. I just hope there will be more winners.

We need to emphasise the value of engineering to a community – get to the core of what happens in the energy industry, for example, as it provides heat and light to people at a touch of a button, on-demand. To ensure that energy stays on-demand requires a huge amount of behind-the-scenes effort, and science and technology application behind the scenes that is generally invisible. I think making it more visible would be a good thing.

The best engineers are the ones that communicate what it is they're doing very well. You need to communicate that engineering detail to a wider public, or even to your peers, in a way that is engaging and doesn't turn people off because, otherwise, it's boring. It's a real talent to get people interested. You need those inspiring people to be visible. I was watching University Challenge recently and there was a young woman, a practicing civil/structural engineer, who led a team that was central to building the Shard building in London. She is also a strong advocate for Women in Engineering.



Opportunities, purpose, diversity... and fun!... *continued*

I thought, wow, what an opportunity – if you were a young professional watching that, might you be inspired to think what you could achieve? Wouldn't that be inspiring? That sort of promotion is missing, unfortunately. But we do our best. Communication is effective if you understand your audience.

As a past Chair of the London Section of SPE, what advice would give to the current Leading Team?

At SPE we hope to deliver material that resonates with our members, and is useful to them, helping expand technical knowledge and provide new insight into new energy. We need to be cognisant of succession at all levels, to keep the board fresh. The sense of delivering now, but also thinking about leaders in waiting, and identifying those people. It's difficult because we're a relatively small, volunteer-based organisation. It doesn't have the structure that you would find in a business. I would think deeply about how we make sure the board has a good balance of diversity. I think it does at the moment so we need to maintain that balance.

The upcoming energy price increases in the UK will be a shock. So, diversifying, broadening the energy supply into the UK is essential to get away from massive price spikes and their significant effect. I hope SPE can find a way to help with the energy poverty that might be coming people's way. We don't know how it's going to affect people and communities, but it doesn't sound good. I would hope we don't turn away from that. We should help people understand the science and technology of oil and gas and energy. We support students, we promote women in STEM, and try to ensure young professionals get a good grounding in learning and career development. Is this something we should be doing for society at large? Apart from telling them who we are and what we do, perhaps we need to be more tangible with outreach? We could be actively involved in decarbonising, such as planting trees. We also need to be aware that, while some members might be enjoying a renaissance in the oil and gas industry due to high prices, people in the community may suffer.

We need to find a way in which the SPE membership and the London section can help people and get positive feedback. We ought to be seen as helping society, not as people unintentionally damaging the climate.

You founded Oleum Ventures in 2016. What motivated your decision to start the company?

In 2016 there was a downturn within the oil and gas industry. I was part of that, but wanted to do something technical. I had ideas about the energy transition. We developed a great product in the new world of transition, helping companies monitor and understand their future emissions, and enabling them to provide evidence to either shareholders or regulators that they're making a positive impact. It's reducing their exposure to ESG threats.

The past 18 months have been taken up in developing the geothermal business, based largely on opportunities in Europe about extracting power, predominantly from very hot subsurface waters. It's a neat fit for oil and gas skills. You're dealing with stuff under the ground that you can't see, bringing it to the surface and processing it, to create energy. Most of my time with bp was about providing gas for power. That's not liquid, but predominantly for power. All the engineering skills needed for reservoir drilling (including well costs and different well integrity issues) are compatible skillsets, but with some subtle differences, and that's the intriguing bit. You're evolving your technical knowledge: although the basic approach is similar, the application of that knowledge is different, which keeps you interested, keeps you curious. It's important to develop your career, keep curious about new developments, different opportunities, different ways in which your skillset can be deployed. We've got geophysicists working for us and some other engineers and they're all: 'Wow, this is similar, but different'. It has a real purpose behind it.

Engineering is resilience, belief, and an understanding of fundamental technology, physics, and science, and getting it to work for you. It's that sort of thing with geothermal – we know what's going on. We can see it. We can imagine it. We've seen it. We need to get people behind us to believe that we are the people to do it and give us some money and support. I just want to get out there and do stuff. It's fun. There is opportunity, so you have to try your best within current constraints.

The engineering world of science and technology world is a great place, a wonderful playground for people to be involved in whether in energy or other forms of science.

Seminars, in-person activities, and go-karting!

The SPE Imperial College Student Chapter engages members and boosts networking opportunities through such diverse events as picnics, go-karting, weekly 5K runs. It has also hosting a series of industry-related seminars. In this update, the Chapter shares events from 2021 and plans for 2022.

For the upcoming year, the **SPE Imperial College Student Chapter** is thrilled to host a seminar series featuring engaging discussions from well-known professionals in the energy industry. The Chapter has also been busy organising several in-person activities to engage members and boost networking:

- ✿ A picnic in Hyde Park in November 2021 offered members a chance to relax and network.
- ✿ Following the easing of UK lockdowns – and to offer a break from the hectic London lifestyle – the Chapter launched an initiative inviting members to weekly 5K runs on the weekends, followed by a cafe rest to interact and recharge before the upcoming week.
- ✿ In February, the Chapter hosted an exciting activity at TeamSport Go Karting Docklands, which is the UK's longest indoor go-karting track.



More activities and events are planned with Chapter looking forward to meeting members.

Presentation: Global pricing of carbon transition risk

In February, Professor Marcin Kacperczyk presented a fascinating presentation on the Global pricing of carbon transition risk.

Professor Kacperczyk is an Imperial College London Professor of Finance with research interests in investments, information economics, climate risk, financial intermediation, and artificial intelligence. He highlighted the implications of the Global Net Neutrality Target on the topic of Climate Finance in this talk, which he co-authored with Patrick Bolton. He provided a detailed analysis of how investors' views and expectations about carbon risk, and thus market carbon premia, have changed over time. Participants from Imperial College London's community reacted enthusiastically to his presentation.

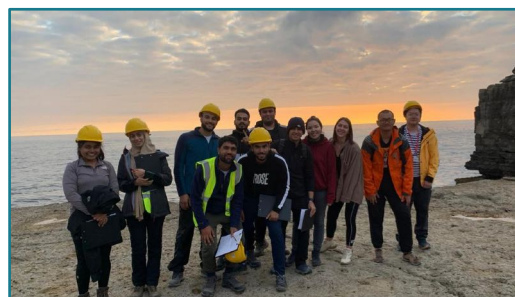
His research interests in climate finance include carbon risk pricing, portfolio manager incentives to divest carbon-intensive assets, and the role of international legislation and technological change in climate finance. For quite some time, global warming has been at the forefront of political and societal issues. Companies face transition risk because of their commitment to reducing carbon emissions. During the lecture, we addressed how transition risks are measured and what challenges exist today regarding carbon emissions. There are two types of risks:

- The long-term premium is unrelated to economic development, energy mix, or social environment, more related to domestic policy implementation.
- The short-term premium is related to technology risk and social environment, less so to policy implementation.

Consideration is also due to changing investor awareness, especially following the COP 21 Paris Agreement.

Upcoming lectures

In the coming weeks, we'll discuss various topics with some of the best professionals in the energy industry. Among many others, don't miss **Sylvain Thibeau's** (Expert - CO₂ Geological Storage at TotalEnergies) lecture on 'The role of pressure on CO₂ storage resources of saline aquifers', and **Zainab Titus's** (ICL PhD student) lecture on 'Neural networks for conditioning surface-based geological models and how that is relevant for reservoir simulations'.



All our seminars are open to members and free.

Follow us on [Instagram](#) and [LinkedIn](#) to stay up to speed on upcoming events.

The iceberg problem in business intelligence gathering



With significant advances in the field of storage and data science, a lot of companies are now focusing on industry buzzwords such as data science, analytics, machine learning, 3d visualization, modern ways of reporting and the like, to improve the way they do business.

This point of view attempts to articulate the challenges in implementing these modern ways of working and suggests a way forward to create solutions that will stand the test of time.

This article is co-authored by Manish Verma, Dominic Launder, and Balasubramanian Chandrasekaran from Infosys Consulting.

Context

Companies are increasingly looking to use modern technologies in Industry Revolution 4.0 to bring more information to the surface to improve the way they do business. Many companies believe that creating information visualisation solutions will allow users to find value locked within their data, which will ultimately create value and help monetise the data. There has been a surge of new projects, cross-functional groups are coming together, and companies are getting excited about building these dashboards to provide data in a presentable and consumer-ready format to users. Companies are increasingly hiring data scientists to mine datasets, and business intelligence designers to craft innovative, visual, and good-looking dashboards with the intent of generating valuable insights to assist in decision making.

While these are all important and need to be done, companies must realize that visualisation and data science only work when what lies beneath (i.e. the data) is the right data, is available, cleansed, structured, and accessible. Companies that focus a lot on business intelligence gathering without fixing the underlying data-related issues would never be able to find the right answers. Apart from this companies also must understand who they are addressing when they create dashboards (i.e. the personas). A senior leadership persona may want something very different to what an operational user of the business intelligence data may want, and it is very important to distinguish this. Lastly, these solutions must be built such that they will stand the test of time and appropriate sustenance methods are in place.

Well designed and accurate business intelligence solutions are a game changer for any industry and any business can use these to make decisions to their competitive advantage.

The challenges – the iceberg problem

Many organisations tend to focus on what is 'visible' i.e. reporting tools, 3-D visualisation of the assets, data science outputs on small scale proof of concepts etc. (we refer to these as what is visible above the water in an iceberg and constitutes <10% of the actual problem).

However, organisations should instead focus more on the portion of the iceberg that is beneath the water, such as creating digital systems of record (and moving away from Excel), fixing data-quality issues and agreeing to data standards and implementing them in the organisation, data-integrity issues, ensuring governance of data, have a clear master data-management strategy, clear data ownership, uniformity in the way the data is interpreted and visualised consistently throughout the organisation, build dashboards fit for purpose, have a clear roadmap for sustaining the dashboards, and lastly, easy accessibility to this data.

The iceberg is an effective analogy for this problem – the visible layer constitutes only 10% of the overall size of the problem, and what lies beneath often gets overlooked, causing organisations to miss what it really takes to tackle this problem.



The iceberg problem ... continued

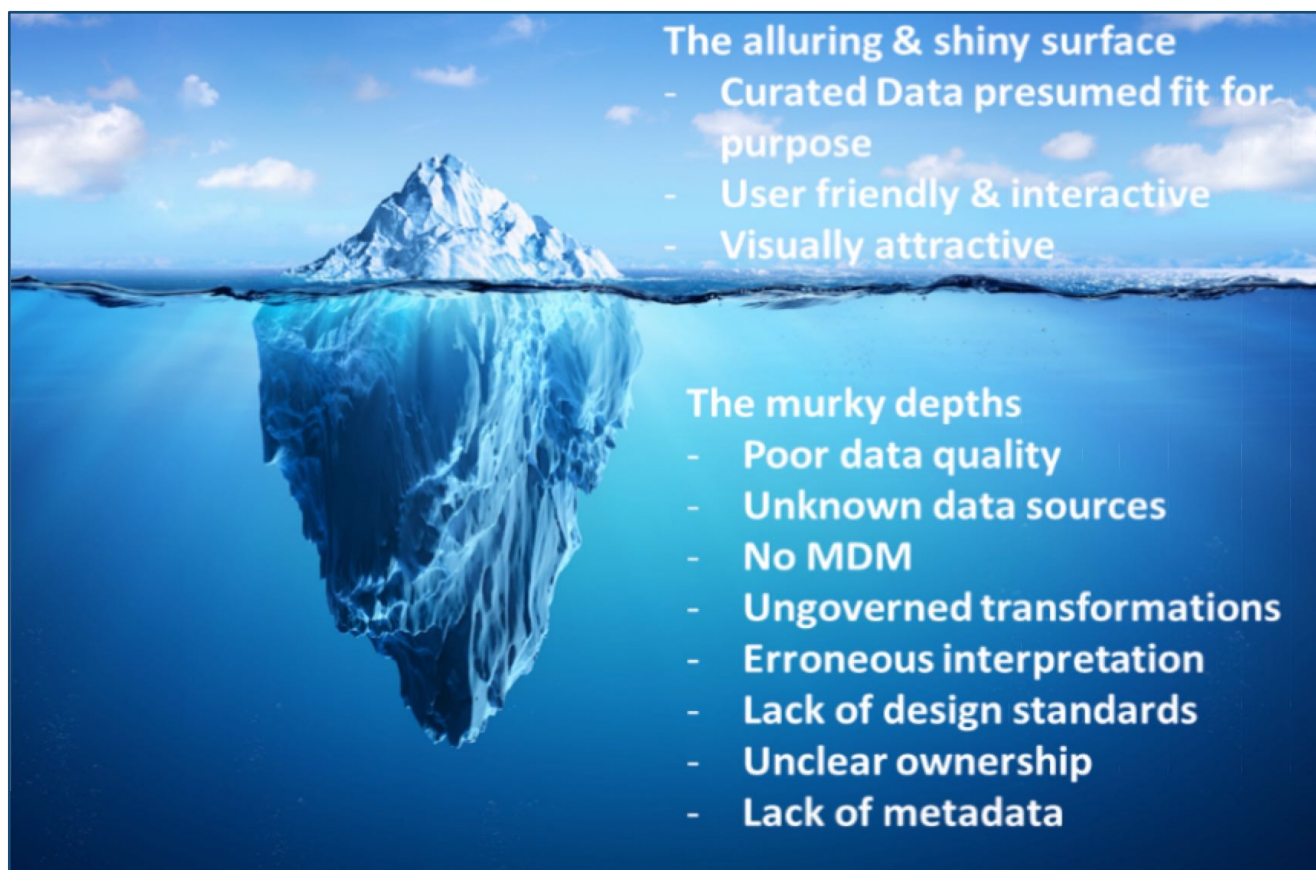


Figure 1: The iceberg analogy neatly demonstrates multiple underlying factors consumers of data visualisations seldom see (created by the authors of this paper).

The following are some ways in which this problem manifests in various organisations:

1: **No system of record for a function** – most of the data is recorded in an ad hoc manner. Business units largely manage their work via spreadsheet-like solutions.

2: **Data quality issues** – different units within the company do not maintain the data in the necessary format, structure, frequency thereby resulting in various problems with data quality that eventually impede the gathering of meaningful and actionable data from the relevant sources.

3: **Lack of data governance** – there is no clear ownership defined in terms of who owns the data, who to reach out to if access is needed, and how it is being consumed and interpreted.

4: **Data integrity issues** – the data gets compromised while sourced and transferred from the source system to the consuming application. This leads to either data being corrupted or lost over the period.

5: **Ad hoc sourcing requests** – multiple requests are sent to data owners for the same data set, leading to duplicated effort and waste of resources. This encourages restrictive sharing of the data by data owners.

6: **Inconsistent information models** – the data gets shared and stored in 'as-is' format, leading to multiple challenges while attempting to mingle data from different source system to draw meaningful insights.

7: **Support and sustain element is missing** – missing information such as a provision to provide feedback, someone to reach out for data queries, no communication on data refresh issues, etc. leads to lack of trust within the tool, leading to a lower adoption rate.

Finally, all the above factors result in dashboards that look great on a visualisation aspect but have all the foundational issues highlighted in the above points.

Approach to solving these challenges

Although these problems have been around for a long time and are known, not all industries and organisations have taken the necessary action(s) to address them. Different companies and industries are



The iceberg problem ... continued

along different points of the maturity curve of implementing the solutions to these problems. However, with significant advances in technology in managing the data such as cloud enablement, better security, lower total cost of ownership, ease of implementation, advances in artificial intelligence & data analytics, blockchain etc. the time is now ripe to look at solving these problems once and for all.

So what's the solution? The key to the success of any business-intelligence-gathering exercise is to look at the design from first principles – breaking down complicated problems into basic elements and then reassemble them from the ground up.

Here are the key ideas we implemented for some of our clients:

Create systems of record

Identify areas where Excel is still a preferred way of capturing and storing data. Design a data-capture solution (s) that eliminates spreadsheet-based solutions and encourages capturing of data in a standardised and harmonised manner. This approach will enable organisations to gather data over a reasonable period thereby enabling downstream data analytics as well as bringing structure to the way data is captured, managed, and consumed. Without a system of record, an organisation can never learn from its past and identify benchmarks to improve for the future.

Defining and executing data standards

We encourage companies to invest time in coming up with a standard data dictionary for the organisations. To do this successfully, the organisation has to invest in setting up the necessary business teams that will both create these standards and drive adoption across the organisation. This standardises the usage of terms and context for the same data set across the regions, functions, and units within the company.

Data cataloguing

Catalogue key information about the availability of data in source systems, its refresh date/time, description of business logic, data owner name, etc. This approach will provide transparency to users who want to know what information is available in the data set, who is the data owner, who to reach out to clarify any information, etc. Based on the size and scale of the organisation, a small app-based tool or custom off-the-shelf tools can meet this objective.

Build curated products

We ask our clients to first create a single list of metrics repository which is tracked across all the functional areas and then identify which metrics are reported multiple times on different dashboard. These metrics need to be centrally built only once as curated products and can be made available to consuming applications. This will help eliminate the duplicate effort spent by different projects to build and support these metrics.

Build a centralised data repository

Identify data needs frequently sourced by multiple consuming applications and store them centrally. Organisations create automated data provisioning mechanisms through API's or pipelines to store data in central repositories that can be accessed by the wider user community. This benefits organisations in multiple ways:

- o Reduces the burden on the source system owner to individually meet the data needs of multiple consuming applications.
- o Removes data silos and artificial boundaries that are created over time.
- o Channelising all the data consumption needs to a single repository enables keeping track of who is consuming the data and for what purpose.
- o Ensures systematic availability of reliable and quality-assured data with minimal downtime.

Present data based on the consumer persona needs

The needs and wants of all users are different. We guide our clients to understand the 5W's (What, Why, Who, When, Where) and 1H (How) of end user needs. Understanding the archetype of the user group and



The iceberg problem ... continued

their information needs help correctly structure the underneath data model and present the correct information on the visual layer.

Contextualise the view by presenting a clear story

Organising the layout of visualisations helps the user follow the intent of the display and to extract meaningful information within the correct business context. Having a UX designer within the team helps accelerate the implementation of a company-wide look/feel to the dashboards and reports, yielding a consistent flow.

Develop support and sustain mechanisms

Engaging with end-users and seeking their feedback is key to the success of any digital tool. We promote setting up of processes to engage with end users to capture their feedback on released (or upcoming) features. This allows organization to keep a pulse on what end-users are thinking and accordingly shape the future releases of the production. We also encourage our clients to dedicate some portion of the sprint's capacity to work in these feedbacks based on priority agreed with the product owner.

As companies accelerate their digital transformation to become fully data-driven, the topics explained in this point of view can help understand what these players are doing, and what they might consider doing to bring data challenges to the surface. Re-defining data ownership, data governance, and embracing design principle are good initiatives, but companies should not lose sight of the culture, change management, and data mindset element, which is vital for successful transformation.

Effective change management and organisational readiness

A key consideration is to evaluate if organisations are prepared to make the technological, people, and data investments to 'do more' with their data.

- o A data mindset is needed from leadership down to trickle down. Inhibitions due to complex organizational structure, laggards of technology adoption, lack of data strategy and lack of skills can hinder the maturity or growth of the data organisation.
- o It is no longer enough for a compact change team to support a single project or group of products. The challenges are bigger than this. Working with real users on real use cases brings the product and possible underlying issues closer to leadership and decision makers. A sustained change agenda is crucial, at leadership and group/sector levels within an organisation to build, and sustain awareness among the user community, product sponsors and the underlying web of stakeholders.
- o Demonstrating the tangible benefits of implementing these data management initiatives, while recognising early adopters, facilitates the change program to market with real stories and use the network to spread the word on the benefit of adoption.
- o Robust change management is crucial to adoption of topics discussed in this PoV at both a granular and strategic level.

Conclusion

To successfully navigate your organisations data and business intelligence journey, you need to focus on what lies underneath, what is visible, and invest in building the right data foundations first. Initiatives such as digitised source systems, data-governance processes, and all the other things mentioned in this paper will help you to have a lasting foundation to sustain your organisation's vision.

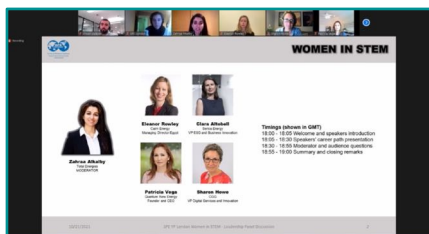
Manish Verma is a Senior Principal with Infosys Consulting. He has more than 15 years of experience working on different segments of the oil and gas value chain, with projects delivered specifically in upstream capital construction and midstream pipeline operations.

Dominic Launder is a Senior Consultant with Infosys Consulting. He has over 10 years of Upstream sector and digital experience. His professional interests lie in the digitalisation of business processes across the end-to-end value chain from exploration to production.

Balasubramanian Chandrasekaran is a Senior Principal with Infosys Consulting. He has more than 16 years of experience in the oil and gas industry. He has deep experience in capital project construction and midstream oil pipeline transportations pace.

SPE YPs: Energy transition and new technologies

The SPE YP London committee strives for technical excellence and knowledge exchange with events such as interactive field trips, the Ambassador Lecture Programme, the SPE Mentoring and Recruitment skills initiative – and by hosting virtual and live networking events. In this update, the committee shares some of its most successful events and future plans.



The SPE YP Committee seeks to promote women's important role in leading a successful STEM Business and was proud to hold the successful diversity and inclusion '**Women in STEM – Leadership**' in December 2021.

Firms with more women at the senior executive level outperform those with lower representation. Yet, historically, women have been consistently under-represented in senior managerial positions and in the boardrooms across various industries, including energy-related sectors.

On the discussion panel, we were honoured to have big names from the energy industry including **Eleanor Rowley (Cairn Energy)**, **Clara Altobell (Serica Energy)**, **Sharon Howe (CGG)**, and **Patricia Vega (Quantum New Energy)**. The panel was moderated by SPE D&I chair **Zahraa Alkalby**. The event was very successful, with inspirational, motivational discussion encouraging women to seek out thriving leadership roles in the industry.

Another event was the excellent '**Intro to Well Modelling**' session with **Peter Mihalik, bp discipline lead**. Peter demonstrated how to construct well-modelling workflows that aid in the optimisation of wells and analysis of well performance using Prosper.

The year officially ended with the '**Carbon Capture & Storage Virtual Technical Event**' on the 9 December, which featured the design and operation of full-chain CCS networks from capture to storage by **Matthew Healey, owner and director Pace CCS**.

Energy transition and new technologies

We aimed to start 2022 with fresh new ideas for our events and to include the audience in the decision-making process by sending an online questionnaire by the end of 2021. We received some very good feedback and many event recommendations. Opinions were split between having more energy-transition events versus focusing our efforts on providing training or workshops about new technologies.

Following the audience recommendation, our first event of the year 2022 was '**Introduction to NSTD and Opportunities for UKCS**' with **William Webster, an Energy Policy Manager at OGUK**, focused on highlighting CCUS, Hydrogen, and Electrification/Wind opportunities as part of the North Sea Transition Deal.



Some statements from the event:

"The UK North Sea Transition Deal, the first by a G7 country, will accelerate the energy transition, reduce UK emissions, and create new jobs across the UK."

"The North Sea Transition Deal encompasses five commitments, that will align for a one deal implementation. This includes Supply Decarbonisation, Carbon Capture & Storage, Hydrogen, Supply Chain Transformation and People & Skills."

"The UK oil and gas industry is an industry in action. We will become a net-zero basin; we will help hit UK net-zero targets and will be part of a fair and equitable energy transition."



Contributions of computational intelligence to petroleum reservoir characterisation



This article is authored by Fatai Anifowose, research scientist at EXPEC Advanced Research Center, Saudi Aramco

Introduction

The Fourth Industrial Revolution (4IR) is digitally transforming all the energy industry's streams: upstream, midstream, and downstream. The elements of the 4IR, including workflow automation, high-resolution visualization, high-level simulation, advanced materials, the Internet of things, robotics, big data, and machine learning have combined to accelerate job performance, increase efficiency, reduce cost, eliminate risks, improve safety, and increase accuracy. These technologies are equally enabling innovative thinking and creative environments to help the industry continue to deliver tomorrow's energy in safer, more efficient, and more sustainable ways.

In exploration, many geological workflows, such as core description, thin section analysis, and drill cuttings interpretation, are digitized and automated. In drilling, humans are being removed from the potential risks through automation. In seismic, the entire chain of activities from data acquisition through processing to interpretation are being digitized and automated through smart and intelligent devices and algorithms. In production, artificial lift devices such as the electric submersible pumps are getting connected for the purpose of inter- or cross-communication and synchronisation, and to provide intelligent fault tolerance.

This article focuses on the energy industry's upstream petroleum exploration sector, and more specifically the reservoir characterisation process. It starts with a succinct overview of the reservoir characterisation process, discussing some of its traditional approaches. Then it gives an overview of artificial intelligence and its various advances. Some successful use cases are discussed. A few of the prevailing challenges are presented. Some recommendations for overcoming the challenges are discussed. The article concludes with a few takeaways.

Petroleum reservoir characterisation process

Petroleum reservoir characterisation is the process of estimating reservoir properties and their impact on reservoir performance. It involves using the estimated reservoir properties to build reliable reservoir models to simulate the behavior of reservoir fluids as they interact with rocks. It seeks to find the optimal techniques for maximum production and reduced cost. It is an integral part of formation damage assessment and mitigation as reservoir properties have a significant influence on the magnitude of formation damage.

Reservoir characterisation provides critical information on the distribution of reservoir heterogeneity and petrophysical properties. Some of the reservoir properties are: depositional environments, lithology, porosity, fluid saturation, grain size, rock strength, and permeability. These properties are correlated with reservoir quality indices.

The reservoir characterisation process is a multidisciplinary endeavor that combines information from various subfields in the energy sector such as petrophysics, geology, petroleum engineering, geomechanics, and geophysics. Reservoir properties are measured, estimated or inferred from the analysis of formation core samples, wireline logging, seismic, mud logging, production, geomechanical, pyrolysis, and geochemical data.

The major goals of reservoir characterisation are:

- To determine the presence of hydrocarbons.
- To determine optimal techniques to extract them.
- To find ways to increase production in more sustainable ways.

Figure 1 (overleaf) shows a simplified example of wireline log analysis and interpretation for reservoir characterization.



Contributions of computational intelligence... continued

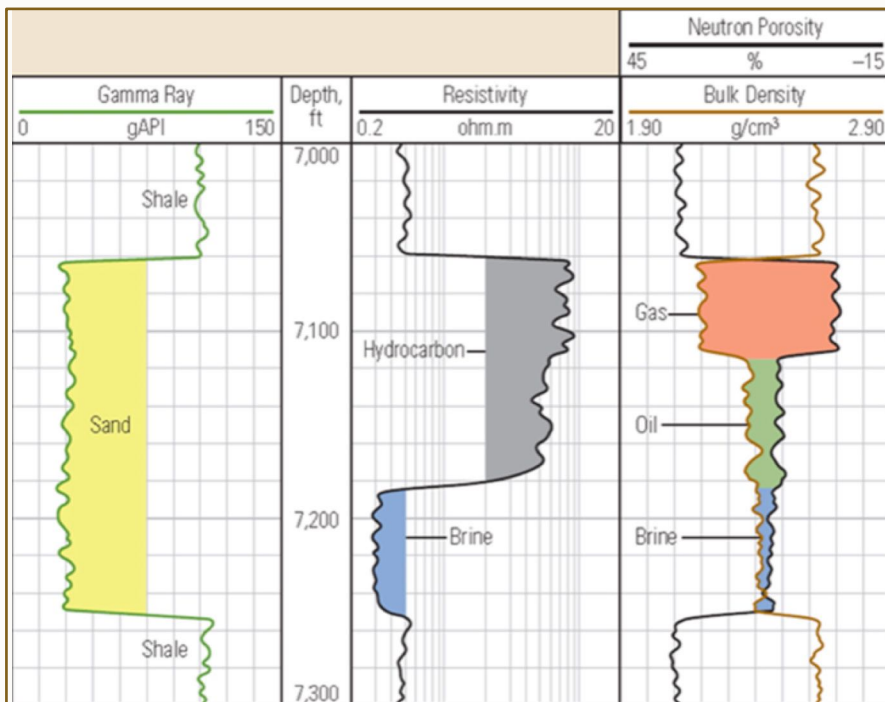


Figure 1: A simplified wireline log analysis and interpretation result (Andersen, 2016)

Traditional exploration data acquisition

The traditional sources of data for reservoir characterisation can be categorised into four major groups: field, surface, borehole, and lab – **Figure 2**.

Field data are obtained from remote locations such as oil and gas fields. Examples include lidar/laser, seismic (land and underwater), and outcrops. Data acquired from or measured/analysed at the surface include drilling parameters and the analysis/interpretations of drill cuttings. Data acquired or obtained from the borehole or wellbore include microseismic, basic and advanced mud logging, image logging, and wireline logging. Data acquired in the lab are usually measurements on rock and fluid samples.

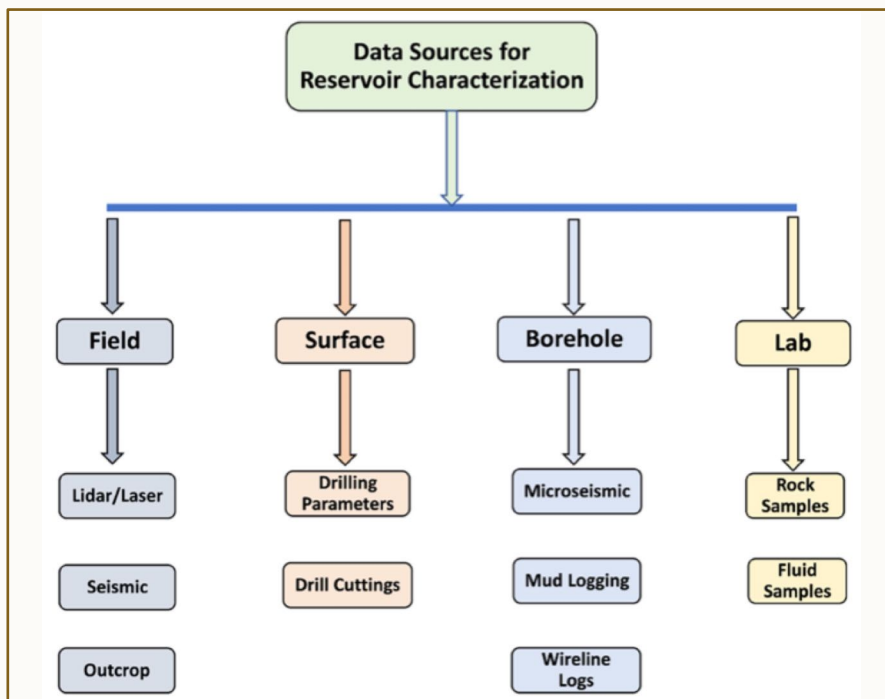


Figure 2: Sources of data/points of measurement/analysis for reservoir characterisation

The conventional analysis of core samples provide data such as grain size, lithology, absolute permeability, saturation, and sedimentary environments while the special core analysis process provides more complex parameters including capillary pressure, relative permeability and wettability. The data obtained from the latter provides vital additional information about the pore structure and fluid mechanics of the reservoir, supplementing the data obtained from the former to give a more complete understanding of reservoir performance.

The analysis of plugs that are extracted from core samples provides porosity and permeability at overburden conditions, cementation exponent, saturation exponent, tortuosity (the exponents m , n , and a in the Archie equation respectively), and capillary pressure (P_c). Thin sections prepared from plugs provide data on porosity, permeability, mineral composition, rock fabrics, and grain morphology. Analysis of fluid samples provides data on fluid types, PVT, API, GOR, etc.



Contributions of computational intelligence... continued

Challenges in reservoir characterisation

Some of these data acquisition methods pose a few challenges to the reservoir characterisation process. For seismic/lidar/laser there are issues with noise, complex workflows, low vertical resolution, and huge costs in terms of personnel, equipment, logistics. For outcrops, there are issues with travel logistics and traffic/safety concerns. For lab measurements, there are issues with data sparsity since samples are generally limited. It is not practical to sample every single interval in a well. As a result of the aforementioned, few data points are usually generated. There are also the possibilities of human errors.

Opportunities for artificial intelligence in reservoir characterisation

The challenges with the data acquisition methods highlighted above have opened huge and almost unlimited opportunities for artificial intelligence (AI) applications in the petroleum reservoir characterisation process.

The robotics aspect of AI becomes a useful tool for reservoir characterisation in the following situations:

- When a process is repetitive but with clear procedures: Robots or robotic devices could be launched to maintain core analysis laboratories for handling routine tasks such as core check-in/check-out, handling, positioning on the slabbing table, etc.
- When safety is a concern: Humans can be kept away from harm's way while conducting inspections or taking samples in remote and challenging locations such as volcanic eruption sites, cliffs, water bodies, etc.

The machine learning (ML) aspect of AI can be leveraged in the following situations:

- When there is no predetermined relationship/equation.
- When the relationships/equations are too complex.
- When the complex relationships are oversimplified with spurious assumptions.
- When the physical rules governing the problem are constantly changing.
- When different equations work for different lithologies, ML could provide an opportunity.
- When there is the need to generate a log from sparse data points.
- When alternative solutions are required ahead of or to complement lab measurements or field data acquisition and analysis.
- When traditional data processing approaches are incapable of efficiently handling large amounts of data.
- When the rate of data acquisition is beyond the limit of the traditional approaches.

Artificial intelligence, robotics, and machine learning: The needed clarification

There exists a little confusion around the concepts of AI, computational intelligence (CI), robotics, and ML within the machine learning and applications communities. This is a result of people having different backgrounds while using these tools without very strong theoretical backgrounds. What I call the 'AI family tree' offers sufficient clarity. An illustration of this is shown in **Figure 3**.

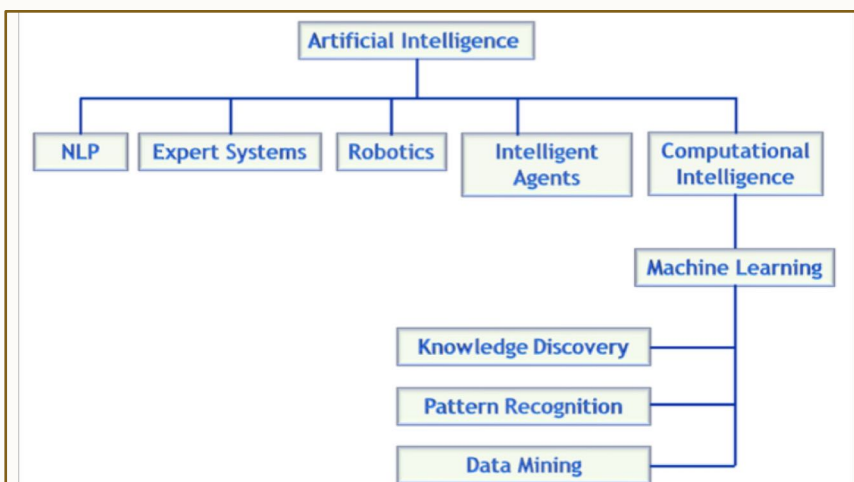


Figure 3: The AI family tree showing the key elements and their relationships

AI is at the root of the 'tree' and has been defined as "The science and engineering of making intelligent systems" (according to John McCarthy of Stanford University). Intelligent systems could exist in the form of hardware, software, or both. An example of intelligent hardware is a robotic arm handling a core sample. An intelligent software runs algorithms driven by data and guided by smart rules. Both capabilities could be combined in intelligent rovers. The



Contributions of computational intelligence... continued

subfield of AI that focuses on this kind of algorithms is called soft computing.

AI, in the general sense, could be any of natural language processing, expert systems, robotics, intelligent agents, and computational intelligence. CI is the computational aspect of AI that deals with data-driven approaches. ML is performed through the processes of knowledge discovery, pattern recognition, and data mining. Examples of ML techniques are random forest, artificial neural networks, support vector machines, decision trees, and many others. The knowledge discovery process includes the following steps:

- Setting an objective to address a challenge.
- Identifying the relevant data needed to address the challenge.
- Selecting the relevant data from a repository.
- Preprocessing the data. This involves cleaning, merging, stacking, or trimming.
- Transforming the data, if necessary.
- Applying any data mining method to extract the relevant information based on the set objective.
- Evaluating the result of the data mining method. If the objective is attained, we have discovered new knowledge. Otherwise, we retrace our steps or simply start all over.

The data mining process may employ any of the database, visualization, statistics, IT or ML technologies. ML, as a component of CI, focuses on teaching computers to do what humans naturally do. As humans learn from experience, computers and algorithms learn from data. Algorithms adaptively improve performance with more data samples as we try to find patterns in data to make better decisions/predictions. More details about ML and its advances in hybrids and ensembles can be looked up in Anifowose (2019, 2020a, 2020b).

Contributions of AI to reservoir characterisation

Some of the successful use cases of ML application in petroleum reservoir characterisation include:

- The drone technology has been used to improve seismic data acquisition (Rapstine et al., 2018).
- Intelligent and ML-based algorithms, with the support of advanced image analysis methods, have been used to achieve more robust seismic processing and interpretation workflows (Whaley, 2018; Giordan et al., 2020).
- The drone technology has literally brought the outcrop to the geologist's desktop (Smith, 2016; Mezghani et al., 2018).
- ML has been used to automate the core description process using high resolution digital core images (Thomas et al., 2011; Baraboshkin et al., 2020; Gesho et al., 2020).
- ML has been combined with advanced image analysis to automate the petrographic thin section analysis (Budenny et al., 2017; Izadi et al., 2017; Koeshidayatullah et al., 2020).
- Cementation factor (the exponent "m" in Archie equation) is a point and sparse data. A few points are obtained from special core analysis for a formation or certain interval of interest. With machine learning, a log can be generated at the log scale, and plugged into the Archie equation, along with the other exponents, for enhanced estimation of water saturation (Anifowose et al., 2017; Heydari and Hajipour, 2018).
- In certain operating conditions such as bad borehole or washout, we might encounter a missing well log or a set of logs. Machine learning can be used to generate the missing sections (Zhang et al., 2018; Kim et al., 2020).

Conclusions and key takeaways

AI, along with other technologies, came together to fulfil the critical mission of the fourth industrial revolution.

AI technologies have become attractive and desirable alternative tools to digitally transform and accelerate business processes.

Oil and gas processes, including the reservoir characterisation, are already getting transformed and positively impacting subsequent processes that rely on their output.

Despite the success stories that have been recorded, there are still challenges, which will continue to be addressed with more research, innovative thinking, and collaborative efforts of both domain experts and AI practitioners.



Contributions of computational intelligence... continued

References and further reading

Andersen, M.A., *The Defining Series: Basic Well Log Interpretation*, Oilfield Review, 2016.

Anifowose, F., *Artificial Intelligence Explained for Non-Computer Scientists, The Way Ahead*, SPE Journal of Petroleum Technology, January 2019.

Anifowose, F., *Hybrid Machine Learning Explained in Nontechnical Terms, Data Science and Digital Engineering*, SPE Journal of Petroleum Technology, February 2020a.

Anifowose, F., *Ensemble Machine Learning Explained in Simple Terms, The Way Ahead*, SPE Journal of Petroleum Technology, July 2020b.

Anifowose, F., Ayadiuno, C., and Rashedian, F., *Carbonate Reservoir Cementation Factor Modeling Using Wireline Logs and Artificial Intelligence Methodology*, Conference Proceedings, 79th EAGE Conference and Exhibition 2017 - Workshops, Jun 2017.

Baraboshkin, E., Orlov, D., and Koroteev, D., *Tools for Automated Rock Description*, Conference Proceedings, First EAGE Digitalization Conference and Exhibition, Volume 2020, p.1 - 5.

Budenny, S., Pachezhertsev, A., Bukharev, A., Erofeev, A., Mitrushkin, D., and Boris B., *Image Processing and Machine Learning Approaches for Petrographic Thin Section Analysis*, Paper SPE-187885-MS presented at the SPE Russian Petroleum Technology Conference, Moscow, Russia, October 2017.

Gesho, M., Chaisoontornytin, W., Elkhatib, O., and Goual, L., *Auto-segmentation technique for SEM images using machine learning: Asphaltene deposition case study*, Ultramicroscopy, Volume 217, 2020.

Gholanlo, H., and Hajipour, Z., *Estimation of Cementation Factor in Carbonate Reservoir by Using Genetic Fuzzy Inference System*. Neural Comput. & Applic. 30, 1657–1666, 2018.

Giordan, D., Adams, M.S., Aicardi, I. et al. *The use of unmanned aerial vehicles (UAVs) for engineering geology applications*. Bull Eng. Geol. Environ. 79, 3437–3481, 2020.

Izadi, H., Sadri, J., and Bayati, M., *An Intelligent System for Mineral Identification in Thin Sections Based on A Cascade Approach*, Computers & Geosciences, Volume 99, pp. 37-49, 2017.

Kim, S., Kim, K.H., Min, B., Lim, J., and Lee, K., *Generation of Synthetic Density Log Data Using Deep Learning Algorithm at the Golden Field in Alberta, Canada*, Geofluids, Vol. 2020, Article ID 5387183, 26 pages, 2020.

Koeshidayatullah, A., Morsilli, M., Lehrmann, D.J., Al-Ramadan, K., and Payne, J.L., *Fully Automated Carbonate Petrography Using Deep Convolutional Neural Networks*, Marine and Petroleum Geology, <https://doi.org/10.31223/osf.io/necbm>, 2020.

Mezghani, M.M., Fallatah, M.I., and AbuBshait, A.A., *From Drone-Based Remote Sensing to Digital Outcrop Modeling: Integrated Workflow for Quantitative Outcrop Interpretation*, Journal of Remote Sensing & GIS, Volume 7, Issue 2, 2018.

Rapstine, T., Sava, P., and Arias, E., *Airborne seismic data acquisition using stereo vision*, Journal of Unmanned Vehicle Systems, Volume 6, Number 1, March 2018.

Smith, T., *Drone Magic*, GeoExpro, Vol. 13, No. 1, 2016.

Thomas, A., Rider, M., Curtis, A., and MacArthur, A., *Automated Lithology Extraction from Core Photographs*, Rock Physics and Formation Evaluation, First Break, Volume 29, June 2011.

Whaley, J., *The Future of Onshore Seismic*, GeoExpro, Vol. 15, No. 2, 2018.

Zhang, D., Chen, Y., and Meng, J., *Synthetic Well Logs Generation via Recurrent Neural Networks*, Petroleum Exploration and Development, Volume 45, Issue 4, pp. 629–639, 2018.



In this challenging year, SPE members continue to inspire and support each other locally, regionally, and globally.

SPE has evolved to provide unparalleled insights, shared expertise, life-long learning and community strength to fuel the success of our members and the future of the industry. As a member, you are part of that!

Renew your 2022 SPE membership to keep your valuable member benefits.

- **Insights**

Access the latest briefs and features on E&P technology advancements across SPE publications including JPT®

- **Networking**

Network and knowledge sharing opportunities at both global and local levels, including more than 1,400 members of the London section

- **Technical Library**

Access to 220,000+ technical documents in OnePetro®, the multi-society, online library

- **Peer-Reviewed Journals**

Discover information on new technologies or build your reputation by submitting a paper for publication

- **Global Events**

Industry-wide technical conferences to in-depth training courses that bring together professionals from around the world

- **Online Education**

Deepen your expertise and engage with other professionals in your field through our continuing education programs.



Renew your membership today

Financial sustainability – responsible investment through sustainable financial institutions



Welcome to the London Sections' Net Zero Committee section of the SPE Review London where we will present and discuss a range of topics associated with Energy Transition and Net Zero. We hope these articles will be informative and help readers understand some of the significant changes in the oil and gas industry. This is the eighth in a series of articles for SPE Review London covering sustainability, brought to you by Adrian Gregory who is a subsurface and wells engineering consultant. Adrian is excited to be part of and contributing to the new London SPE Net Zero Committee and will be writing future briefing articles broadly focusing on sustainability strategy, frameworks, principles, delivery and performance.

Financial Sustainability – Responsible Investment

This article will be covering the third Sustainability Perspective, **Financial Sustainability** which is about **Responsible Investments**, through Sustainable Financial Institutions, with its pillar of opportunity bringing together **Wealth** in developed countries and developing countries, through commercial transactions, to create **Sustained Value** and **Sustainable Value** through Global Sustainability. **Doing Better** matters – financed by **Responsible Investments**. 'Unsustainability', 'Means vs Ends', 'Wholeness Worthiness Riskiness' and 'Opinions Facts Truth' will be covered. Investments in all economies now carry risk, **Physical Risk**, **Transition Risk** and even **Litigation Risk** -- if the ambitions of a 1.5°C world is not met. **Financial Sustainability** is achieved primarily through creating **Sustained Value** through organisational enterprise's decision making in a manner that reflects the **Principles of Sustainability** to ensure that these activities and investments today, do not limit the range of economic, social, and environmental options open to future generations.

For readers who want a 22-second outtake:

"Responsible Investments are needed with decision making in a manner that reflects the set of Principles of Sustainability to finance Better Practices, Better Development, Better Government and Better Capitalism – ultimately to ensure Carbon Removal from Industry Agriculture Energy. These Responsible Investments must ensure Pollution Reduction & Emissions Reduction or endure increasing Physical & Environmental Limits effecting the Markets & Capitalism. Companies operating under this increasing stress means traditional 'modus operandi' is unsustainable. Societal expectations are ratcheting-up; the Capitalist Society is the force of Liberalism. Even current 1.1 or 1.2°C, post industrial revolution temperature rise, many vulnerable millions are now living on the 'Tragedy of the Front-Line'. The importance of Doing Better cannot be understated, that requires sustainable finance & funds. Investment Governance facilitate & expedite these matters. Political Governance is the key requisite. Technical Sustainability is the key means. To raise the economic, social, environmental tapestry at the Base of the Pyramid will need 'eye watering' quantities of Responsible Investment. Prosperity of People & Planet (3Ps) is very much aligned with 'Economic Wellbeing', but based on 'Wholeness'. Wellbeing is seen by many as part of the destination; 'ends'. 'Wholeness' builds from Stewardship, incorporating the three keystones of Governance Governness Worthiness -- so 'means' & 'ends'. How to use 'Ultimate Means' to serve best 'Ultimate End' is Stewardship. Worthiness is testable through Opportunity Costs. 'Worthiness Index' could also be constructed based on activities being assessed and then applying weighting through associated 'focus groups'. Riskiness in terms of Wholeness is about Total Risk; not just Current Risk or Full (Market) Risk. Evidence based on Fact or Truth, Known & Unknown matters when considering Total Risk. Wholeness is best made up with the composites of Creative Activities,



Financial sustainability... continued

Optimised Reduction (both pollution, emissions), Purpose Fit and Group Motivation. Conservation is a critical part of Wholeness activities. Transformation through conservation takes a lot of dialogue & integrated models and modelling. It also needs Technical Mastery and having a group Shared Vision. Responsible Investment is needed to fund the Shared Mission pathways, crafting and creating new Working Landscapes. Freedom, acting with scrutiny and delivering future proofed performance will mean dividing up individual team's activity 'workplate'. Group Motivation enables 'challenge after challenge' to be turned into additional opportunities. The importance of Doing Better cannot be understated, that requires sustainable finance and funds."

To be more sustainable, Global Sustainability, **Responsible Investments** must ensure that **Pollution Reduction & Emissions Reduction** activities are sufficiently resourced. Ultimately **Carbon Removal** from Industry Agriculture Energy needs to be achieved as 'conservation' of some composites of current **Capitals Stock** seems inevitable today when considering the remaining Carbon Budgets and time frames. Without the challenge of **Net Zero** being met – **Total Carbon** in the atmosphere will keep on increasing, driving up global temperatures. Currently, our **Unsustainability** means **Doing Better** in order to achieve the ends, **Sustainability**. Better Practices, Better Development, Better Governance, Better Capitalism is paramount needing **Continual Innovation & Entrepreneurialism**, which will be discussed in the next article.

To achieve **Global Sustainability**, 'development as transformation', Humanity has to be **Social Responsible** (Article 7), more than just being socially 'responsive'; driven by 'happenings' and the increasing changes experienced in the **Environment & Society**, living vulnerably on the **Tragedy of the Front-Line**. **Social Responsibility** requires new utility, new content, mitigation & contingency planning – adaption; delivered through **Global Partnerships** on Climate Mitigation, Adaptation and Loss & Damage driven now by **Political Necessity**. This requires **Political Sustainability & Financial Sustainability**. **Technical Sustainability** delivery of the 'means' through content, must build from enterprise's Research & Experimentation, Knowledgeable Practices & Mindsets, Processes, Frameworks & Systems - through **Continual Innovation**. **Entrepreneurship** creating **Value** will be paramount from the new **Opportunities** and new **Utility**, creating new **Enterprise** -- overcoming **Risk** beyond normal, current activities and progressing at pace.

Continual Innovation, builds very nicely out of the **Learning Organisation** thinking, being defined as 'desiring to continually expand organisational **Capacity**, through **Development**, to create its future'. The test of achieving **Sustainability Progression** towards the True Sustainability 'destination', is whether **Sustained Value** is created, catalysed through **Responsible Investment**. This means that adaptive & regenerative learning, building new competencies & skills, individual & organisational, are a key part of delivering **Systemic Thinking** (Article 7). Stewardship, "Doing Right for The Whole", requires 'a shift of mind' or new **Mindset** typically linked to **Doing Right** as part of a team – delivering **Better Development**. Better team working being the building blocks of organisational learning, working & enterprise; **Group Enterprise & Organisational Governance**. 'Leader Leadership' has been highlighted as one means to motivate new endeavours, new economies, as well as co-working through 'hub' networks; responsible to events particularly consequential activities, actions and non-actions.

Entrepreneurialism is key as new utility is needed, both **Blue Utility & Green Utility** (Article 7). This new utility will have to be sufficiently resourced through **Responsible Investment** to achieve the **Scale** and **Pace** required; the **Pace** being primarily set through good **Political Governance; Better Government**. The desired **Blue Utility** is already present in **BluePrints**, created by the **HandPrints** of the industrial revolution; building technical **Succession** since George Bruce leased a mine coal in the shire of Culross, Scotland in 1575. For the **Green Utility**, **Research & Experimentation** is needed – expect many failures, few successes as otherwise we would have this new utility already; commercially available. The Apollo Space Mission did not get to the moon on Apollo 1, but Apollo 11. Apollo 11 was engineered using three spacecrafts to achieve its mission. Taking an



Financial sustainability... continued

elephant-like leap to the **Green Utility** is not currently possible and will need lots of prototypes.

The **Limitations** (Article 7) to achieving **Global Sustainability** are cast in keystones of the **Present State of Technology; Political Governance & Responsible Investment; Base of the Pyramid; Social Organisation;** and **Inclusive Capitalism & Total Capitals Stock. Global Prosperity** needs Continual Innovation & Entrepreneurialism to create the **Value & Wealth** from the new utility built along with the **Sustainability Pathways**. The importance of **Doing Better** cannot be understated, that requires finance & funds"; **Financial Sustainability**. The transformative power of **Capitalism** seeks out the best ways for **Value Creation** and **Wealth Creation**, through 'Opinions Facts Truth'; often overcoming Dolan's **Opportunity Costs**(1).

Financial Sustainability has now very nearly reached the **Limits of Finance** to actually provide enough **Responsible Investment**; Global Finance & Funding to actually attempt to achieve **Global Sustainability**. The **Carbon Budget** is a 'cumulative account'. Any more delay only increases the financial resource necessary which may now become the critical limit to the **Transformation to Sustainability**; the current financial sums are truly eye-watering. At COP26, GFANZ has organised some \$130 trillion in financial assets to secure **Responsible Investment** into the future. However, un-remarkably at the same time, IFRS failed on the urgency for **Global Sustainability Reporting Standards**, now due 2023(?). The EU also seems to be more focused on Environmental Sustainability Reporting Regulation, through Taxonomy. Crafting Nature-by-Rules has proven not to be a simple matter. GAAP as usual seems 'un-transparent' to date. TCFD seems to be the private sectors' best practice approach to **Sustainability Reporting**, built on the back of SASB and GRI. Elkington⁽²⁾ defined **Sustainability** as "the principle of ensuring that our (activities and) actions today, do not *limit* the range of economic, social, and environmental options open to future generations". So **Sustainability Limits** (Article 6) matter, cast into five keystones of **Natural Resources, Nature & Living Commons, Transformation to Sustainability, Valuing Everything** and **Values & Behaviours**. How successful these **Sustainability Limits** are overcome on the transformational pathways will dictate the future **Prosperity**, effecting **People & Planet**. Companies and Corporations producing at or above **Environmental Limits** will mean increased **Societal Scrutiny. Visibility** of what companies are *actually* doing is key to staying onside with local Communities & 'Society-at-large'; that will require **Responsible Investment**. This is also driving the desire for more regenerative means.

Visibility of how people live their lives and how this may change is also key; particularly reforming **Human Nature**. Enterprise will need to consider 'wider choices' – listening to differing **Opinions** if they want to maximise access to **Environs Capitals** beyond the factory area or 'production boundary' (Article 6). The new generation will have a very different viewpoint on the future relevance of existing legacy 'stock', its Resources and associated Products, its associated practices, impacts & effects; **Resource Relevance**.

For example, **Natural Sequestration**, a **Nature Based Solution** ('NBS') by planting trees or improving soil management is a great concept on the pathway to **Valuing Nature**. But, as a commercial process, it is fraught with complexity needing trusted accreditation, audit, transparent accounting ('accountifactual' process), and above all 'multi-generational banking' and not simply later turned back into an energy resource by new owners. If all of the above is not 'carbon tight' this just becomes a 'license to carry on polluting' ('LTCOP') as long as enough trees are planted; and not subsequently destroyed through **Global Warming** impacts & effects. As yet there are no standards of practice, international protocols, nor 'audit-certifiers' approved lists. Without **Independence & Impartiality** (trustworthiness) these mechanisms, however worthy technically, will always lead to claims of **Green Washing** (Article 7).

As discussed in **Article 3 [Figure 1]**, **Sustainability** has three **Dimensions** from Elkington's **Triple Bottom Line**⁽²⁾ (Economic, Social, Environmental) and 'pillars of opportunity' based on the three **Perspectives**: Technical Sustainability, Political Sustainability and Financial Sustainability. **Sustainability Risks** effect principally **The Commons, Urban World** and **Natural World. Unsustainability** means when some events happen, the negative outcomes are given descriptors linked to 'curse' and 'disease' such **Natural Resource Curse** and **Dutch Disease**. Unsustainability 'tragedies' are prevalent such as the **Tragedy of the Commons, Tragedy of the Horizon** and **Tragedy of Outcomes**, all having been defined to date.



Financial sustainability... continued

Based on the previous Articles, it is now, hopefully, more obvious that **Technical Sustainability** builds **Additional Utility** -- the key *means* by which **Capitals Stock** can be regenerated; driving **Global Prosperity** forward. **Technical Sustainability** is the perspective, the pillar of opportunity of **Advancement (Additional Utility)** particularly from regenerative **Natural Capital** (Nature, Biodiversity and Habitats) & **Reputational Capital**, built on **Succession & Stewardship**, the stewards of **Resource & Pathways** (the **Means**), now and in future generations.

Business Sustainability is 'full-on' **Value Creation** focused and driven also by **Dynamic Materiality** and (Stock) **Governance & Governness**; the **Stock-of-Life**. **Political Sustainability** is the key requisite to building **Global Sustainability**. **Financial Sustainability** is key to facilitating and expediting these matters, aided by **Investment Governance**; brings together **Wealth** to create **Value**, through **Responsible Investment**; creating **Sustainability Value, Sustainable Value**, and hopefully **Sustained Value**. **Legal Governance** is the keeper to account.

The Triple Bottom Line enterprise 'flows' (Economical Social Environmental) plus 'stocks' effect **Business Sustainability**. Assimilating **Intrinsic Value** driven by **Dynamic Materiality**, introduced the integrated thinking behind **Total Value** (T_v), rather than Full Value (F_v) -- hence why understanding **Governance Value** is so core to maximising **Sustainability Value** (S_v) in current, next & future generations activities; total **Stock & Flows**. Through primarily **Technical Sustainability** (Principles, Strategy, Priorities, Practices & Frameworks; Delivery and Performance; Dynamic Materiality) these Stocks & Flows need to be critically aligned with the current **Enterprise Value** (E_v). **Total Value** means Technical Sustainability has to be the DNA core of the Total Value 'umbrella' of the *whole* enterprise; **Sustainability, Stewardship and Succession**.

Wholeness, Worthiness, Riskiness – Engineering Sustainability

Unless Humanity changes its **Values & Behaviours** ('Habits'), our current **Unsustainability** means that the next & future generations (**Governance**) will have increasing **Physical Limits & Environmental Limits** to overcome, making systemic Re-Architecture, Restoration & Regeneration new competencies & skills needed at scale if the future **Prosperity of People & Planet** (3Ps rebranded!, **Article 7**) are not to be less flourishing for the generations to come. Politicians and Consumers have a vested interest that **Capitalism** survives the **Transformation to Sustainability**. The **Capitalist System**, developed through Political Policy, has the greater ideology of maximizing Economic Stability delivered by efficient market **Sourcing** and allocation of **Resources**; even delivering economic **Wellbeing** as Porritt⁽³⁾ desired in 2007 through his vision of **Sustainable Capitalism**.

Prosperity of People & Planet (3Ps) is very much aligned with Porritt's 'Economic Wellbeing', but based on **Wholeness**. **Wellbeing** is seen by many as part of the destination; 'ends'. 'Wholeness' builds from **Stewardship**, incorporating the three keystones of **Governance Governness Worthiness**. 'Means' & 'Ends'. "The overall problem is how to use 'Ultimate Means' to serve best the 'Ultimate End' ...Stewardship."⁽⁴⁾

Wholeness for a company is best made up of six steppingstones, the **Creative Activities** to 'manufacture produce deliver' **Better Development** plus three cornerstones (a) **Optimised Reduction** (both pollution, emissions) built from the **Sustainability Economy** (next Article) respecting the full **Life Cycle Assessment (LCA) framework** -- not a Linear Economy ('Take-Make-Waste'); (b) **Purpose Fit** reflecting 'Means vs Ends' (Technical Sustainability vs True Sustainability); and (c) **Group Motivation** ensuring the **Group** attract, retain & motivate the workforce, 'Share the Dream' built on **Opinions Facts Truth** and 'Care about Success' - challenge after challenge; and **Group Share & Partnerships** through better Research & Experimentation, 'Knowledgeable' Practices & Mindsets; Processes, Frameworks & Systems; Engagement and 'Walking the Talk' built on transparency & track record; building additional **Technical Excellence & Functional Excellence**; 'engineering the future' (**Figure 1 overleaf**).

Means vs Ends matters, as the **Purpose Fit** activities guide the longer term desire to create new utility, plus, an understanding based on current **Content**, how much of the current utility should or needs to be conserved. **Succession** helps to guide this understanding which different 'elements or building



Financial sustainability... continued

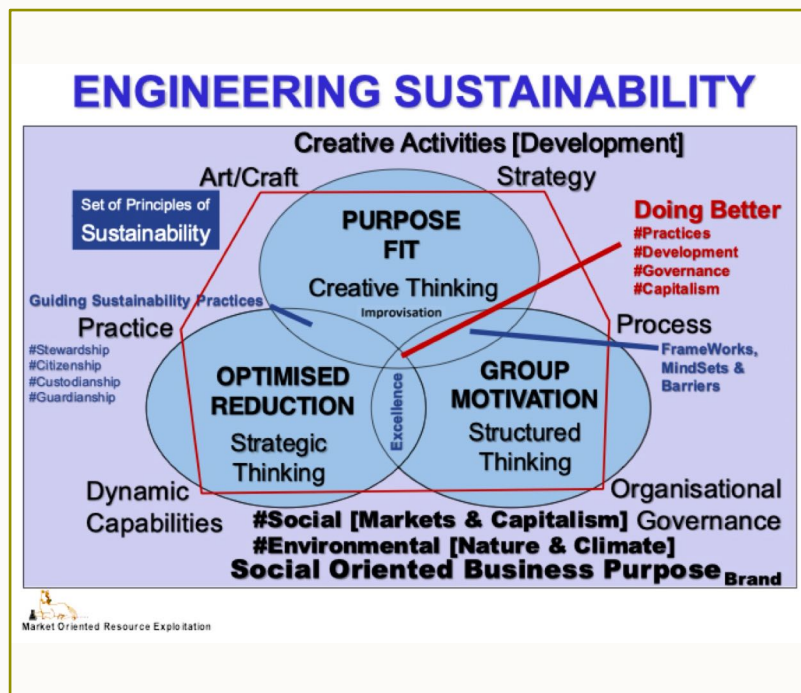


Figure 1. Engineering the future

blocks' (**Composites**) are to be conserved and those where **Innovation** is needed to 'bridge' across 'the stream'; engineering the future – guided by science.

Conversation is a critical part of **Wholeness** activities. **Transformation through Conservation** takes a lot of dialogue & integrated models and modelling. It also needs **Technical Mastery** and having a group **Shared Vision**. Responsible Investment is needed to fund the **Shared Mission** pathways, crafting and creating **Working Landscapes**. The **Shared Vision & Shared Mission** must follow a core set of **Principles of Sustainability (Sustainability Principles)** enacting the core guiding **Sustainability Practices** (Stewardship Citizenship Custodianship Guardianship).

Group Motivation matters forming a common feeling ('Essence' or 'Brand') such that belonging to that 'tribe' builds individual motivation too as well as organisational; helping staff retention and also attracting additional recruits through sharing stories; stoking enterprise 'energy' – enabling 'challenge after challenge' to be turned into additional opportunities. Through **Collaboration & Partnerships**, shared 'Knowledgeable' Practices & Mindsets increase as well as the **Dynamic Capabilities** and the practices for **Pollution Reduction & Emissions Reduction [Optimised Reduction]** benefits in assets and organisationally. **Dynamic Capabilities** are defined as the firm's ability to integrate, build, and reconfigure internal and external **competencies** (& skills) and **competency** (roles & responsibilities) to address rapidly changing environments.

Wholeness six steppingstones which make up the **Creative Activities** to 'manufacture produce deliver' Better Development are **Strategy, Process, Organisational Governance, Dynamic Capabilities, Practice and Art/Craft**:

Strategy is all about 'where we are now?'; 'where are we heading?'; 'how are we going to get there?'; and 'what 'limits' will we encounter on route?' ...determining the destination's (Sustainability) **3Ps: Prosperity of People Planet. Sustainability Strategy** being focused and crafted around the firm's **Dynamic Materiality** and how to endure by being **Purpose Fit**. This requires **Creative Thinking** due to **Incomplete Knowledge**, causing **Bounded Rationality**; 'lack of **competence**' hence creating the desire for a 'fit' Strategy.

Process (and Systems) is where **Frameworks and Mindsets** typically reside. Process being related to activities that produce specific resources, product or service, cross-discipline. **Frameworks** being structure supporting sets of **Concepts, Values, Practices** that constitutes a way of viewing 'The Whole' (**Wholeness**); **Total Reality. Group Motivation**, is often the reason why processes are 'structured' – providing clarity and reducing associated costs, also to help overcome complexity. **Sustainability Frameworks** often re-frame activities such as Better Practices, Better Design, Better Development, Better Governance, Better Government, Better Capitalism -- providing the motivation to instigate changes to overcome Global Sustainability *Limitations*. **Re-Framing** helps to 'refocus' 'reengage' **Means, Thinking** (Integrated & Systemic), **Mindset** (viewpoint eg choices [eg **Source** of Resource]), **Better Behaviour & Values** (based on Value). Similarly **Re-Architect** provides the motivation to instigate changes to overcome Sustainability *Limits*, such as **Transformation to**



Financial sustainability... *continued*

Sustainability by overcoming *Sustainability Structural Barriers*; or to better Consumer Markets by *Valuing Everything* (Valuing Nature along with traditional Economic Valuations); or understanding the importance of *Governance* for the ‘options’ analysis of the next & future generations. **Innovation** and **Innovative Solutions** typically are catalysed through processes; building on new evidence, insight through **Content** – often ‘sparked’ as to be discussed in the next article (**Goddess Nigella**).

Organisational Governance through Group authority creates the ‘guidelines’, ‘guidrails’, or ‘guideropes’ setting the ‘freedom’ for a team’s level of creativeness. **Good Governance** should mean the ending of micro-management, replaced by a responsible **Leaders Leadership** regime helping to build **Resilience** in (Governance & Governance) Value Assets; testable through **Worthiness** (Opportunity Costs). **Freedom** to ‘act with scrutiny’ plus focus on **Delivery & Performance** [Metrics & Targets (Goal Optimised)] should be rewarded, not restricted, if building **Resilience** is a ‘core essence’ of **Group Motivation**.

Practice, particularly **Better Practices** towards the **Environmental Stewardship** and Natural Resource firms access to their **Natural Capital** is a paramount strategic activity. Tactics being a key part of all **Strategic Thinking**. The **Optimised Reduction** cornerstone **Sustainability Economy (Article 9)** respects the full **Life Cycle Assessment (LCA)** framework **practice** -- not a **Linear Economy** (‘Take-Make-Waste’: “treating Nature as our toilet”) approach. The **Sustainability Economy** incorporates the **Circular Economy** primarily for **Pollution Reduction; Pollution Prevention** and **Reducing Emissions** (Product Footprints) helping to drive **Design** and incorporation of **Eco-Efficiency** into the Value Chains as their ‘chain of custody’ (**Custodianship**) -- tracking all components [**Optimised Reduction – Practices & Techniques; Purpose Fit – Specialisms (Arts/Crafts)**]. **Enhancing Productivity & Cost Reduction**; considering **Life Cycles & Design; Re-Purposing** Grey Utility to Blue Utility or Green Utility (Value-of-Use), all incorporated in the **Sustainability Economy**. **Better Practices** needed to be developed at a planetary scale which does not come cheap and is not simply a matter of **Technology Transfer**. The **Limitation** of the **Present State of Technology** particularly in Emerging Economies is more complex (Technical, Economical, Environmental, Political, Societal [TEEPS] **Sustainability Contextual Framework**). **Technical Limits** based on competence matters too, as well as **Physical Limits & Environmental Limits**.

Art/Craft for any organisation is a core **Creation Competence**. Ensuring the firm is resilient, being **Purpose Fit** is core to the firm being considered **Competent** and having **Competence** to fulfil its activities, actions and non-actions. **Distinctive Competency** being defined as what a person or organisation does or can do which is not readily reproducible. **Core Competency (or Strength)** being defined as what a person or organisation does or can do which is not obviously reproducible. An organisational **Core Competency** is its strategic strength. **Core Competencies**, typically linked to a specific **Specialism**, is defined as what a person or organisation does or can do which gives them **Value Advantage**. Core Competencies differentiate an organisation from its competitors – creates **Competitive Advantage** based on differentiated art & craft. Crafting **Working Landscapes** is a creation activity, regenerative working - not exploitative; leaving the landscape in a better state than the previous generation; adding **Governance Value**. **Sustainable Institutions** definitely have a key role to play forging specialisms, ensuring **Governance**. **Sustainability** is a ‘super discipline’, **Systemic, Cross Disciplinary Art/Craft**, built with **Hereditary Knowledge** cast from Economics, Social Science, Environmental Science and forged in **Ecology** guided by the **Science of Sustainability – Technical Social Environmental (Article 6)**, with a bedrock of **Applied STEM** (discipline-led ‘Science Technology Engineering Maths’).

Figure 1 illustrates how these **Wholeness** steppingstones and cornerstones can be assembled, ‘engineering the future’. The **Group Wholeness** (‘tribe’ concept) therefore assigns **Organisational Governance** with the



Financial sustainability... continued

Group authority to end micro-management and to instigate **Leaders Leadership** ('responsible' concept) to building resilience in Capitals Stock assets; testable through **Worthiness** (Opportunity Costs). **Freedom** to 'Act with Scrutiny' and focus on 'Delivery & Performance' [Metrics & Targets (Goal Optimised)] is important if future resilience is to be endured. Today, Humanity does have everything in Developed Economies except ensured future resilience. Its importance in Civil Society must not be taken for granted.

Freedom, acting with scrutiny and delivering future-proofed performance, will mean dividing up individual team's activity 'workplate' based on 'current' bedrock and 'new' emerging and to be created activities. This could be based on the following **BluePrint** approach built with **Leader Leadership** responsibility in mind:

- 1: **Freedom @Pace:** (1/3rd New Activities) Research, Experimentation, New Utility focused on 'moving' Mindset, enterprise 'energy', ReArchitect Limits
- 2: **Other Freedom:** (1/3rd Bedrock Activities) Technical Excellence & Functional Excellence delivery & performance
- 3: **Lifestyle – Wellbeing:** (Global Prosperity) Resilience & Global Sustainability; Changing Habit
- 4: **Toleration – Asset (& Organisational) Pathway Limits & Limitations** [Delivery; Performance]

Toleration is a recent consideration driven by the necessity to transition all economic sectors towards Sustainability. **Toleration** was a core composite of the **Age of Enlightenment** in the 17 & 18th Century, as was **Liberty**. **Freedom Toleration** comes with the willingness to respect or accept habits or opinions different from current or legacy technical specifications. Regulatory guidelines can only be 'future' tightened related to pollution & emissions. **Toleration**, today, is about working with the mindset to reduce to zero, even negatively extract historical, legacy waste discharged to the environment. Monthly asset or organisational targets need to be reviewed with progression inMind [**Optimised Reduction, Purpose Fit, Group Motivation**]; "touching minds, changing habits".

The importance of the **Wholeness** keystones of **Governance Governness** has been discussed in full in previous articles. However, **Worthiness**, was introduced only briefly in **Article 6**. **Trustworthiness** has however been a recurrent redress through most of these Sustainability Articles.

Responsible Investment has to be linked with the Wholeness keystone **Worthiness**. Projects or activities having 'sufficient' **Worthiness** – having **Value**, are obviously worth considering investing in. **Article 2** discussed issues of 'work done' and 'enhancing value' linked to the first real pioneer of modern day Sustainability, Edwin Dolan. In 1971, Dolan published TANSTAAFL⁽²⁾: 'There Ain't No Such Thing As A Free Lunch' becoming the bedrock of Natural Resource economics and a must read for anyone interested in **Natural Resource Ecology**. Dolan's book nicely discusses how 'everything of value' has a cost. There is an '**opportunity cost** – the idea that whatever you chose to do has a cost that is measured in terms of the other things (or activities) you could have done instead with the same time and resources', work done. Particularly with non-renewable resources, **full cost** pricing including waste disposal, harm from pollution, and depletion of resources is the only way for industry to co-exist with society, without gaining at the expense of others. Full cost pricing is **socio-efficient**. The polluter must pay the full costs was Dolan's core **Integrated Thinking**. Delaying full costs only makes the total costs higher. 'Anything 'free' costs twice as much in the long run, or turns out to be *worthless*'. Projects or activities being '*worthy*', ie having **Worthiness**. **Worthiness** matters particularly for **Financial Sustainability**. **Worthiness**, however, needs **Integrated Thinking** as well as **Systemic Thinking** to be relevant to today's 'opportunities'. **Stewardship**, "Doing Right for The Whole", how to use 'Ultimate Means' to serve best the 'Ultimate End'; requires new Mindsets delivering Better Development on the **Transformation to Sustainability** overcoming *Structural Barriers, Valuing Everything* and understanding the importance of *Governance* for the 'options' analysis of the next & future generations.

Worthiness is a societal dimension based more on the 'quality' that a project or business activity is competent in terms of the associated **Opportunity Cost**; **Doing Better** as a 'specification'. A project's **Worthiness** can be appraised based on its **Social Impact Assessment**; **Environmental Impact Assessment** and



Financial sustainability... continued

full **Life Cycle Assessment (LCA)**. A 'Worthiness Index' could also be constructed based on these studies, or activities, being assessed and then applying weighting through 'focus groups' representing local communities, local stakeholders & planners, environmental agencies, policy-makers & institutions, technical disciplines & functions, and commercial enterprise. **Sustainability Assessment Modelling (SAM)** based on Social, Environmental, Resource and Economic assessments can also be carried out.

To help support a 'Social License to Operate' (**SLO**) or a 'Societal License to Operate' (**SL₂O**), a **Mastery Audit**, built around **Technical Competence** should also be carried out – being experience & performance-led, assessing the specific activities **Riskiness** in terms of **Wholeness** – not **Fragmentation** as often results from carrying out **Risk Assessments** on 'known' rather than 'known & unknown' evidence, occurrences & happenings. Similar project experience, impacts & effects are instructive and insightful but **Riskiness** is about **Total Risk**; not just Current Risk or Full (Market) Risk. Evidence based on **Fact** or **Truth** matters being often a 'grey' area when considering **Total Risk**. **Mastery Audits** thereby help to ensure both **Technical Excellence** & **Functional Excellence** are well grounded and transparent, building **Societal Trust** that these activities reviewed are credible and trustworthy based on 'specific activities or project' **Riskiness**; hence **Mastery Audits** are a key part of **Worthiness**.

Opinions Facts Truth

'Opinions Facts Truth' matters when considering **Responsible Investment**. **Decision Making** depends very much today on **Limits & Limitations**, **Opinions Facts Truth** so Integrated Thinking & Systemic Thinking should play a critical role, as developed through **Worthiness**.

To 'Share the Dream' built on **Opinions** is something that also needs a lot of thinking, work done, discussion, repeat; **Testing Process**. **Knowledge (Content)**, particularly **New Knowledge**, has to be tested to ensure our experiences are not biasing through our beliefs or 'mind-image' (**Mindset**), obscuring reality; **Truth**. **Fragmentation** is a means of living with differences. **Fragmentation** demonstrates the heterogeneity of **Wholeness**. **Sustainability**, being a 'super discipline', requires **Integrated Thinking** and **Systemic Thinking**. Is it just a coincidence that 'sy**STEM**' has that construct? Science is based on **Evidence**; Engineering is based on discipline-led structured & systemic **Applied STEM** ('mega discipline' of 'Science Technology Engineering Maths'); and Economics can be based on **Pure Opinion** – often a belief, which may not be founded in 'actual' Behaviour today, but, 'missing' Behaviour – 'time will tell', if those 'gaps' were actually there. **Gaps** ('Unknowns') can always be there, in both, in the mind's understanding and our response; our **Values & Behaviour**; our **Habits**. Humanity's evolution – unlike all other species is very much 'in the mind'. The Sustainability 'desire' and Global Sustainability 'need' is to value everything, shows how Economics is still evolving – desiring and needing to value **Total Value** built from **Natural Resource Ecology** thinking; **Governance Value & Governness Value**. **Valuing Everything** has to come first in order to value everything (**Article 6**). **Worthiness** evolving from the **Testing Process** from Dolan's **Opportunity Cost** economic concept. **Continual Innovation** is not delivered 'blind', but, very much with '**Desire-in-mind**'; **Mission Oriented** but **Process-Led** repeated, challenge after challenge.

Because **Sustainability** is a 'super discipline', its construct sits above its fragmented different 'building blocks', 'elements'; **Composites**. Systemic dynamic 'Perspectives' of Technical Sustainability, Political Sustainability and Financial Sustainability are very complex and easily fragmented; compartmentalised heterogeneity.

All Sustainability 'Concepts' 'Theories' 'Frameworks' 'Mindsets' need to be tested [**thinking, work done, discussion, repeat**] for **Wholeness**. **Fragmentation** though important is not **Sustainability**. **Opinions** are a good starting point, listening comes before hearing; **Diversity of Thought** matters. One way to think & test 'Fragmentation vs Wholeness' is to think about **Capacity**. Has the organisation or project got more **Capacity** than the models and modelling would suggest? Do the models address the wholeness *essence* or are they composites of the 'whole'? Value-of-Use? (**Article 6**).

Capacity is the ability of People, Enterprise, Organisations and Society-at-large to manage their affairs



Financial sustainability... continued

successfully. **Capacity Development** is the process whereby People, Enterprise, Organisations and Society-at-large as a whole unleash, strengthen, create, adapt and maintain Capacity over time. Capacity is very much linked to **Wholeness**, core to **Sustainability**.

Facts are ‘things’ that are **Known** or proved to be **True**. They can also have a high, or very high probability of **Truth**. **Facts** are supported by **Evidence**, measurements where **Accuracy** vs **Precision** matters (**Article 6**). **Known & Unknown** (‘Gaps’) ‘things’ mean a lot of phenomena are not readily observable. The importance of **Riskiness** representing **Total Risk** being highlighted earlier. Methane (**Article 4**) cannot be seen from the ‘business window’ as it effects the *infrared spectrum*, not our *white light spectrum* which Humanity can only ‘see’. So with Concepts & Theories which are created - how good they are depends ‘in the future’ on their utility based on predictability of ‘future’ outcomes. That often needs these ‘future’ outcomes to happen to ensure that they are grounded in **Fact**. So facts have a **Time** composite as well as **Content Space**.

There are a lot of ‘future’ events in Sustainability - such as primarily all Climate Change **Tipping Points** attempted to be expressed in **Planetary Boundaries** theory⁽⁵⁾. But as discussed in these Articles is not the **Planet’s Boundaries**, between the **Urban World** and the **Natural World**, just as important, if not more; eg **Human Nature?** Respecting the **Planet’s Boundaries**, working with Nature – delivering **Better Development** to save our Planet; Political Vision of Global Sustainability (**Article 7**). Heterogeneity matters – one opinion cannot dominate. Evidence on **Planetary Boundaries** is still being researched today even though it was proposed in 2009, with COP26 **catalogue for reference** finally focusing the wider audience onto the importance of Oceans, particularly **Deep Oceans** (below 3000m) which looks like the **Blue Planet** of Nature Stock is key to regulating the Planet’s Climate (**Article 7**) -- the **elephant in the room** at COP26; **International Waters**. Lovelock, in 1979 highlighted how poorly Humanity understood Nature, “everything in Our Living Planet is interconnected”. Scientists are still working on the **Planetary Evidence**. Be wary of ‘Doughnut Economics’ if built on unsure bedrock.

Johan Rockström’s Planetary Boundaries and the UN’s Sustainable Development Goals (**Article 7**) represent great examples of how complex Sustainability is, delivering Sustainability without full **Facts**. Managing without **Factual Measurements** is not new as Humanity is very creative. ‘Manage only what you Measure’ unfortunately is **Fragmentation**. Being **Responsible** means ‘Management by Authority’ is not enough operating and delivering with **Limits & Limitations**. Micro-management needs to end. The need and desire is to **ReFrame & ReArchitect** -- instigating **Leader Leadership** to ensure enduring **Resilience**; moving across different economies. **Freedom** to ‘Act with Scrutiny’ and focus on ‘Delivery & Performance’ (Goal Optimised) is important enough to demand change to hopefully ensure **Resilience** is to be endured in many commerce sectors. Developed Economies do have a head start but the importance in Civil Society must not be taken for granted. The **Capitalist Society** has goals too needing **Doing Good** and the desire of **Doing Right**. The role of Business in Society is an ancient matter which up until now there has been no agreement which settles this matter; this situation has not been conclusively determined and may never be if Humanity continues to ‘take’ the future.

Freedom, acting with scrutiny and delivering future-proofed performance, will mean dividing up individual team’s activity ‘workplate’. **Freedom Toleration** comes with the willingness to respect or accept habits or opinions different from current or legacy technical specifications. **Quality** is all about meeting specifications. This means during transformative transitions, **Excellence** rather than **Quality** is where **Leader Leadership** needs to focus. Even more reasons why ‘Management by Authority’ is now obsolete – replaced by ‘Governance by Authority’ with Teams responsible & responsible with scrutiny (Technical Assurance; Mastery Audits) and delivery through optimisation; **Goal Led** on the pathways to destination **Sustainability**. Management of Teams, Disciplines and Functions still matters but ‘policed’ through having ‘Chiefs’ too. ‘Management without Chiefs’ was key to speeding up **Exploitation**, but, under **Stewardship** needs **Restoration Regeneration; Re-Architecture**.

Excellence matters because then ‘authority’ just has to focus on risk, riskiness, strategy, scrutiny, audits, delivery



Financial sustainability... continued

– often called **Good Governance**. Governance focuses on **Dynamic Materiality** – value, impacts and effects is just as important in a world with ‘limits & limitations’, as accountability, strategy, business model, opportunities, performance, and outlook (**Article 3**). Building an organisational workplace around ‘common purpose’ and enterprise cultural ‘collective values’ matters; getting work done through the **Ingenuity Culture**; and **Safety and Wellbeing Culture**. When company **Purpose** (‘Why’) and ‘meaning’ connects with current and potential employees, their engagement gives people the enterprise energy & passion (**Motivation**) to achieve more.

Today’s **Economic Social Environmental TBL** ‘Dimensions’ also make up a rich **Fabric Materiality (Article 6)**; a **Tapestry** from which going forward is improved and enduring so that **Sustainability** attainment ‘performance’ can be also ‘marked’; through **Standards of Performance**. Managing without **Factual Measurements** and resulting to ‘Manage only what your Measure’ unfortunately is **Fragmentation**, not Sustainability. This TBL **Tapestry** should consistently illustrate that there is a balance between each ‘Dimension’, NOT a trade-off by any means. Everything has to be valued – Sustainability is all about **Valuing Everything**. Annual **Sustainability Reports** and **ESG Reporting** which just focus on **Impacts & Effects** miss the **Value Composites** gained through valuing everything. **Sustainability Reports** and **ESG Reporting** need to build a broader narrative; **Content**. **Insight** then enables focusing on what really matters; **Materiality**. ‘Resilience & Fit’ being the primary **Process Test**; ‘perfect being the enemy of Doing Good’.

Manufacture Production Delivery of **Value** is core to the **Technical Pillar; Value Creation & Wealth Creation**. As **Capitals Stock** determines our humanity’s survival, our **Happiness**, the **6 Capitals Stock model** is the best place to start **Valuing Everything; Stock-of-Life**. Once the **Desire** to attain delivers new more sustainable Stock-of-Life; **Needs** can then be more easily satisfied through responsible Political Governance; **Prosperity of People & Planet (3Ps)**.

Truth vs Ideology needs a lot of thought and ‘**thinking, work done, discussion, repeat**’. The letters of the alphabet are representations of ‘sound’. The way something is ‘described’ or ‘characterised’ – “idea of truth” can be just models or even a picture or image. What’s in the Public Interest (or Harm) may not be the same as what the Public, ‘Society-at-large’ (**Civil Society**) is interested in – Public Curiosity. **Tribes** are groups of **People** representing or characterised by an **Idea of Truth**. **Truth** determines **Human Behaviour**. With **Idea of Truth**, inevitable changes in ‘frame’ occur with the passing of time. This means ‘common sense’ or myths are overcome by **Insight**, built from **Content**. Different ‘thoughts’ can be deemed a threat to an **Idea of Truth**, a disruption to underlying Tribe or Group structure – moral, ethical, religious **Values & Behaviours**. **Ideas of Truth** are common occurrences with **Sustainable Development** ideology linked to Relevance, Ownership, Morals, Ethics, Equity, Justice, Realignment of and Redistribution of Opportunities & Wealth; a thick soup of often bubbling **Global Quadruple Bottom Line (GQBL)** ‘magma’.

With ‘happenings’, the **Principle of Salience** effects how individuals and organisations such as **Corporate Governance Boards** react to an ‘event’. Firstly, their attention is drawn to the ‘thing’ that is the most relevant to them at that moment in time, rather than ‘events’ or ‘outcomes’ with longer term repercussions. How they individually react depends on how closely they have been linked to that ‘event’ or ‘outcome’ or having actually experienced similar, at close-hand. A report about a ‘fire’ may not change **Human Behaviour** as much as actually witnessing, seeing and smelling its after-effects. So to change the Culture (**Values**) and to put **Sustainability** front and centre can take courage aided by **Salience**. **Regulatory Compliance** is a good means to ensure **Better Practices** and **Better Developments** are adopted and enacted longer term. But that needs **Better Government** first.

Opinions Facts Truth create the need to instigate the **Testing Process**. Poor Practices & Doing Bad (**Doing Wrong**) waste time, enterprise ‘energy’ and effect **Group Motivation**. **Reputation** loss effects the ability to gain **Responsible Investment**. **Reputational (Brand) Capital** loss will severely effect **Current (Market) Value**, particularly **Market Capitalisation** worth, effecting **Enterprise Value (Article 4)**. Hence **Doing Right** and **Doing Wrong (Figure 2)** matters when considering **Responsible Investment**. The difference can become subjective,



Financial sustainability... continued

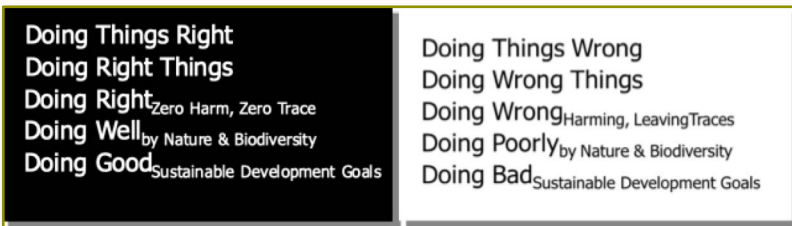


Figure 2. 'Ideas of truth'. Doing right vs doing wrong

with often in-action delaying the timely collection of relevant **Evidence**. The **Principle of Salience** is worth discussing as part of **Group Motivation** (Figure 1). Removing **Bad Practices (Citizenship)** from the Supply Chain and increasing **Opinions & Options** through **Diversity of Thought** is just good business common sense.

Sustainability Contextual Framework [TEEPS]

Sustainable Value? is linked to **Enterprise Value** and **Sustainability Value**. To answer that question, as does Sustainable Development? Sustainable Commerce? is best answered by asking other questions; set in a defined **Context** (boundary conditions) (**Article 4**).

The **Sustainability Contextual Framework [TEEPS]** has **6 Pillars** built on the foundation of the four core **Sustainability Practices**. **Sustainability Technical Limits** based on competence matters, as well as **Physical Limits & Environmental Limits**. **Responsible Investments** in **Global Sustainability**, particularly in Emerging Economies, is more complex (**Article 7**) hence why **Technical, Economical, Environmental, Political, Societal [TEEPS]** 'Pillars' have to be understood systemically to ensure the total 'context' is understood and transparently assessed. The **Economical Pillar** includes **Economics, Commercial, Organisational** sub-composites; and the **Societal Pillar** includes **Economic (Economy)** and **Social** composites.

These five 'technical' Project or Product **TEEPS Pillars** form the building blocks of the **Sustainability Contextual Framework** built on the foundation of the four core **Sustainability Practices: Stewardship, Citizenship, Custodianship and Guardianship**.

Figure 3 illustrates that the **Sustainability 'roof'**, umbrella-like, rests on these **Sustainability Pillars**, providing the **Technical Competence**. When carrying out **Product Life Cycle 'eco-auditing'**, the Sustainability Contextual Framework **TEEPS** becomes an integral part of all **Product Life Cycle Analysis ('LCA')**. Limits around Known &

Unknown **Product Performance** impacts & effects -- due to Technical, Physical & Environmental Limits need to be assessed and transparently reported.

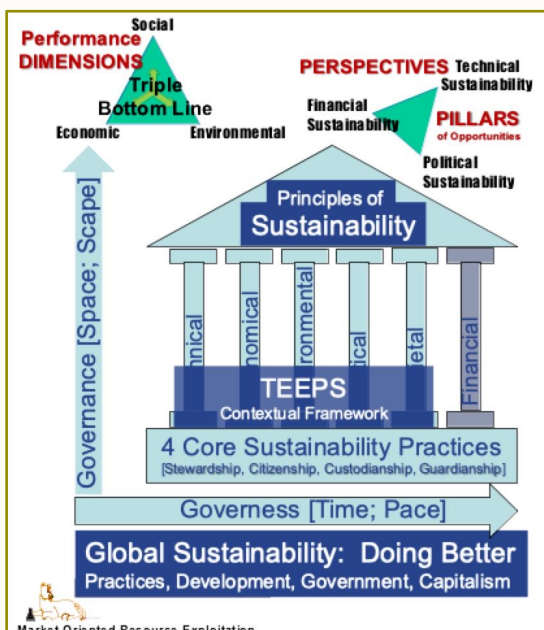


Figure 3. Sustainability pillars, dimensions, perspectives

With **Sustainability**, Integrated Thinking requires 'balancing the dimensions' and not the trade-off between the **Economic Social Environmental** Dimensions called the **Triple Bottom Line ('TBL')** after John Elkington⁽²⁾ in 1999. The **Science of Sustainability – Technical Social Environmental (Article 6)** guides. The **TBL Framework** was introduced to encourage the 'governance of companies' to think more than just about main stream **Corporate Finance**⁽⁶⁾ with business **Financial Accounting**, profit & loss as presented in their annual **Financial Reporting**; and more about Social Consumption and Environmental Waste.

Corporate Finance⁽⁶⁾, the theory of, enables the understanding behind predominantly the current market **Enterprise Value** and the longer term **Sustainability Value**, so **Total (Intrinsic) Value (E_v + S_v)**; and why Corporate Governance and Financial Directors & Managers "behave the way they do". Good

understanding of the theory helps you ask the right questions when times change and new challenges must be analysed. Financial theory is used to solve practical problems – financial decisions (investment &



Financial sustainability... continued

financing); and to illuminate the **Facts**. *How much to invest? What specific asset ‘species’ class to invest in? How much should be raised externally?* Financial theory is not perfect and complete with continual controversies “on what firms ought to do”. **Success** is best judged by increased **Value**, the **Additional (Net) Value; Sustainable Value?**

For **Market Traders** that’s ‘buy low, sell high’ – “the problem (‘question’) is how to do it”. The ‘theory’ is not simply ‘read’ ‘do’. The **Wholeness Composites** being **Financial Capital** (access to **Wealth**), **Social Capital** (access to **People & The Market**, ie **Global Funding Networks** – the theory helps to evaluate how **Financial (Real) Assets** are **Valued**), **Financial Services** (access to **Human Capital** & Financial Practices, Processes, Frameworks, Systems), **Time**, **Uncertainty Space** and **Risk**. The **essence** builds with “experience, creativity, judgement, and a pinch of luck?” So two major constructs for the **Financial Pillar (Figure 3)**: **Investment Decisions** (Capital Budgeting) & **Financing Decisions**.

For some corporations, **Corporate Social Responsibility**, being Good Citizens, became important well before 1999, dating back to the 1950’s; to work and do business ethically and to respect worker rights through-out (their Supply Chain). On 10th December 1948, the General Assembly of the United Nations announced the **Universal Declaration of Human Rights (UDHR)** - 30 ‘rights and freedoms’ that belong to all Humanity. The **Supply Chain** involves all parties in ‘contract’ to fulfil a **Customer Client Request** -- leading to **Customer Client Satisfaction**. The associated **Value Chain** is that set of interrelated activities a company uses to create **Competitive Advantage**, with the **Core Competencies** differentiating an organisation from its competitors. Around 2005, Corporate ESG (**Environmental Social Governance**) reporting became more routine, taking into account Environmental and Social factors along with financial ‘governance of corporations’; (**Corporate Governance**). The (Corporate) Governance, the Board is responsible for traditional **Financial Reports** as well as for preparing and reporting in annual **Sustainability Reports** what was ‘material’ or relevant to their **Business Models**. **ESG Reporting** means today companies have to provide broader information to financial investors to ensure efficient, effective and timely **Investment Governance**, often called **Stewardship Practices** - aiding ‘responsible investors’. Commerce still does not have agreed-on **Global Sustainability Reporting Standards** even in 2022. A great example of **Unsustainability**, fragmentation with some 14 taxonomies for **Sustainable Finance** existing today, with the EU focusing on **Environmental Sustainability** regulation.

For Product and Resource Life Cycle Analysis, these five Technical Project or Product **Sustainability Pillars** [Technical, Economical, Environmental, Political, Societal] are sufficient to build the **Sustainability Contextual Framework**. However, as **Article 7** discusses, the six Pillar, **Financial Pillar**, is also very influential as **Global Sustainability** cannot be achieved without **Global Partnerships**, which needs **Global Finance (Financial Capital) & Global Funding Networks (Social Capital)**.

Responsible Investment funds now run into the \$-trillions so **Investment Governance** is now “big time” creating ever-burgeoning financial **Environmental Social Governance** [‘ESG’] Practices. Achieving Global Sustainability is not just Government-to-Government ‘doings’ (Doing Right, Doing Good, Doing Well), but, also the Private Sector, Business-to-Business who deliver to Society the desired goods & services. The Private Sector must move to the new utility by **Doing Right** which the **Capitalist Society** now desires; full of **Better Practice**. So is ESG today about Business Model **Material Risk** or about achieving (**Capitalist**) **Society Goals**? What about Environmental & Social **Impact & Effects**? **Sustainability Performance – Optimised Reduction? Good Governance?**

So the **Six Pillars of Sustainability** are **Technical Economical Environmental Political Societal Financial (Figure 3)**. The **Financial Pillar** being instrumental in determining the ‘space’ and ‘scape(s)’ which enterprise can occupy. Given a strong ‘technical’ **TEEPS** framework plus with good **Governance**, the ‘pace’ having **Technical Competence** as well transparently reported. **Global Sustainability** simply **Doing Better** through Better Practices, Better Development, Better Government, Better Capitalism will all need **Financial Competence** too; **Technical Sustainability, Political Sustainability & Financial Sustainability** being the **Pillars of Opportunities (Figure 3)**.

Dynamic Investment

Capitalism is the market mechanism that delivers rewards to those who put up the Capitals Stock and those



Financial sustainability... continued

that took the risks in producing & manufacturing -- delivering the Resources or Products to market, satisfying consumer demand. Market opportunities create **Sustainability Value**. **Capitalism**, therefore, is the productive use and reinvestment of the Capitals Stock (**Article 6**). **Dynamic Investment**, investing and reinvesting, is needed to deliver the new utility to get to **True Sustainability**. Flourishing global Capitalism is needed due to increasing Human Population. Full **Sustainability** benefits cannot be achieved at a planetary scale by simply shrinking our way to that destination. Investment and the provision of Financial Services being the 'pillar of opportunity' which **Financial Sustainability** offers, creating future utility.

The **Dynamic Investment** needed over the next thirty years to achieve limiting the Planet to a 1.5 Degree C temperature rise, as outlined in the Paris Agreement at COP21 in 2015, has recently been estimated at some \$100 – \$150 Trillion (**Article 7**). This will require mainstreaming **Financial Sustainability**. The Paris Agreement is a legally binding international treaty on Climate Change. Further ongoing 'Adaptation' costs past 2050 have not been estimated as the costs to 2050 are based only on 'linear' effects on the **Planetary Boundaries**, without natural tipping points causing more complex 'happenings'. Humanity has reached the point in time where we can take, or make, the future. Any further delays would be financially unsustainable through **Dynamic Investment**. Any further delays only increase the financing needed to fund **Loss & Damage**, **Adaptation** with increasing **Physical Risk** to assets, **Transition Risk**, **Liabilities**, and consequential loss of **Reputational Capital**. Humanity has reached the limitations of the global financial system.

Environmental Social Governance (ESG)

Material Risk, Delivering Society Goals

Post-2008 **Global Banking Crisis** has ensured enterprise governance and management practices are now strongly embedded in business commerce – aimed at being responsive; particularly in response to increasing **Investment Governance**, Environmental Social Governance ('ESG'). More importantly, an overall 'business sense' of impinging societal and environmental issues, not just ongoing business market concerns on day-to-day operations, but, needing to make better informed decisions – Sustainability becomes more than just a discussion. This means **Governance** has to be responsive to enduring **Sustainability** – more than just TBL considerations.

Governance is the organisational benefit of the enterprise being worth or valued more than just the sum of its parts – its *full* collective benefit. **Good Governance** adding **Additional Value** to **Sustainability Value**.

Governance is the activity concerned with setting goals, the direction to be taken to achieve these goals; its roles and responsibilities of functionaries; what an organisation must do and what it should become in the future; the 'concern' of governance ensuring compliance with the rules and regulations and making necessary changes in 'command & control' policies to avoid conflicts inside and outside the organisational 'production' boundary (**Article 5**). Typically, in **Business Sustainability**, three main areas of governance exist: project, business & corporate.

ESG Reporting has become a large part of **Corporate Governance** reporting with corporations not only publishing an annual **Sustainability Report** but also TCFD, GRI, IIRC<IR>, SASB and Climate Change Reports - all highlighting organisational risk (**Material Risk**), sources of risk and 'judgement through insight'. These practices now form the bedrock of **Financial Sustainability**. Through **ESG Reporting**, Corporate Governance now has a chance to win Society over – by delivering on **Society Goals** too. The role of Business in Society is an ancient matter. Up until now there has been no agreement but this may be finally starting to change – business and businesses are changing.

ESG only covers Environmental, Social and Governance. **Sustainability** is also about Governness, Governness, Worthiness, Riskiness and Integrated Thinking (TBL) & Systemic Thinking; about the Perspectives of **Technical Sustainability**, **Financial Sustainability** and **Political Sustainability** - where the 'future' opportunities and risk reside; **Global Prosperity of People & Planet (3Ps)**. **Governness** provides the **Content** about tomorrow's next and future generations. The modern **Sustainability Landscape** has evolved considerably since Dolan's book in 1971. For Business Sustainability, the **Economical Pillar** includes **Economics**, **Commercial**, **Organisational** sub-composites; and the **Societal Pillar** includes **Economic (Economy)** and **Social** composites.



Financial sustainability... continued

Producing at the expense of others is not sustainable hence having a **Business Purpose**, being social-oriented, is at least prudent if not paramount in resource and even product manufacture production delivery **Operations**. The Industrial Agricultural Energy Transitions are simply about moving from one Capitals stock, system to another so actually a **Transformation** Transition having addressed the issues of **Conservation**. The objective of Political Sustainability **Policy** is to ensure **broad constructs** are formed to draw in 'Capital 1886' based on current and evolving ESG Best Practice and Investment Governance -- Financial Institutional acting to 'contract' & 'transact' the future – not to take the future; **Responsible Investment (Article 7)**. Hence why **Corporate Governance** is so key to **Sustainability** adding value through internal funding of **Operations & Projects** but also create value as the necessary **Responsible Investment** finance will be available at a more reasonable **cost of capital** to finance the new utility, creating Operations & Projects with a strong tapestry of Economic Social Environmental, **Triple Bottom Line** ('TBL'). Developing real assets for the future; benefiting also associated Stakeholders, Local Communities and even Society-at-large when the necessary scale is achieved is simply good business to those companies having a **Social Oriented Business Purpose (Article 4)**.

Responsible Business Models have not delivered fast enough; the **Visible Hands** are ensuring the pace is picked up as issues of resilience are being added. The slower the pace of relevant, Responsible Investments – the larger the **Manufactured Capital** stranded resources and ultimately stranded assets will be. The new frameworks we adopt for being a **Responsible Business**, in each business sector, have now moved beyond philanthropy and simply paying taxes, to be an integral part of the core business strategy & models, and guiding set of **Sustainability Practices** – requiring Integrated Thinking & Systemic Thinking, enacted through TBL and creating the **Pillars of Opportunities**.

However, due to **Succession**, additional **themes** and activities are not required as **Visible Hands** in the marketplace are now active; some proactively. This context to some means that Competitive Advantage, not just Comparative Advantage can be gained by embracing this additionality – typically linked with economic externalities. **Capitalist Society** can get involved through philanthropy or simply paying taxes, but, issues like Net Zero are about decarbonisation of all industries, agriculture and energy provision; **Carbon Removal** needing **Continual Innovation & Entrepreneurialism**. Relevant, **Responsible Investments** and **Governmental Policies** dictate how fast Net Zero is achieved; and its Net Pace. Supply of new products will deliver new demand through new behaviours.

ESG1 & ESG2 Composite Models

Value Impacts Effects

Financial Institutional act to build the future – not to take the future. They have a vested interest because of their **Wealth** built from **Global Capitalism** which is the productive use and reinvestment of the **Capitals Stock** to generate both **Short/Near Term Value & Sustainable Value**, through **Responsible Investments**. **Short Term Value** investments since the **2008 Global Banking Crisis** can be just as risky, with UK Capital Markets effected also by 'political events' like Brexit and 'social tragedies' like Covid. With unstable current market valuations and the longer term uncertain, it is not surprising that **ESG** has become the 'process of choice' for Corporate Boards, through Corporate Governance, to communicate externally with **Financial Institutions** and the **Investment Community**; individual investors, hedge funds and institutional investors such as commercial banks and pension funds. **Long Term Finance**, in particular, has its attractions.

There are basically two ESG composite model approaches to create the narrative & story, as well as transparency necessary, to gain the firm's necessary short/near term and longer term **Financial Capital** to give enough headroom within their **Working Capital** to pursue new opportunities.

ESG₁ is built around the additional financial benefits the **Enterprise Value** will gain through medium term **Value Creation & Risk Mitigation** of 'Environmental and Social' impacts and effects; most likely linked to the current **Business Strategy**. More about 'growing' economies – through increased consumerism; **Customisation** and tweaking 'mature' economies – through material waste reduction or even prevention; **Sustained Desire**. **ESG₁** will clearly explain the current Purpose and enterprise Values & Behaviours.



Financial sustainability... continued

ESG₂ is built around **Sustainability Strategy** – a vision or mission creating additional **Triple Bottom Line** benefits, not just financial, of longer term **Value Creation** through **Sustainability Value**. More ‘creation of the new’ economies through **Innovation**, potentially also ‘surviving’ economies through **Mass Technology** at scale – often creation to achieve **Society Goals** and **Inclusive Capitalism**. The ESG₂ narrative & story will not be built around accurate Materiality measurements but more Brand Marketing with insights, creating shared value with prominent ‘Societal and Environmental’ Pillars context; building on supply chain resilience and potentially social justice & equity. Technical Competence being focused on Renewables, Restoration, Regeneration; **Re-Architecture**.

Financial Reporting even after 120 years is still not optimal. **Sustainability Reporting** even after only some 10 years is at best evolving but most likely will be subject to legal, regulatory and soon **Due Diligence** assurance, similar to current Financial Reporting which is seen as a necessity.

External **Corporate Communication** has a key choice, one built on just **Business Strategy** or one built on **Sustainability Strategy**. Clearly, internally that means that Enterprise Value & Sustainability Value need to be fully understood, differentiated and that the process of Business Strategy & Sustainability Strategy creation must be combined – a co-strategy which then is effectively marketed – communicated as either ESG₁ or ESG₂ to give the necessary transparency. Clearly, for the Investment Community, ESG₂ approach means it is even more likely that the ESG data Quality Assurance will be ‘limited’ and for ESG₁ the data Quality Assurance will more likely have ‘reasonable assurance’. Pretending to ‘Manage only what your Measure’ unfortunately is **Fragmentation**.

ESG₁ can be likened externally to the **Profit People Planet** framework with **Integrated Thinking**. Issue being **Relevance Risk**, linked to the governance primacy of **Profit Maximisation** plus the governance issue of the new generation having a very different viewpoint on the future relevance of existing legacy ‘stock’, its Resources and associated Products, its associated practices, impacts & effects.

ESG₂ can be likened externally to **Prosperity of People, Planet** framework with Integrated Thinking & Systemic Thinking. Wholeness linked to **Values** (linked to Value), **Quality of Life(-Style)**; **Doing Right, Doing Good & Doing Well** through Purpose; Governance Governness Worthiness integrated-systemic communication. Issue being **Consequential Risk**, linked to mainly Practices & Processes which fall short of being social-oriented; if just being market-oriented can result in loss of **Reputational Capital**. **Doing Well** reflects the needs to protect **Planet’s Boundaries**, from Urban World’s footsteps into the Natural World. Activities, actions and non-actions resulting in more Natural World loss is not good news for ESG₂. A ‘culture of ingenuity’ – an innovative culture delivering appropriate solutions only minimise **consequential** outcomes; and ‘culture of safety & wellbeing’ with ‘events’ and ‘happenings’ can also still result in **consequential** outcomes.

Triple Bottom Line is pretty clear - economic activity is the only dimension that delivers **Prosperity** and there is only one mechanism ‘capitalism’ which has actually delivered a global ‘economy-at-scale’. Unfortunately, current **Capitalism** only values ‘flows’, not ‘stocks’. Stranded assets in transitions are inevitable. Learning from the **Tragedy of the Horizon**, we have to learn to value ‘stock’ not by consequential loss; environmental or biodiversity loss. Thus, for those respective products and resources, it is very important for companies to understand the additional value of non-use ‘stock’ to make fully informed decisions for consequential Impact & Effects on Planetary Ecosystems. In addition, respecting the Planet’s Boundaries between the Urban World and Natural World will only increase as the current generation hands over to the new generation, more akin to being ‘Good Guardians’. **Good Guardianship**, the fourth guiding **Core Practice of Sustainability** – protecting Planetary Living Commons, Green Commons, Global Cover & Natural Ecosystems. Companies need to have due regard of their own **FootPrint** and respect the Planet’s (societal & environmental) Boundaries; and protect **Natural Wildernesses** from our **FootSteps**. This requires a ‘Ring of Protection’ and the ability to track all of humanities **FootSteps**.

Sustainability Reporting

Sustainable Value depends on having a responsible and resilient **Business (process) Model**, built around the



Financial sustainability... continued

‘offering’, focused on ‘inputs’, ‘outputs outcomes outtakes’ & ‘materiality’, are now fully integrated into corporate annual reporting. These composites vary over time; **Dynamic Materiality**. On the ‘inputs’ side, we identify different concerns (or issues) that business chooses to consider material and address. On the ‘process’ side, we focus on various organisational perspectives that business takes. And finally, on the ‘outputs outcomes outtakes’ side we find different values that business creates, nurtures or chooses to preserve for later; steward. **Stewardship; Doing Right for The Whole** through **Decision Making** focused on ‘activity’ leading to **Action**, planning that **Action; Action Plan** typically over the next few years (1-3+ years). Forward looking.

A focus on ‘inputs’ can define **Business Sustainability** according to the relevant concerns considered by business (‘What’; ‘Where’). A focus on ‘process’ defines **Business Sustainability** according to the organisational perspectives taken by business (‘How’). A focus on the ‘outputs outcomes outtakes’ defines **Business Sustainability** according to the values created by business (‘What for’ Society: Boundaries, Frontiers & Environmental Limits). So transparency on the ‘story’ (**Reporting**) behind the **Business Model** and the **Business Purpose** (‘Why’) provides value to the reader and what any investor should actually needs to further understand and do associated research analysis on.

Understanding the **Governance Value** – Existence Value & Future Value, means associated surface **Resources** and **Capitals Stock** need full assessment – and should be reported in some manner in annual corporate Sustainability Reporting. Annual Financial Reporting is about **Governance Value** and (Corporate) Financial Performance⁽⁶⁾; annual Sustainability Reporting should be about **Governance Value**, Sustainability Performance: Impacts and Effects -- built around **Dynamic Materiality**. Relationships with **Stakeholders** and formalised **Partnerships** are also key to Sustainability, keystones to the governance and governess activities of full **Stewardship** (Business-Technical-Resource-Product). **Business Sustainability** is built on **V&5Cs** (Value & Capitals, Connections, Cooperation, Collaboration, and Co-organisation).

Annual **Financial Reporting** is well understood and drilled - built around global ‘Standards of Financial Accounting’ and protocols; and national Corporate Governance ‘codes of conduit’. Annual Financial Reporting is built around the **Enterprise Value** creation activities and the created or captured values in the form of financial wealth creation. Creating value and created value is the ‘cross’ companies must bear as they make their way up the ‘hill’ towards ‘redemption’ through wealth stock assimilation – needing collective Human Capital to carry that ‘cross’ along the chosen pathway. For natural resource companies, **Reserves and Contingent Resources** are well documented in strategic reports giving access to valuations supporting **Enterprise (Governance) Value**.

Annual **Sustainability Reporting** covering ‘materiality of activities’ and ‘Environmental Social Governance’ metrics and performance are still evolving - particularly needing a global ‘Standards of Financial Sustainability’ to provide clear, binding, procedures on past, current and forward Sustainability data, assessment, response (through **Action Plans**) & disclosure. Current Sustainability Reporting seems to only concentrate on past performance data through the ‘eyes’ of Corporate Governance, and, surprisingly not *current data* and *forward data* – particularly related to next and future generations, through the additional ‘eyes’ of Governess (**Article 5**).

Figure 4 illustrates a ‘wholeness framework’ for **Sustainability Reporting**. As discussed above managing without **Factual Measurements** and resulting to ‘Manage only what your Measure’ unfortunately is **Fragmentation**, not Sustainability. Having a ‘wholeness framework’ is important due to the ‘forward looking’ nature of Sustainability Reports and ESG Reporting. TCFD (Task Force on Climate-related Financial Disclosures) recommended framework for instance being **Governance Strategy Risk-Management Metrics-and-Targets**. ‘Forward looking’ means lack of **Facts (Factual Data)**. So **Data Assurance** is key behind the ‘story’, needing validation of ‘known’ data through internal audit and external audit, depending on the ‘materiality’ to the **Business Model**. So reported ‘materiality’ has limited or reasonable assurance. Depending on which determines the value of the annual **Sustainability Report** to the **Investment Community** and what Investors actually ‘need’.



Financial sustainability... continued

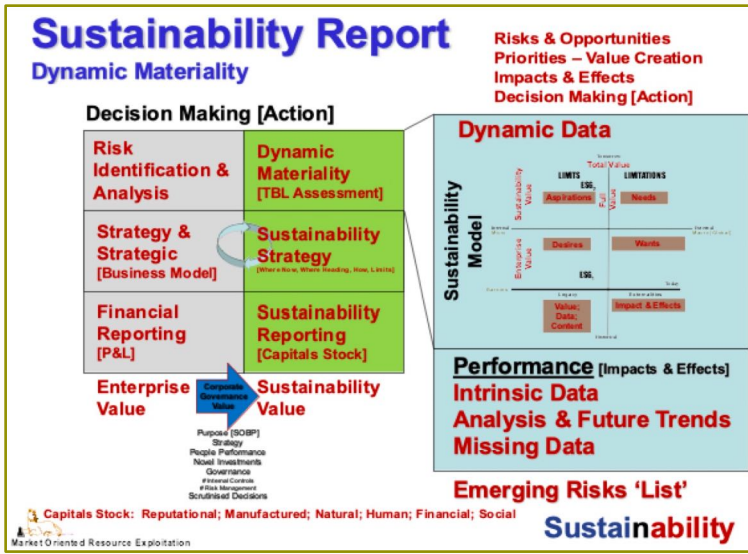


Figure 4. Framework for sustainability reporting

GRI STANDARDS	
GRI 11: Oil and Gas Sector 2021	
11	<ul style="list-style-type: none"> Topic 11.1 GHG emissions Topic 11.2 Climate adaptation, resilience, and transition Topic 11.3 Air emissions Topic 11.4 Biodiversity Topic 11.5 Waste Topic 11.6 Water and effluents Topic 11.7 Closure and rehabilitation Topic 11.8 Asset integrity and critical incident management Topic 11.9 Occupational health and safety Topic 11.10 Employment practices Topic 11.11 Non-discrimination and equal opportunity Topic 11.12 Forced labor and modern slavery Topic 11.13 Freedom of association and collective bargaining Topic 11.14 Economic impacts Topic 11.15 Local communities Topic 11.16 Land and resource rights Topic 11.17 Rights of indigenous peoples Topic 11.18 Conflict and security Topic 11.19 Anti-competitive behavior Topic 11.20 Anti-corruption Topic 11.21 Payments to governments Topic 11.22 Public policy

Figure 5. GRI 11: Oil&Gas sector [2021]⁽⁷⁾ {Dynamic data}

Figure 5 illustrates the ‘themes’ or topics related to the latest **GRI Standards (2021)** for the Oil and Gas Sector. The value being in the **Dynamic Data** populating each topic. This **Structured Thinking** and process framework (**Figure 1**) aids **Organisational Governance** (‘Group’ Level) to report consistently but also to aid the **Investor Community** to compare different companies of the same ‘species’. Other industries have differing composites. This is why **ESG Analysis** based on different algorithms gives different results – so depending on the ‘characteristics’ of each ‘species’ depends on whose ESG analytics Responsible Investors should benchmark their portfolios and individual decisions. Very complex.

From a **Sustainability Performance**, Impacts & Effects viewpoint, the Intrinsic Data, Analysis & Future Trends, Missing Data is key to the ‘story’ as well as the emerging Risks ‘List’. The **Sustainability Model**, Limits & Limitations, Desires-Needs-Wants-Aspirations, ESG₁ vs ESG₂, Internal vs External, Today vs Tomorrow, Legacy & Externalities; all adding to the ‘richness’ of the **Dynamic Data**. For Transnational Corporations in particular, **Corporate Governance** is also important to report Purpose [SOBP?], Strategy, People Performance, Novel Investments, Governance (through Internal Controls & Risk Management), Leader Leadership, and Scrutinised ‘Decision Making’ processes & mindsets.

Governance Value reporting of **Existence Value** (ie Speculative Resource) or **Future Value** (ie Prospective Resource and Speculative Prospective Resource) seems absent by comparison in current Sustainability Reports. Why? Is not the next and future generations safety not a core **Sustainability Principle**? Why is current Sustainability Reporting not reporting **Value** or at least ‘priorities’ for **Value Creation** as much as **Impacts & Effects**; just **Performance** based on monitoring ‘elements’ deemed ‘material’.

How many of these ‘elements’ are actual composites to Sustainability (‘Desires’) and Global Sustainability (‘Needs’). Should not there be more specific insights and expectations of company’s **Speculative Prospective Resources** (plays & leads), **Prospective Resources** (drill ready prospects) & **Speculative Resources** (discovered resource, undergoing delineation or economic evaluation) – an important part of the annual ‘stock-take’ where existent and future value reside -- the longer-term **Intrinsic Value** of hydrocarbon provinces; the resource for future enterprise and value creation, capture and appropriation?

TBL ‘Compounds’: Socio-Economic, Eco-Efficiency, Socio-Environmental

Figure 6 illustrates that by combining two Triple Bottom Line **Dimensions**, then the resulting **TBL Compounds** being **Socio-Economic Eco-Efficiency Socio-Environmental**. **TBL Dimensions & TBL Compounds** need to be considered with **Sustainability Practices**; with **Integrated Thinking** requiring the ‘balancing the dimensions’

Financial sustainability... continued

and not the ‘trade-off between dimensions’ as so much more is embedded as the **TBL Compounds** matter too as ‘agents for change’.

In **Article 1**, the notion for those new to ‘Sustainability’ was to think of **Sustainability** as core to *future jobs*, *wellbeing* and *protecting* our **Planet’s Boundaries**. **TBL Compounds** illustrate not only Job Creation, Wellbeing ‘gezellig’ Togetherness (‘Society & Nature’) and the protecting the Planet’s Boundaries – but **Integrated**

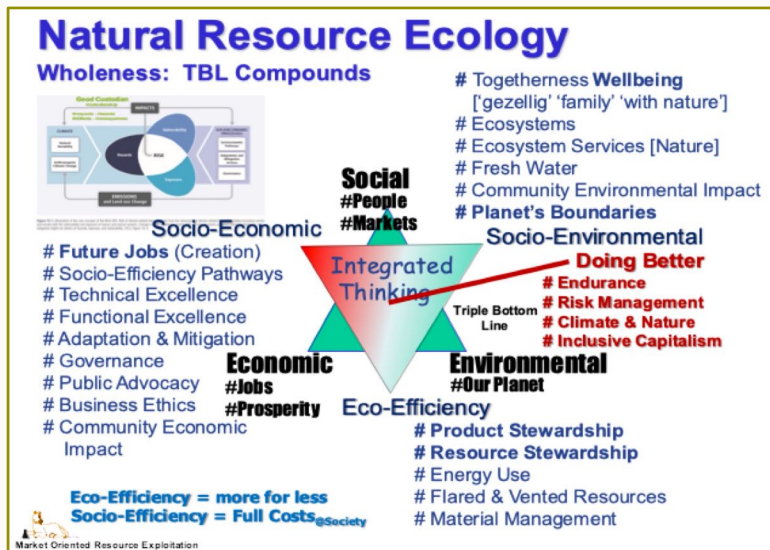


Figure 6. TBL compounds: Socio-economic, eco-efficiency, socio-environmental

Thinking should deliver **Product Stewardship** and **Resource Stewardship** amongst others (**Figure 6**); ‘if’ Doing Better delivers endurance, Risk Management, ‘doing well’ Climate & Nature, and inclusive Capitalism. So very much more complex.

Prosperity of People & Planet (3Ps) is very much aligned with Porritt’s ‘Economic Wellbeing’, but more based on **Wholeness**. ‘Wholeness’ builds from **Stewardship**, incorporating the three keystones of **Governance Governness Worthiness**; massive complexity. However, some consider ‘Social Wellbeing’ as the ultimate ‘end’; happiness, harmony, identity, fulfilment, self-respect, community, transcendence, enlightenment; **Social Wellbeing**. **Environmental Wellbeing**

involves ‘living in harmony with the earth’. So these additional ‘compounds’ are very alluring too. These Articles, however, have been focused at **Prosperity of People & Planet (3Ps)** based on **Wholeness**. **Diversity of Thought** means other focuses, to others are just more aligned to their ‘common sense’ of importance and that must be respected. Compounds, like the **TBL Compounds**, are very ‘meaningful’ constructs as they focus our minds on the better ‘means’. Debating and ‘thinking’ can be very illuminating, but, we are a long way from having the ‘means’ to achieve **True Sustainability**; ‘the well’ that keeps on giving -- through natural & technical succession & ‘spark’ of entrepreneurialism (Goddess Nigella!), to be reflected on in the next Article.

Political Policy too has always been needed to aspire the Urban World to improve *our* material ‘standard of living’, year on year. **Good Regulation** is ‘part & parcel’ with **Doing Right**; 15th century Sustainability ‘terminology’. Traditional Fiscal means have not been able to deliver this globally. Natural Ecosystem Services cannot keep up due to increased **Living Commons** being stripped to concrete jungles, with a few associated **Green Commons**. The objective of Political Sustainability **Policy** is to ensure **broad constructs** are formed to draw in ‘Capital 1886’ based on current and evolving **ESG Best Practice and Investment Governance** -- Financial Institutional acting to ‘contract’ & ‘transact’ the future – not to take the future.

New solutions from **Capitalist Means**, such as charging Entry Tolls to the Natural World’s wildernesses is an obvious **Outside-the-Box** thinking that could create immediate Social Wealth at the **Base of the Pyramid** to local indigenous communities on the Planet’s Boundary to the Natural World. Raising the **Base of the Pyramid** locally & regionally through **Sustainability** will improve Economic Social Environmental TBL; nationally & internationally led by **Good Political Governance** (GQBL).

Nature is not a **Public Good**. Non-excludable **Common Goods** such as **Nature & Natural Ecosystem Services** can be made through **Inclusive Capitalism** to have their ‘stock’ less non-excludable through reducing ‘rights-of-passage’ through their ‘scapes’. To change **Human Nature** will need mechanisms **conditioning individual Behaviour** and **creating Values based on Value**, but, not losing individual autonomy & free choice.

Sustainable Value Model

With **Sustainable Value?** it is important in any assessment or analysis that the **VUCAR** framework is given respect; **Vulnerable Uncertain Complex Ambiguous Radical**. With the **Tragedy of the Front-Line** are the



Financial sustainability... continued

Vulnerable. The longer term is *Uncertain* with ‘Uncertainty Space’ particularly important when ‘engineering the future’. *Complex* or ‘Complexity’ is integral to **Systemic Thinking** and **Systems Thinking**. *Ambiguous* Dynamic Data is integral to **Sustainability Models & Modelling** – that data having elements Known & Unknown; a high proportion being **Forward Data**. *Radical* because the current transition for Industry Agriculture Energy is a **Transformation Transition**; **Radical Innovation** is needed to achieve Global Sustainability at pace.

In 1997, Stuart Hart started the conversation⁽⁸⁾ examining the opportunity for corporate commerce to profitably pursue strategies for a more sustainable world, creating **Sustainable Value**. ‘Global poverty, rising inequity, and environmental degradation in the Third World led the list of problems to be solved’. Hart’s work at that time promoted the embryonic Corporate **Business Model** which actually is more about **Sustained Value**.

Hart published his seminal book in 2010, ‘Capitalism at the Crossroads’⁽⁹⁾ focused on “**Reinventing Capitalism** and Companies for a Radically New World”. Hart focused on the simple question, but complex answer: “*how best to serve the needs of the 4 billion people at the base of the economic pyramid?* - culturally appropriate,

environmentally sustainable plus economically profitable”; core elements of Global Sustainability’s **People Planet Prosperity**. This led to the **Sustainable Value Framework**. Figure 7 is a ‘modified’, update for 2022, ‘thinking’ ensuring **VUCAR** is respected!

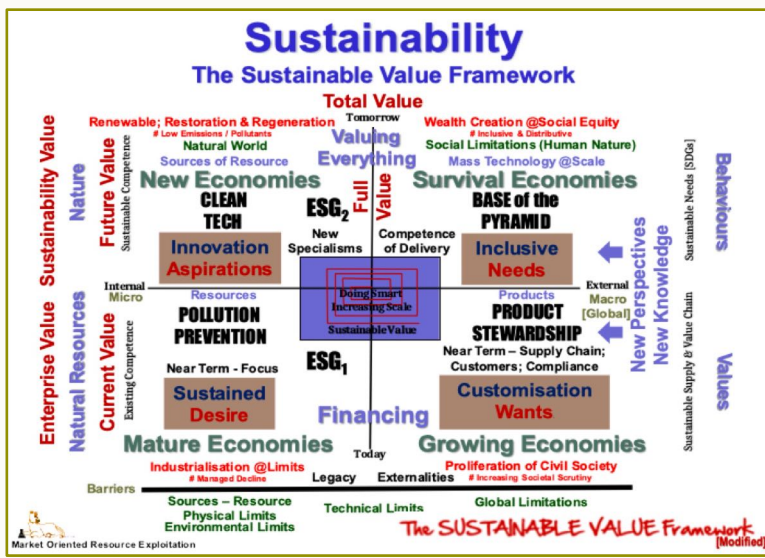


Figure 7. The sustainable value framework modified

- 1: Firms can create value by reducing the level of material consumption and pollution associated with rapid industrialisation [**Mature Economies**]. **Desire** being the main motivation; **Sustained**.
- 2: Firms can create value by operating at greater levels of transparency and responsiveness, as driven by **Civil Society** [**Growing Economies**]. **Wants** being the main motivation; **Customisation**.
- 3: Firms can create value through the development of new, disruptive technologies that hold the potential to greatly shrink the size of the **Human Footprint** on the Planet [**New Economies**]. **Aspirations** being the main motivation; **Radical Innovation**.
- 4: Firms can create value by meeting the needs of those at the bottom of the world income pyramid in a way that facilitates inclusive wealth creation and distribution [**Survival Economies**]. **Needs** being the main motivation; **Inclusive Capitalism**.

Being **Today** focused means ‘Opportunities & Risk’ and ‘Limits & Limitations’ are linked very much by **Barriers** (eg the **Sustainability Structural Barriers**: Power, Value, Cost & Delivery), **Legacy** (eg Content, Technical Competence, Data, Information, Current Knowledge) and **Externalities** (eg Impacts & Effects, Historical Waste). Today’s ‘driving force for change’ being **Financing**. Tomorrow’s ‘driving force for change’ being **Valuing Everything**. **ESG₁** resides in (1), while **ESG₂** resides in (3) as they fall under **Internal** focus. Global Sustainability (**Article 7**) being enduring through the Global Economy Society Environment & Political Governance (GQBL).



Financial sustainability... continued

By assessing an enterprise's range of activities, actions and non-actions in each of the four quadrants of the modified **Sustainable Value Framework**, Business and Corporate Governance can assess the degree of the portfolio balance, holistically. Portfolio imbalance suggests missed opportunities and potential future vulnerability. Few **Incumbent Firms** seem to recognise, let alone exploit the full range of new business opportunities available; poor stewards of **Shareholder Financial Capital**. Most focus their time and attention only on the bottom half of the matrix – **cost reduction, current risk** tied to existing Resources & Products and societal groups.

Exploiting the opportunities associated with the upper half of the **Sustainable Value Framework**, the portion focused on building new capabilities and new markets, requires **Foresight** and **Leaders (Leader Leadership)**; rather than being led by sector or industry peers. Those enterprises with demonstrated ability in acquiring new skills, working with unconventional partners, embracing **diversity of thought**, incubating disruptive innovations, shedding obsolete businesses, and creatively destroying existing 'Product' Portfolios, possess a potentially powerful first-mover advantage compared to those **Incumbent Firms**, more oriented toward defending current Business Models in **Consumer Markets** encountered in Developed Economies and the Emerging Economies.

Given the nascent nature of **Clean Technology (Green Utility)** and new **Base of Pyramid ('BoP') Markets**, small experiments, pilot & demonstrations projects (**Market Testing**) are far preferable to a single big investment in **Consumer Markets**. **Emerging Economies** are more focused on Pollution Reduction, than Emissions Reduction. These initiatives should be evaluated for funding using a new crafted set of criteria and metrics, since they will almost never meet the short-term revenue and profitability targets associated with projects designed to expand existing businesses; improvements or enhancements. The potential scale of **Base of the Pyramid (BoP) Markets** associated 'Product' Portfolios needs to be kept firmly in-focus. Creating a separate investment fund for these initiatives and a separate organisational entity to nurture these 'new business' experiments has proved successful. Early success is never guaranteed with trial and error very much part of **Entrepreneurialism**.

Hart⁽⁸⁾ summed up very distinctly that 'like it or not, the responsibility for ensuring a sustainable world falls largely on the shoulders of the world's enterprises, the economic engines of the future'.

Companies are like 'Stars'

Managed Decline companies reside in **Figure 7** quadrant (1) **Mature Economies**. They simply do not generate enough **Capitals Stock** to sustain themselves or simple lack the **Leader Leadership – Group Motivation**, to change 'momentum'. Those with sufficient **Capitals Stock** regeneration capacity, need to re-architect themselves and reinvest now in the Blue, then the Green Economy at pace – not just expense their excessive economic rents on **Financial Stock Buy-Backs**. That Financial Capital will simply be 'lost in transition'. Capitalism is *the productive use and reinvestment of the Capitals Stock*. Some **Managed Decline** companies will burn bright like 'stars', only to burn out dramatically. Only a few companies possess the magical 'star' dust to survive the transformational change necessary to get to the new utility; and **Sustainability**.

Sustained Value

The firm's **Sustained Value** is achieved through enterprise **Value Creation** and **Wealth Creation** activities, built through the productive use and reinvestment of the Capitals Stock (**Capitalism**), particularly Financial Capital. The first 'concept' of 'Sustained Value' is actually one of the earliest Sustainability 'fables' that of the **Golden Goose – laying Golden Eggs** ascribed to Aesop who lived around 600 BC. "Killing the Golden Goose" is a metaphor for any short-sighted action that may bring an immediate reward, but will prove disastrous in the long term. As the story goes:

"A man and his wife had the good fortune to possess a goose which laid a golden egg every day. Lucky though they were, they soon began to think they were not getting rich fast enough, and, imagining the bird must be made of gold inside, they decided to kill it. Then, they thought, they could obtain the whole store of precious metal at once; however, upon cutting the goose open, they found its innards to be like that of any other goose."



Financial sustainability... continued

“This short ‘story’ captures the essence of Sustainability: the **Natural Resources** (the Golden Goose) must not be overexploited, but managed with care and respect to last.” A firm to produce long term **Value**, ‘on-and-on’ into the future is the equivalence of **Sustained Value**; a ‘star’ that burns bright forever, enduring.

Financial Sustainability is the perspective which creates its pillar of opportunity that brings together **Wealth** in developed countries and developing countries, through commercial transactions, to create **Sustained Value** through organisational enterprise’s **decision making**, in a manner that reflects the **Principles of Sustainability** to ensure that these activities and investments today, do not limit the range of economic, social, and environmental options open to future generations.

Sustained Value, is linked to **Business Excellence (Technical Excellence and Functional Excellence)**. **Doing Better** matters, financed by Responsible Investments. **Investment Governance** facilitate & expedite these matters. **Legal Governance** is the keeper to account. **Political Governance** is the key requisite. **Technical Sustainability** is the key means.

True Sustainability; ‘the well’ that keeps on giving -- through natural & technical succession & ‘spark’ of entrepreneurialism also links well with the ‘essence’ of **Sustained Value**.

Ethical Investment & Legal Governance

Ethical Investments (or Ethical Investing) is typically considered an umbrella term for all approaches to investing that consider a set of **Values** as well as **Investment Returns**. The **Values** composites could be issues such as climate change, workers’ rights, gender equality, arms, tobacco and gambling. Basically, structural composites based on **Responsible Practices**.

PRI – Principles for Responsible Investment⁽¹¹⁾ was launched in April 2006 championed by the United Nations. **PRI** works to promote the incorporation of Environmental Social (Corporate) Governance (ESG) factors into investment decision making. **PRI** has 6 core ‘membership’ signatories’ **Principles**:

- Principle 1:** We will incorporate ESG issues into investment analysis and decision-making processes.
- Principle 2:** We will be active owners and incorporate ESG issues into our ownership policies and practices.
- Principle 3:** We will seek appropriate disclosure on ESG issues by the entities in which we invest.
- Principle 4:** We will promote acceptance and implementation of the Principles within the investment industry.
- Principle 5:** We will work together to enhance our effectiveness in implementing the Principles.
- Principle 6:** We will each report on our activities and progress towards implementing the Principles.

Collectively, the organisations that have become signatories to these **Six PRI Principles** are responsible for a total **Assets Under Management** (‘AUM’) of over \$100 trillion.

Legal Governance has importance through **Independent Judiciary**, holding Institutions & Transnational Corporations to account. Challenge is usually made based on Good Society ‘Principles’; **Civil Society**. **Civil Society**, is deemed the “third sector” that of **Society**, distinct from **Government** and **Business**. Civil Society is used in the sense of:

- 1: The aggregate of non-governmental Organisations and Institutions that manifest interests and ‘The Will of Citizens’.
- 2: Individuals and Organisations in a Society which are ‘independent of thought’ of the ‘Government’ & Political Governance.
- 3: The term Civil Society has a more general sense of ‘elements’ such as Freedom of Speech, an Independent Judiciary, etc, that make up a “Democratic Society”.
- 4: Civil Society is seen as a normative concept of Civic Values.



Financial sustainability... continued

Legal Governance is the keeper to account; **Doing Right vs Doing Wrong (Figure 2)**.

Science Based Targets(12)

The Science Based Targets initiative ('SBTi') defines **Financial Institutions** as companies whose business involves the dealing of financial and monetary transactions, including deposits, loans, investments, and currency exchange. If five percent or more of a company's revenue or assets comes from activities such as those described above, they are considered to be **Financial Institutions**.

'So what are **Science Based Targets**? They are targets adopted by companies to reduce GHG emissions being considered "science-based" if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement – to limit global warming to well below 2°C above preindustrial levels and pursue efforts to limit warming to 1.5°C. Among companies globally, there is a growing momentum for science-based target setting through the **SBTi**.'

As of January 2022, some 2,424 companies and Financial Institutions have publicly joined the SBTi, among which some 1,143 companies have had their targets officially approved. As a good practice definition, these could be described as **Sustainable Financial Institutions**.

Financial Institutions can make four simple changes, to become **Sustainable Financial Institutions**:

- 1: Project Finance – Low Carbon Investments [Responsible Investments]
- 2: Product Innovation – by pricing 'in' externalities, having Products that include a 'carbon offsetting' mechanism
- 3: Adaptation of Financing Operational remit – go beyond 'core financing' or 'intermediation'
- 4: Making decisions on Long Term Financial Capital investments & re-investments based on Financial, Social & Environmental benefits mindset (ESG); creating and maintaining a 'Sustainable Economy'

'**SBTi Framework** for Financial Institutions aims to support them in their efforts to address **Climate Change** by providing resources for **Science Based Target setting**. The framework includes target setting methods & criteria; a target setting tool and guidance document. The **Guidance** includes a 'Business Case' for setting science-based targets ('SBTs').'

On September 14, 2020, New Zealand announced it was the first country to require annual Climate Risk reporting by large banks, asset managers, and insurers.

'Financial Institutions' largest impact on climate change is through their investment and lending activities; thus, it is essential they prioritise Target Setting in these areas. The **SBTi** has adopted an asset 'species' class – a specific approach to enable robust and meaningful targets. After an extended stakeholder 'engagement process', the SBTi has selected three methods that link Financial Institutions' investment and lending portfolios with climate stabilization pathways, each of which can be used for one or more **Asset Species Classes**:

Sectoral Decarbonization Approach (SDA): Emissions-based physical intensity targets are set for real estate and mortgage – related investments and loans, as well as for the power generation, cement, pulp and paper, transport, iron and steel, and buildings sectors within corporate instruments.

SBTi Portfolio Coverage Approach: Engagement targets are set by Financial Institutions to have a portion of their investees set their own SBTi approved Science Based Targets such that the Financial Institution is on a linear path to 100 percent portfolio coverage by 2040.

The Temperature Rating Approach: Financial Institutions can use this approach to determine the current temperature rating of their portfolios and take actions to align their portfolios to ambitious long-term temperature goals by engaging with 'portfolio companies' to set ambitious targets.

The SBTi recognizes that these methods are neither exhaustive nor comprehensive and welcomes review of



Financial sustainability... continued

additional methods. In addition to setting targets for their investment and lending activities, Financial Institutions are required to set targets for their operations (ie Scope 1 and 2 emissions) consistent with a well below 2°C pathway, and are encouraged to set them for a more ambitious 1.5°C scenario. Financial Institutions may also set targets for the remaining Scope 3 categories, as defined by the **GHG Protocol Scope 3 Standard**.

While Financial Institutions' **Business Models** are vulnerable to climate disruptions, greater attention is also being given to the 'influence of investment' and 'lending portfolios on climate outcomes'. Financial Institutions are seeking to lead 'zero-carbon transformation' rather than just minimize **Risks** related to climate impacts.

Financial institutions have historically focused on maximizing economic return on investment as a guiding 'Principle' and Business Model. However, the meaning of fiduciary duty, that is Financial Institutions' legal and ethical obligation to act in their clients' best interests, is shifting in the face of climate change. The new 'Business Case' for financial institutions to set SBTs for their investment and lending portfolios is based on a four-part rationale: **Resilience Policy Demand Innovation**. Adoption of SBTs can help financial institutions augment their resilience and competitiveness in the face of extreme weather events and other climate-related risks. By becoming change makers rather than change takers, Financial Institutions can effectively anticipate Climate Policy and regulatory shifts. Clients are increasingly demanding climate actions by their Financial Institutions, and SBTs help to provide transparent credibility. Finally, SBTs help direct Financial Institution **Innovation** toward potentially higher-margin products that support emissions reductions in the real economy.'

Financial Sustainability can accelerate the **Transformation to Sustainability**. This needs Policymakers and Regulators playing their part – 'tilting the playing fields'. Intelligently 'incentivising' banks can use their unique intermediation position in the economy to promote these options. Putting in place **Taxonomies** and **Market Incentives** through **Global Sustainability Reporting Standards** to enable **Green Securitisation** to scale.

Principles of Sustainability [Sustainability Principles]

To achieve the desire of Global Sustainability, **Article 7** on **Political Sustainability** framed that this destination would require **Better Practices, Better Development, Better Government & Better Capitalism**, inclusive with Developed Economies, Emerging Economies & Surviving Economies, raising the economic, social, environmental tapestry at the **Base of the Pyramid**. This will need 'eye watering' quantities of investment; **Financial Capital**, finance & funds through **Global Partnerships** assembled through **Political Sustainability** bringing together countries & states with different economic, political, ecological/environmental and social circumstances. **Decision Making**, in a manner that reflects the set of Principles of Sustainability, is desired to finance the **Responsible Investments** needed. **Sustained Value** through organisational enterprise's **Decision Making** in a manner that reflects the **Principles of Sustainability** ensuring that these activities and investments today, do not limit the range of economic, social, and environmental options open to future generations.

The landscape of **Sustainability** can be defined by these book authors, encapsulated by this equation (**Article 3**):

Sustainability = Locke + Dolan + Lovelock + Stead & Stead + Elkington + Porritt
[Equation 1: Landscape of Sustainability]

The set of **Principles of Sustainability** referred to in **Figure 1** and **Figure 3**, ensure the interests of the **Capitalist Society** and the **Perspectives of Sustainability** are respected. Based on the core essence of the **Sustainability Content**, the resulting insight forms the basis for these **10 Core Principles of Sustainability**:

Sustainability Practices

- 1: **Sustainability** needs to be core to the business 'bottom-line' [TBL] to endure and create **Total Value** (ie **Enterprise Value & Sustainability Value**).
- 2: Actions and activities today should not limit the options of future generations.
- 3: Businesses need a **Social Oriented Business Purpose**; & **Valuing Everything**.
- 4: Companies need to act with **eco-efficiency** and be **socio-efficient**.
- 5: Companies need to act with social responsibility and good governance [**Citizenship**]; 'Stakeholders in Society'.



Political sustainability... continued

Sustainability Practices... continued

6: Natural Resource & Product companies need to act as good stewards [**Stewardship**].

7: Companies facing increasing physical & environmental limits need to ensure their activities, resources and products do not harm their ecosystem custody [**Custodianship**]; 'Stakeholders in the Environment'.

8: Companies need to have due regard of their own footprint and respect the Planet's (societal & environmental) Boundaries; and protect natural wildernesses from our footsteps [**Guardianship**].

9: Companies need Sustainability Strategies that reflect the Dynamic Materiality of their activities & actions; and address material environmental & societal impacts & effects.

10: Companies need to reflect & value 'good society' values & behaviours.

Continual Innovation & Entrepreneurialism, the **Blue Economy** will be discussed in the next Article – also the need for 'sparking' the necessary new utility, at scale, transforming through systemic Re-Architecture, systemic Restoration but more importantly systemic Regeneration; **Natural & Technical**. What will **Carbon Removal** utility actually have as a 'Working Landscape'? To move from **Grey-to-Blue-to-Green** will take more **Global Partnerships**, need more Global Finance & Global Funding Networks but has considerably less risk which is how Engineers 'build to get across streams'. **Conservation** is key too. Engineers apply experience, insight and wisdom in Manufacture, Production and Delivery; Risk & (Technical) Risk Management. 'Elephants-a-leaping' is not engineering practice. To develop new utility – particularly the **Green Utility** will need lots of prototypes. Is **Group Motivation** ready, to go back to the 'drawing board'? We already have the **BluePrints** for the **Blue Utility**, created by the **HandPrints** of the industrial revolution building technical **Succession** since 1575.

Natural Succession & Technical Succession, how can they be combined to deliver True Sustainability; 'the well' that keeps on giving? Article 9 in the next SPE Review London, Continual Innovation & Entrepreneurialism - Sustainability Performance; Value, Impact & Effects.

References

- (1) Edwin Dolan – TANSTAAFL, A Libertarian Perspective on Environmental Policy; Searching finance, 2011 Version 40.0
- (2) John Elkington, Cannibals with Forks, the Triple Bottom Line of 21ST Century Business, p20 1999, Greenleaf Publishing
- (3) Jonathon Porritt, Capitalism as if the World Matters, Revised Paperback Edition 2007, Routledge
- (4) Herman Daly, Paradigms in Political Economy (Stewardship), Toward a Steady-State Economy, edited by Herman Daly, 1973, W H Freeman and Company
- (5) Johan Rockström's, Let the Environment guide Our Development, YouTube, 31th August 2010 [Planetary Boundaries]
<https://youtu.be/RgqtrlixYR4?t=37>
- (6) Richard Brealey and Stewart Myers, Principles of Corporate Finance, 3rd Edition, 1988
- (7) Global Reporting Initiative [GRI]
<https://www.globalreporting.org/standards/standards-development/sector-standard-for-oil-and-gas/>
- (8) Stuart Hart, Beyond Greening: Strategies for a Sustainable World, Harvard Business Review, January-February Magazine, 1997
- (9) Stuart Hart, Capitalism at the Crossroads – Next Generation Business Strategies for a Post-Crisis World, Third Edition, 2010
- (10) Stuart Hart and Mark Milstein: Creating Sustainable Value, Academy of Management Executive, 2003, Vol. 17, No. 2
- (11) Principles of Responsible Investment [PRI]
About the PRI | PRI Web Page | PRI (unpri.org)
- (12) Science Based Target initiative [SBTi]
<https://sciencebasedtargets.org/companies-taking-action/>

Meet the SPE London Board

SPE is a non-profit professional society with more than 156,000 members in 154 countries, who participate in 203 sections and 383 student chapters. SPE's membership includes 72,000 student members. The SPE London Section, with an average 2,000 members and seven associated student chapters, is an active section with an aim to connect, engage and promote the exchange of knowledge within the London energy community of technical and commercial professionals. The SPE London board is the governing body for the SPE London section. The different committees oversee the chapters various activities including the evening programme, various SPE events, Young Professionals, Women in Energy and associated student chapters.



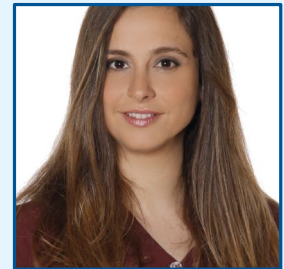
Chair
Adam Zalewski



Past Chair / Sponsorship Chair
Adrian Southworth



Programme Chair
Tim Lines



WiE Chair
Isabel Asenjo



Cont. Education Chair
Adam Borushek



Inter-society / Industry Liaison:
Carolina Coll



Director
Miles Cudmore



Director
Anthony Perry



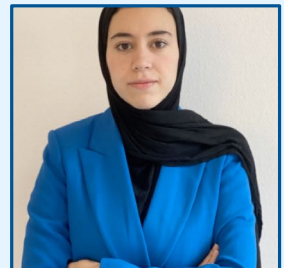
Director
Arnaud Mille



Director
Alain Gringarten



Communications Chair
Promise Athante



Big Data Chair
Raghd Gadrboh



Secretary/Chair Elect
Elizaveta Poliakova



Treasurer
Vincent Penasse



Young Professional Chair
Shwan Dizayee



Membership Chair
Mehdi Alem

Challenging, fun, career-boosting, educational - why not explore the great opportunities with the SPE London team?



LOVE TO ORGANISE?
Volunteer with the events section of SPE London – you'll learn lots, be valued for your ideas, and have fun!



GOT GREAT IDEAS?
How about sharing and contributing as an SPE London Board member?



YOUNG PROFESSIONAL?
Learn, explore and meet your fellow YPs at SPE London

FIND OUT MORE!
Get in touch with our Editor, Elizaveta Poliakova via [LinkedIn](#)



**Skills. Increase knowledge.
Sharpen thinking. Boost expertise.
Solve problems. Gain confidence.
Stay competitive. Improve prospects.
Move ahead. Enhancement.**

Keep up with the rapidly evolving field of E&P through SPE training courses and webinars from seasoned industry experts.

Join the Society of Petroleum Engineers, a not-for-profit professional association that serves a growing worldwide membership in the E&P industry. SPE is a key resource for technical knowledge providing publications, events, training courses, and online resources.

To learn more and become a member, visit www.spe.org/join.

SPE—Setting the standard for technical excellence

Society of Petroleum Engineers

