October / November 2021

SPE Review London

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

London Section

Point-of-View: Managing data quality in big data environments

Also in this issue:

SPE SECTION EXCELLENCE *** AWARD *** 2020

50 YEARS

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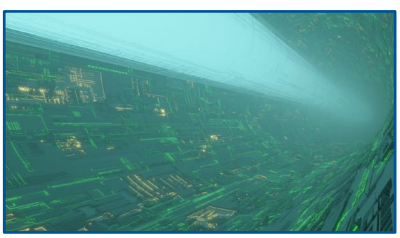
SPE SECTION EXCELLENCE *** AWARD *** 2020

In this issue

FEATURES



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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

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Letter from the SPE London Chair

Dear SPE London members and colleagues,

The COP26 and the queues at petrol stations have brought our industry back into the spotlight of current issues. However, through the chaos of today, we need to look forward to the future. In this letter, I would like to highlight the work that volunteers in our section are investing into the future of the Society of Petroleum Engineers.

The sustainability of our organisation depends on our ability to adapt and to continue to maintain a pipeline of new talent that would benefit from our membership.

SPE Student Chapters are crucial elements of this talent pipeline, and we currently support five Student Chapters as a London Section: Imperial College London, The University of Manchester, Coventry University, London South Bank University, and University of Portsmouth. They are run by the students for the students, supported by local faculty advisors with their own budget and technical, social programme. They offer a fantastic opportunity to learn more about the industry and build our student members' leadership skills.

All our SPE Student Chapters recently went through or are planning their student officer elections immediately. I would like to thank all the student volunteers for spending their crucial time in between exams, labs, and libraries in service to others! The Society of Petroleum Engineers student offering is underpinned by our senior members global participation in programmes such as eMentoring and local willingness to support an evening lecture programme or a student visit. We need to continue to support the students who are interested in a career within the Energy Industry.

The ability to adapt has been highlighted through the content and form of our London Section programme. I would like to thank Adam Borushek for the series of Networking Events that he organised over Zoom during the past two years. During the peak of lockdown, they have been fully booked – allowing us to stay in touch with each other and discuss current events. We are hoping to replace them with physical social events early next year.

We are planning something new and out of our comfort zone as a Section – offering a hybrid event in January for the Evening Programme, we are hoping to see you both in-person and online. Finally, the Net Zero Committee continues to expand the remits of what we offer, following the latest trends and membership focus – their session on COP26 and its impact on the O&G organised in collaboration with Aberdeen Section is a highlight.

The final and most important part that enables us to grow and adapt is feedback. Thank you for attending our events and please feel free to share with us your thoughts post-event 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 final SPE London Review Edition of 2021. This year has been marked with great progress over Covid-19, which allowed SPE and others to start holding hybrid events. A great example is COP 26 that was held as a hybrid event, allowing participants and speakers to collaborate in real life. In addition, PETEX, the largest subsurface-focused conference, was held in person this year. All the above-mentioned give us hope that life is getting back to normal, and we hope this will only continue to improve!

In this publication, Piers Johnson, the founder and managing director of Oilfield Production Consultants (OPC) Limited, shares his career and life experience with us on **page 7**. Behrooz Fattahi, the President of the EnerTrain Institute, shares his model 'Manager – to – Leader Manager' or 'MLM Fattahi model', describing a leadership approach to management; refer to **page 9** to learn more. On **page 13**, you will find the article 'Point of view: Managing Data quality in big data environment' by Naga Suresh Govindaraju and Dominic Launder.

October/November also marks the beginning of a new academic year, meaning that Student Chapters are forming new committees – SPE Imperial College London share their update on **page 18**. We continue publishing Net Zero 101 Series by SPE London Net Zero – and in this publication, you will find Harry Simmons' review of the three scopes of Green House Gas emissions (refer to **page 20** for more). You can learn more about Production Gains from digitalisation on **page 22** in an article written by David Gonczi, Reservoir Team Lead at DATAGRATION.

Last, but not least, please refer to **page 25** to read about Political Sustainability written by Adrian Gregory, subsurface and wells engineering consultant. This article is the seventh publication in the series of 10 by SPE London Net Zero in SPE London Review.

I would like to welcome Shalom Amakhabi to the Editorial Team as Editorial Volunteer, and to express my gratitude to Ffion Llwyd-Jones, Josh Beinke, and Mark Beleski for constant ideas, energy, and feedback!

Have a lovely end of the year!

Sincerely Yours,
Elizaveta Poliakova

Click here to access past issues of the SPE Review London!

NEWS DIGEST... NEWS DIGEST... NEWS DIGEST

Neptune energy sells minority stake in Norwegian offshore fields and pipelines

Through agreements to sell its interests in three producing fields and two export pipelines in offshore Norway, Neptune Energy stands to get $35 million. M Vest and OKEA will each bear the liabilities associated with decommissioning as declared in the sales agreement. OKEA will get Neptune Energy's 2.2% interest in the Ivar Aasen Unit in the North Sea, while M Vest increased its interest in the producing fields and two pipelines in the North Sea.

Read more

Oil prices tumble

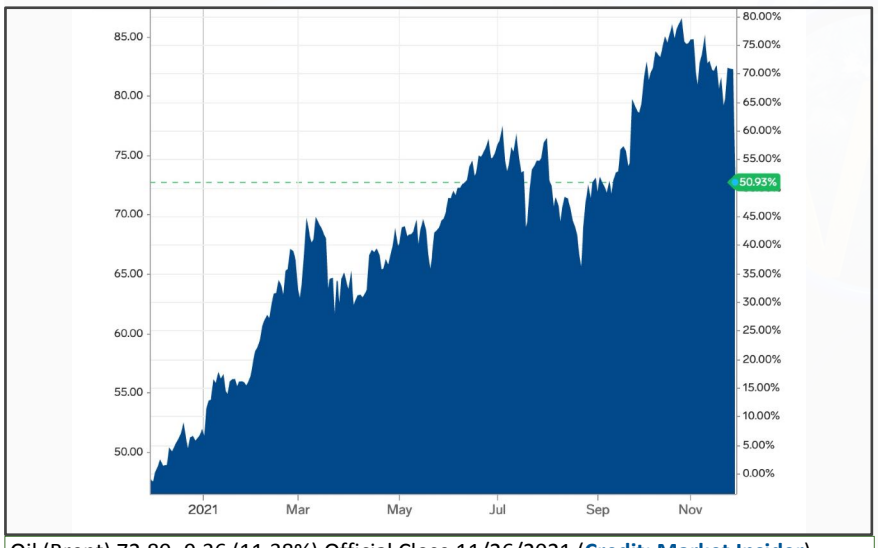
In mid-November, discussions by President Biden and President Xi Jinping about releasing crude from their reserves led to falling oil prices, which went lower than their 50-day moving averages. The drift in prices was in the range of $7 for the previous six weeks amid uncertainty in market direction in 2022. According to the International Energy Agency, supply is catching up with robust demand, while the Organization of Petroleum Exporting Countries said a surplus may result from a faltering rebound from the pandemic.

Read more

UK offshore sector methane emissions pledge

At the COP26 climate summit in Glasgow, a 'Global Methane Pledge' saw several countries pledge to cut their emissions by 30% by 2030. According to Oil and Gas UK (OGUK), Britain's offshore oil and gas sector plans to cut its total methane emissions by half (compared to the 2018 baseline) in the next nine years. By 2023, offshore installation owners and managers are to create a 'Methane Action Plan', which will monitor and measure methane output, together with abatement actions.

Read more



Oil (Brent) 72.80 -9.36 (11.38%) Official Close 11/26/2021 (**Credit: Market Insider**)

Threat to recovery?

Concerns about the effects of a new coronavirus strain emerging from southern Africa caused a fall in oil prices in late November. As travel from the continent was banned by several countries, the global market reacted with heavy sell-offs. The new strain may represent the biggest threat to the oil consumption recovery in several months, according to a Bloomberg report.

Read more

Motor racing, training ... and the energy transition

Piers Johnson is the founder and Managing Director of Oilfield Production Consultants (OPC) Limited, and a petroleum engineer with more than 35 years' experience in the industry. He has a B.Sc.(Hons) degree in Mechanical Engineering from Nottingham University, and is a Chartered Engineer with the Institution of Mechanical Engineers. He is past Chairman of the SPE London Section, a Member of the Petroleum Exploration Society of Great Britain, and a member of the Institute of Energy. He is also a Visiting Lecturer in Petroleum Engineering at the Institute Français du Pétrole in Paris.

Who is Piers Johnson? Tell us about yourself.

I graduated from Nottingham University with a degree in Mechanical Engineering and wanted to travel around the world and get paid well for it. I noticed from my research into jobs for engineers, that the oil and gas business offered the highest salaries. So, while two of my engineering colleagues managed to get a job with Flopetrol (which later became part of Schlumberger), I didn't! So, I asked what was needed to get hired and they said some hands-on work experience offshore or overseas. This was 1979/80 and the UK oil business was taking off and apparently it was possible to get a job offshore as a roustabout just by turning up in Aberdeen at the heliport. But I did not have enough money to go to Aberdeen at the time. Fortunately, in my home town of Reading was the Foster Wheeler (now part of WOOD) head office, so I applied for a job with them on the condition that I was sent overseas. I was going to go to Venezuela but ended up in Nigeria in Oku Iboku, near Calabar, not so far from Port Harcourt, where I worked for a year. Towards the end of the year, I applied again to Flopetrol and I was successful this time! I have worked in the oil and gas business ever since and it has been fun, challenging, interesting and tiring at times. And I am still at it, albeit with my own company, Oilfield Production Consultants (OPC) Limited and that makes 40 years in the oil business in 2022.

I used to play rugby at the weekends, including in Singapore against the Singaporean national side and once against the touring Japanese National side, but as time went on that became too taxing on the body. On retiring from rugby, I took up motor racing, initially in Caterhams then, Ginettas then GT cars (Corvette Z06R GT3, BMW Z4 GT3, and a Ferarri 458 GT3) and now C1s with an occasional GT outing when funds permit! I am also a keen cyclist and cycle the eight miles round trip from home to the office in London and back every day when not travelling away from London.

How did you start Oilfield Production Consultants? Walk us through your career.

I met a girl in Europe on one of my holidays back home from the Far East where I was working for Schlumberger and she would not leave the UK to join me in the Far East. So, I left Schlumberger to come back to the UK to be with her, but my relationship ended almost as soon as I arrived home! So, there I was in the UK, loveless and jobless! Many of my friends from school and university had found their way in life by being self employed and starting their own business. I liked the look of that and so initially started consulting for Schlumberger but realised I could obtain a higher day rate by working for the operators, and pitched for a well-testing contract with what was then Philips Petroleum (now Harbour Energy), which I won on tender while working from my bedroom in my flat in London using the fax machine at the post office down the road from my flat.

So, that got me going as Oilfield Production Consultants (OPC) Limited, although I was going to call the company Oilfield Production Engineering Consultants – OPEC. I thought that may cause issues with OPEC themselves (the Organisation of the Petroleum Exporting Countries) so I went with OPC. Philips Petroleum had more well tests than I could manage on my own so I started to contract additional well-testing consultants who could help me out on additional well tests. And then as time went on, I started to get asked for additional

Motor racing, training... and the energy transition... continued

consultants who were not well testers and OPC grew from there into a global consultancy, providing not just consultants but also training and in house sub-surface studies.

You studied Mechanical Engineering for your Bachelor's degree and started your career as Cost and Planning Engineer. Tell us about your transition to O&G.

Some of the answer to this question is contained in the previous commentary, but I just realised that the oil and gas business paid a better salary and it had always been my goal to get into the oil and gas business.

But my former University colleagues who had got a job with Schlumberger directly from University did help with a reference to get me the job with Schlumberger. One of them has only just retired from Schlumberger!

OPC was founded in September 1988. Have you observed any changes related to operational challenges in the past 10-15 years?

The biggest changes have occurred in the last six years, since the initial downturn in the oil price of 2015. Procurement and Supply Chain Management (PSCM) appear to have taken over managing operators' businesses.

Prior to that, the biggest operational changes have been in, quite rightly, paying more attention to safety which when I started was not really a consideration. My first offshore job happened in the Philippines with no training at all in any capacity. I set the sea on fire because I could not get the separator to work, and on another job in Japan, I broke my arm when it was hit by the flow line that had been broken down by mistake! It could have been worse. I could have died! Now, of course, we are respecting the environment more and so the environment, flaring and emissions are a big consideration, too.

What advice would you give to young professionals starting careers in Oil & Gas?

Make sure you have some experience or education in relation to the Energy Transition space. While oil and gas will continue to be needed, there will come a time when the global consumption of hydrocarbons will significantly reduce. Fortunately, there will remain some overlap with the past and the future in injecting, for example, CO_2 and using Geothermal wells to produce heat and power.

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

It has of, course, been a difficult time over the last 18 months with Covid restricting face to face meetings. Generating funds was, and I believe remains, a challenge. It is interesting to note that the London Section has gone from holding monthly meetings in the Grosvenor House Hotel on Park lane in the eighties, to the Café Royal in the nineties and noughties (a move that I initiated in my capacity as Meetings chair before becoming Chair) to Imperial college to, well, nowhere – virtual meetings. But finding sponsorship for the London section is an important source of funds and this needs work by someone. In 2000, the London Section had 40 sponsors, and today I believe is less than ten, although I am proud to state that OPC has sponsored the London Section for almost all the time it has been in existence. BP and Shell should be able to say the same thing, but they cannot! SPE managed training courses, which also generated significant funds and I would advise this should be reconsidered as a source of revenue.

Prior to starting OPC, you worked for Flopetrol Johnson Schlumberger. Did you find it difficult to transition from a service company to a consulting one?

Although I have spent long periods of time working for operators as a consultant, I have never been employed by one. Essentially, there is not much difference between a service company and a consultancy. They are providing a service to the operators. So, in fact, working for Flopetrol Johnston Schlumberger was a very good learning experience to be transferred to starting my own consultancy. So, no, it was not that difficult. You learn to handle challenging customers!

A leadership approach to management

Behrooz Fattahi prepared this article for SPE Review London. He is President of the EnerTrain Institute, providing petroleum heavy oil training and consulting as well as lectures, and workshops on soft competencies internationally.

"In theory, theory and practice are the same, in practice, they are not!"
Albert Einstein

A recent study by Gallup shows that companies fail 82% of the time to choose the candidate with the right talent for management jobs, costing businesses billions of dollars each year. The same study also shows that only 1 in 10 managers possess the talent to manage anyway. Another Gallup study of 27 million employees over a 20-year period, revealed that roughly 33 of U.S. employees, and a staggeringly low 13% worldwide were engaged at work.

A study by Fortune shows only 7% of CEOs believe their companies are building effective world class leaders, and only 10% believe their leadership development initiatives have a clear business impact. A McKinsey study also indicates that only 11% of more than 500 executives around the globe strongly believe their leadership development interventions achieve the desired results. And finally, a study by CareerBuilder says that 58% of managers say they did not receive any management training.

Management Failure

Such studies, at least partially, explain the significant role of management deficiencies in creating a largely unhappy, and disengaged employees. But before searching for solutions, let's explore the meaning of the terms used in the management, and the leadership world. The terms manager, leader, lead, head, chief, director, etc., have often been used with confusing, and mixed descriptions. Such titles usually refer to official capacities, and positions as designated on organisation charts for example. They refer to those who oversee people, and processes, and their responsibilities commonly include coordination of efforts of a team to accomplish its goals, and objectives, managing utilisation of financial, technical, and human resources, and to monitor achieving milestones.

The terms management, and leadership often are used interchangeably, however, we must recognise whether these terms refer to 'groups of people' or to 'attributes of people'. If addressing groups of people, both terms mean very similar, referring to those in positions of control. However, when comes to attributes, they imply very different roles – management is about control, while leadership is about influence. Steve Jobs, the founder, and former CEO of Apple said: "Management is about persuading people to do things they do not want to do, while leadership is about inspiring people to do things, they never thought they could."
The fact is that organisations need both talents. Marcus Buckingham in an article published in the Harvard Business Review uses an interesting analogy to describe management styles. He says that "average managers play checkers, while great managers play chess in the workplace." He explains in checkers, all the pieces are uniform, and move the same way, while in chess, each piece moves in a different way, and looks different. You cannot play chess if you do not know how each piece moves.

Many studies have clearly shown the positive impact of learning and practicing elements of leadership in a workplace such as leading by example, and engaging people, on improving productivity, and success of teams. This is critically important in today's very diverse workplaces, where managers must not only understand the varied elements within their management domain such as gender, cultural backgrounds, race, beliefs, etc., they must also recognise the unique value offered by each of the team members in reaching the teams' ultimate goal.

Management and Leadership Models

Since the positive impact of leadership has become clear, many models have been proposed to incorporate the elements of leadership into management. A model proposed by Deloitte for example, describes a

A leadership approach to management ... continued

pathway for training managers to become 'strong leaders'. The model prescribes learning certain key leadership competencies in enabling managers to become competent leaders.

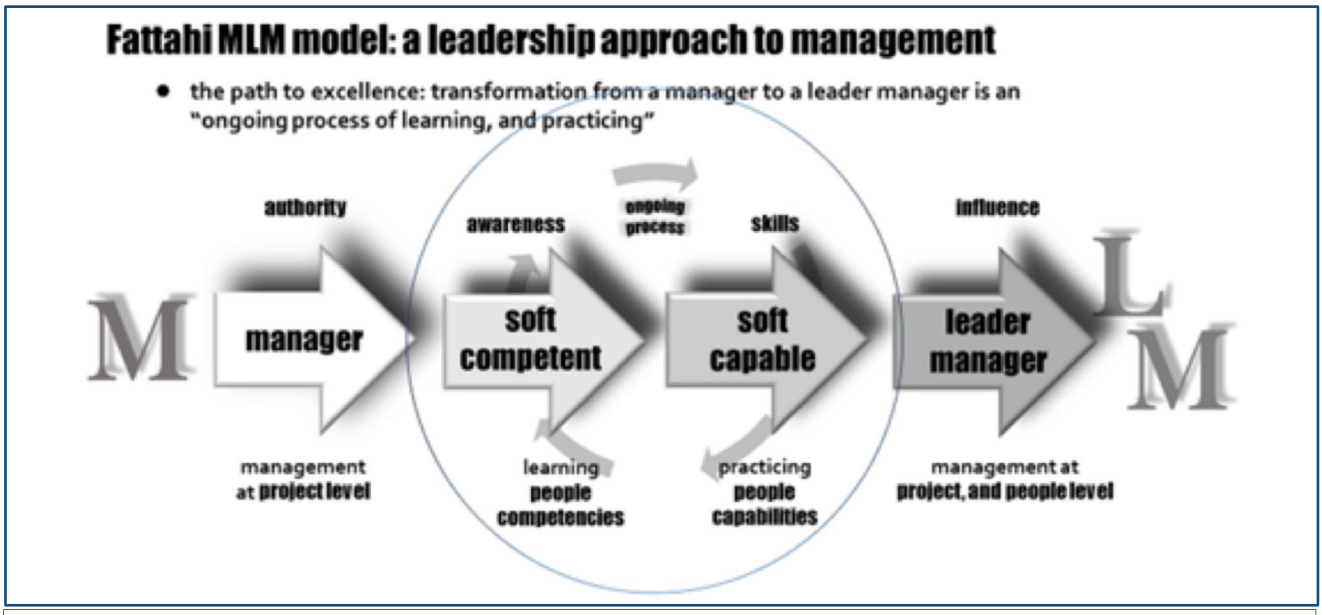


Figure 1: Fattahi MLM model

What many of the published models are missing, however, is the real emphasis on competency in 'practicing' leadership. Albert Einstein once said: "In theory, theory and practice are the same, in practice, they are not!" The wisdom of Einstein's statement is obvious in learning arts. A beginner in dancing, for example, can learn the dance steps in a short time. Yet being able to perform the same steps in such a way to impress a large audience takes years of practice. The same goes for learning soft skills to be followed by developing a flawless practicing capability. In the process of progression in human capabilities, we start at the beginning stage of discovering ourselves as an individual and becoming aware of our own capabilities. This step is followed by acquiring interpersonal skills, as we interact with others around us in a functional team. With age and experience, we are elevated to a position of a team lead, department manager, or a technical resource. It is at this stage that we are heavily involved in interacting with, and leading teams. And eventually, we integrate all our learnings into a high level of mastery when we arrive at our mature career stage to lead a larger organisation.

I am proposing a new model that is aimed at enhancing managers' capabilities through a transformation from a purely 'project' level management to leadership at 'project and people' levels.

The path to excellence described in this model is an ongoing process of learning, and practicing, a transition from 'awareness only' to 'practicing' skills or learning people competencies followed by practicing people competencies so they can become a natural behaviour for managers. While the Fattahi MLM model recognises learning people competencies as a fundamental initial step in the process, it stresses the critical follow up step of developing soft capable leaders through practice, practice, and practice!

Practicing People Competencies

Our decision-making process forming our reactions to what we sense within our bodies, and around us is governed by an iterative process called emotional intelligence. This simply constitutes a collaborative analysis between the rational brain, and the limbic system that houses our emotional life including behaviour, motivation, and emotions. However, we should note that the limbic system not only participates in this exchange, but it is also first to receive the sensory signals, and to create the first reaction. It is therefore critical to train this part of our brain to make it soft competent.

A leadership approach to management ... continued

In doing so, the Fattahi MLM model emphasises not only the development of awareness of the elements of soft competencies, more importantly, it further underlines the critical significance of a follow up step - 'developing practicing leadership capabilities, and skills'. This is an important stage of acquiring leadership skills in a seamless transition from a 'Manager' to a 'Leader Manager'. Not pursuing mastery of practice, a managed project can result in unintended outcomes, which is referred to as 'Skilled Incompetence'. Skilled Incompetence is excelling at a management style only because it feels right!

Concluding Thoughts

Although leadership training has become popular, it seems that a lack of proper practice has diminished its impact on management effectiveness followed by poor employee engagement at the workplace. While managers plan, organise, and measure value, leader managers take the additional steps of inspiring, motivating, enabling, and adding value. The latter requires a lot of practice to become natural at it.

The key to success for an organisation is to transform its managers into leader managers through the ongoing process of soft competency learning followed by effective soft-capable practicing. This latter process must become an important component of managers' performance evaluation by their higher ups to ensure success.

Behrooz Fattahi holds Ph.D. degrees in Aerospace Engineering, and in Mechanical Engineering from Iowa State University. After 37 years of working in the industry, he retired from Aera Energy LLC, an affiliate of Royal Dutch Shell and ExxonMobil companies in 2014.

In his last position as the Learning Advisor, he taught internal company technical courses including topics on reservoir engineering and enhanced oil recovery.

He served as the Executive Editor of the SPE Reservoir Evaluation and Engineering Journal, President of SPE Americas, VP-Finance, and SPE Foundation Vice President. He also served as a member of the United States National Petroleum Council. He is the recipient of AIME/SPE's DeGolyer Medal for Distinguished Service, AIME's Presidential Citation, recognised by SPE as a 'Distinguished Member', 'A Peer Apart', and elected as AIME/SPE's 'Honorary Member'.

He was a 2018-2019 SPE 'Distinguished Lecturer'. Fattahi served as the 2010 President of SPE International, and as the 2014 President of the American Institute of Mining, Metallurgical and Petroleum Engineers.

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

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Point-of-View: Managing data quality in big data environments

As organisations deal with explosion of data by leveraging latest cloud technologies, managing data quality is challenging due to huge data volumes, variety, and rapid changes to data. In this paper, we look at some of the key areas that organisations should focus to improve the state of data quality.

This article is co-authored by Naga Suresh Govindaraju and Dominic Launder from Infosys.

Introduction

Organisations have multi-cloud and on-premise environments managed by respective functional units. Data is moved across these data ecosystems for leveraging large-scale compute and technology capabilities of the cloud to deliver business outcomes. Most of the use-cases need data from multiple data domains and getting the data in the right format and quality is challenging. Gartner named data quality as one of the top three barriers to AI adoption. Data quality is typically performed at source system and includes steps to profile data, cleanse, define data quality rules to ensure data validity, consistency, accuracy, and integrity. As data moves across the platforms, applying data quality consistently across the board needs a holistic approach and a set of proactive and reactive data quality measures.

With each move there is a risk of data quality deteriorating where any record of the 'what, when, where and why' reasoning to transform or clean the data is typically lost over time. Factors could include personnel change or restructuring, new technology deployments and general contextual loss as different teams work on data. With each change, there is a transactional risk with an associate cost to quality as data evolves – few organisations could probably trace back a business outcome e.g. raw seismic data to choosing a perforation interval within a well many years later. Preserving data quality over time and layers is a challenge facing most organisations.

Quality data is an Asset

The concept of 'data as an asset' is nothing new, but to define an asset as "something with economical value that an entity controls, with the expectation of achieving a future benefit", data must be of sufficient quality for a particular action.

The production, management and consumption of high-quality data ensures not only that organisations make better quality decisions, but also that a competitive advantage can be achieved through the interpretation and implementation of action from high-quality information.

Poor quality of data leads to poor business decisions, creates uncertainty and introduces risk in the decisions that are made based on that data. Data quality brings countless benefits, but can broadly sit in three categories:

- **Confidence** – in making decisions that rely on data where acting on a ‘trusted interpretation’ yields improved confidence in executing the plan of action – rubbish in commonly gives rubbish out!
- **Time and cost savings** – decisions made on high-quality data reduce the risk of spending further time or financial resources to resolve.
- **Organisational reputation** – data leaks, breaches or misinterpretation of poor-quality data has reputational consequences that arose from poor data management.

Better data leads to better decisions. Proactive data quality measures include defining quality rules and processes upfront and leveraging a tool to automate some aspects of data quality. In a big-data world, this puts a huge burden on data governance teams to keep up with data changes and volumes and proactive

Point of view... continued

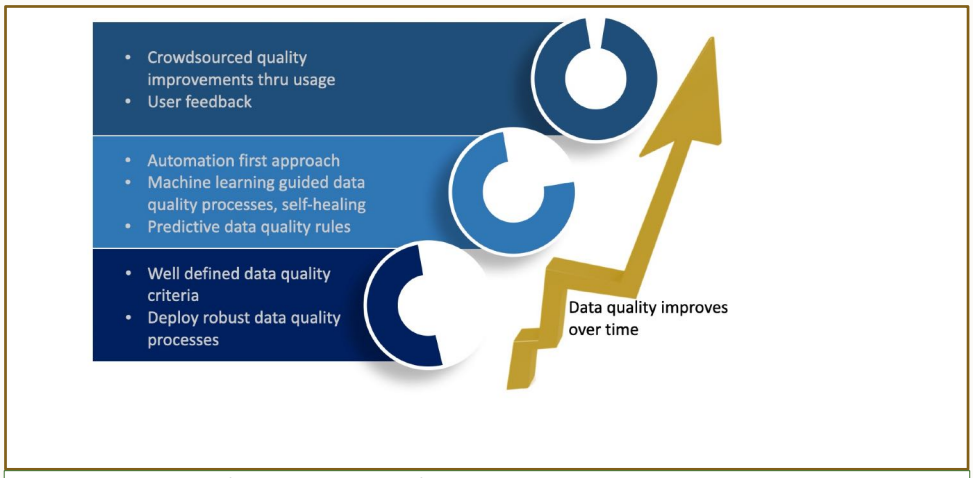

Figure 1: Proactive and Reactive Data Quality Measures

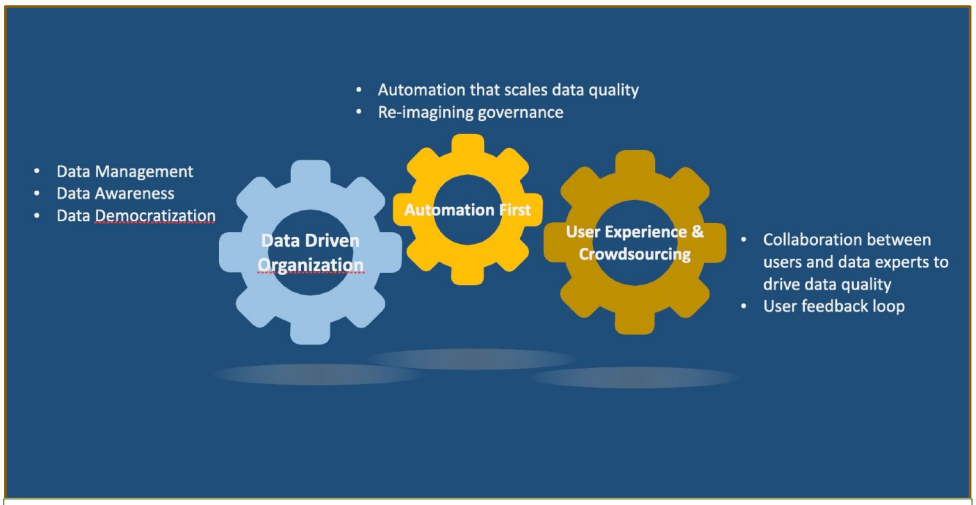

Figure 2: Data Quality Focus Areas for Improvement

measures put in place may not achieve the desired quality objectives. Data quality needs re-imagining to crowd-source quality by bringing user consumption dimension as a key guiding factor for improving quality. The more a dataset is used the better it is in terms of quality. User consumption increases if users understand the data and consume in a self-service manner. Therefore, strategies to drive up user consumption should be a part of data quality initiatives.
Re-imagining data quality requires sustained effort in addressing changes in people, processes, standards, and technology.

In this point of view, we discuss three areas to focus on for bringing change in the current state of data quality.

Data Driven Organisation

Data driven organisation is a generic term for groups who adopt various initiatives, behaviours and promote a mindset change to improve data management practices, elevate data awareness to stakeholders, and to encourage data democratisation across data systems, functions, and regions. Within each of these areas, specific actions are taken to grow data quality maturity.

1. Data quality roles: Establish roles and accountability for defining data quality approach in consultation with data experts from domain as well as user communities.

Data driven organisations promote a custodianship culture to enhance the value of the governed, trusted, and transparent data assets, so that data is more usable and understandable. Data Owners can be engaged to drive various weighting and scores on how they perceive data quality, including correctness, consistency, currency, and completeness might be used. Such metrics, for example 'correctness' aren't entirely objective, but instead is a question of whether the data describes a real-world object and does the data need precision and accuracy to achieve a business outcome. Creating dedicated roles helps users answer questions about data quality, where they act as an anchor of understanding to the quality of that data.

2. Streamline data quality during onboarding: Create an onboarding process and data registration mechanism with a focus on how data quality will be measured and enforced across data platforms to build consistency. Such processes may include the collection of technical and business focused metadata since this

Point of view... continued

improves the data quality in terms of contextualisation. Data may have very well-defined, but potentially arbitrary, DQ dimensions measured. However, without well-described metadata at table, and/or column level, with domain-led usability guides on suggested usage, the data will be less understood by others who find or wish to consume the data. In-built data quality within the data pipeline, and good metadata ensures only high-quality data is available for analytics.

3. Meaningful curation / models: Create information models that help build common understanding of the data and improve trust in data; promote consumption via self-service.

Data Curation is more than just a measure the data quality dimensions. Curated, or endorsed data from a data expert, owner or SME encourages other users to trust and use the data. Provisioning such endorsement can leapfrog various checks to accelerate data usability and validation of provenance so that the user can begin to work on the data and achieve an outcome faster. More mature organisations will go beyond provisioning raw source data to its users, but to begin building business data models or products that are user-ready data products in more consumable format. Implementing data quality and transformation lineage and data curation/endorsement into these models from experts or custodians help people trust data.

4. Intelligence about datasets: Curation activities, data rules, descriptions, transformations etc. need to be standardised and documented for visibility across data expert and user communities. Utilising industry wide standards such as PPDM for Oil & Gas data leverages the learning and experience from industry equivalents to improve in-house data. Similar, internal groups within an enterprise can create internal standards and ways of working, usually driven from a data lead, to align the expectations of data quality across functions.

5. Promote data culture: Facilitate hackathons, lunch & learn, data expos / campaigns, community of practices – data ambassadors create a collaborative data community, generate excitement to improve consumption. Organisations are working hard to break the misconception of data and tech is IT, and businesses are the end-consumers. In the modern data driven organisation the concept of citizen data scientists is prominent and realistic aspirational goal!

Data Ambassadors and Promoters can act as both change agents to promote and encourage new data practices, as well as capture data quality feedback on that data to improve future understanding. Identifying data ambassadors within specific data domains will improve collective data quality understanding. Ambassadors and promoters help overcome challenges and perceptions to data users, bridging the gap of between the perception that IT-based data profiling is sufficient, in parallel to collaborative Business knowledge growing around data. Ideas evolve off ideas and use cases trigger new use cases, therefore the sooner the user's experiment, and become familiar with using high-quality data, the sooner they can share with the community who can piggyback of others' learning as a proof of value.

Community building around data through on/offline events and initiatives helps excite users about data, to encourage people to think more about using data in their roles leading to increased cross-organisational knowledge.

6. Reference data management: Identify and manage reference data in standard systems and ensure data quality processes tap into this repository to resolve reference data issues. Resolving reference and master data could be perceived as a quick win, particularly for large multi-national, multi-functional organisations. What might seem as basic data issues, such as providing an organisation wide [curated & standardised] list of Regions, Sectors, Units of Measures, or abbreviations would yield multiple benefits for creators of visualisations and reports where everyone, independent of location or sector is 'speaking the same language' when creating filters.

Adopt Automation First Approach

Data production is exploding – at a rate where even with disciplined data management practices, automation

Point of view... continued

and technologies must do more to help transform the vast amounts of data into something of value. Human error is a well-known obstacle to data quality, automating checks and fixes minimises the risk of missing issues. Whilst the six DQ dimensions are well known with readily available off the shelf tools to deal with data quality, additional approaches aim to automate the adherence to defined data quality [for that specific data type, domain, or organisational need] and to provide transparency into where intervention is needed for improvements.

1. Predictive health checks: Data changes over time; Assess AI tools that can learn from data and suggest health checks (data quality rules); Every dataset should have health checks configured and implemented in the pipeline. Data quality rules should be reviewed regularly by the newly established DQ roles to reassess and iterate various data rules to ensure health checks measures are evergreen and accurate.

2. Self-healing using ML: Implement AI methods / technologies to understand anomalies in the data and auto-correct the datasets; Automation tool can submit tickets to data experts to rectify errors. Data bots can be built to identify missing values or expected attributes as a way of exposing and resolving errors.

3. Crawl and detect data quality issues: Scan folders in data lakes and report mismatches in naming conventions, missing files, incorrect paths, duplicate files, incomplete files, conforming to syntax (format, range, type), of correlation to master records or attributes; minimise manual data management oversight. Defining relatively basic documentation, filing and even data rules, usually common to a broad range of data, will vastly bring a standardised view to the folders in the datalike. Within the data itself, cross correlation with master and reference data tables (if defined) such as country names or abbreviation, can be a good place to start to issue resolution.

4. Data lifecycle: Implement technology that can show full data path and transformations across data platforms; Enables impact analysis to understand how data changes can affect downstream consumption. Preserving knowledge of how data evolves through its lifetime and context of the change will lead to better downstream decisions made upon the data. During audit, the inheritance of data quality from one stage to the next should be transparent.

5. Dashboards: Implement comprehensive data quality dashboards so that issues are proactively tracked / resolved before they impact users; Pull user feedback via consumption patterns / reviews. Dashboards will report metrics such as data completeness of a data entity, informing producers, owners, and consumers how much of the data and metadata is populated. Dashboards provide a democratised focus point for high-value data, and its usage to be transparent and serve to continuously improve the management and knowledge of the data, thus, improving quality.

User Experience and Crowdsourcing Data Quality

Capitalising on the ideas and insights of employees to crowd-source feedback, use case success stories and contributions from data initiatives, will deliver measurable value by collaboratively validating and enriching data quality with focused outcomes.

1. Consumption drives data quality: Engage users to share feedback (ratings / reviews) on datasets to provide input for driving data quality improvements; Enable users to submit tickets to report quality issues. On the contrary, allowing users to rate and review datasets based on quality and readiness to use, can lead to healthy competition between data groups while exposing and ultimately encouraging different parts of the business perceived to hold poorer data quality to remediate.

2. Social networking for data: Leverage well-established social networking platforms like Yammer to discuss about data (general accessible datasets only); Helps bring data experts and users together. Confirming if data is 'good enough to use for X use case' is just as much as knowing who to ask for their expert judgement, in addition to where to find the data. Data Owners may be considered as the owners of data quality perception.

Point of view... continued

3. Strategies to drive consumption: Enforce data governance cadence between data expert community and users to drive data quality initiatives collaboratively; Identify high valued / most used datasets to prioritise data quality enablement. Communities of practice and domain led data groups e.g., procurement team can open their high-quality data and invite other groups to use it with the objective of finding new cross-domain insights. The more this happens, curiosity and experimentation grow, as does the data quality when functions know their data is being used elsewhere.

4. Democratise data for visibility: Define tagging strategy to ensure users can find the datasets easily and consume them. Applying data quality measures upon data onboarding will vastly aid the metadata discovery of data through intelligent, domain-based user searches.

5. Give datasets an internal ranking of gold, silver, or bronze: Leverage existing knowledge on quality measures implemented in projects to give a relatable analogy, such as e-commerce rankings. Provisioning curated data with well-defined criteria of health checks, data quality metrics and standards reduce the ambiguity in data integrity.

Big data governance and traditional data governance approaches look similar in terms of processes, roles, and services. A major shift is looking at data quality from a consumption standpoint and enabling strategies that bring users into the data quality improvement. Successful data initiatives are those that engage users in the conversation to improve quality and help organisations become truly data driven.

Metrics to understand the success of data quality should capture the outcome and consequences of high data quality on its operations and decisions. Metrics may include:
- % improvement in Data Quality Scores
- Adherence to Data Management Standards and Processes
- % reduction in risk events
- % reduction in Data rectification costs
- % data owners who say their data is aligned with corporate objectives.
- % increase in the agility and speed of decision making
- % increase in the width and depth of insights

Organisational readiness is a necessity to adopt a data-driven organisation mindset, and to sustain data initiatives. An automation first approach will accelerate data quality Improvements via technology, to expose and resolve data quality issues at a rate people can't. Embracing user experience and crowdsourcing feedback will collectively enrich the data quality through a broader data usage, awareness, and knowledge sharing. Organisations should remember employees' and their collaboration is as important as deploying tools and technology to mature data quality.

Conclusion

Instilling and sustaining practices to improve data quality will likely continue to be challenging to data heavy organisations.

The key message in this point of view is that whilst there is a balance of proactive vs reactive data quality, it pays dividends to put emphasis on data quality before it reaches the consumer who will make business decisions on what they find. Being reactive can be costly and wasteful. In parallel to proactivity, new technologies make it simpler to continuously improve and sustain a defined level of quality. Visionary organisations will also push to get their human capital to collectively improve data quality through sharing knowledge and crowdsourcing learnings from use cases and business outcomes.

Better data quality can bring new competitive advantages. Organisations that embrace the data-driven mindset and experiment with new technologies or initiatives will benefit from a wider understanding of the value that good data quality can bring to personal and organisational performance.

SPE Student Chapter at Imperial College, London

As part of SPE International, the Student Chapter at Imperial College, London promotes students into the world of petroleum engineers.

The Student Chapter organises lectures at Imperial College, along with social events and networking opportunities with industry professionals from companies all over the world. The Student Chapter also enhances collaboration with the wider SPE world, and organises the international field trip to provide 50 students with a hands-on experience in the oil industry.

SPE Chapter Objectives

- Organise, execute and raise funds for a safe, enjoyable and educational international field trip for SPE members studying on the Petroleum Engineering MSc at Imperial College, London.
- Enhance collaboration between the SPE Imperial College London chapter and the wider SPE community.
- Organise social, technical and career events and maximise participation by SPE members.
- Raise the national and international profile of the SPE Imperial College London Chapter and its members.

SPE Committee accountabilities

- Ensuring the international field trip is deemed successful by those attending it.
- Ensuring safety and responsibility in everything we do.
- Using effective project management to ensure success of initiatives held throughout the year.
- Using effective team co-ordination.
- Tracking the log of events throughout the year.

SPE Student Chapter members for 2021/2022

President: Firda

Firda is currently an Msc candidate in Petroleum Engineering at Imperial College London. She holds a Bachelor's of Science in Petroleum Engineering from the University of Tulsa, Oklahoma from which she graduated Cum Laude with the Thomas C Frick Award in Petroleum Engineering and is a member of the Tau Beta Pi Honor Society. Firda spent 4+ years as a Petroleum Engineer with PETRONAS, Malaysia's National Oil and Gas Company prior to pursuing her Msc. Firda has been a member of SPE since 2013 as an undergraduate student in the McDougall School of Petroleum Engineering in the University of Tulsa and as a professional member in SPE Kuala Lumpur Section. She currently holds the position of President of SPE Imperial College Student Chapter. Her vision is to strengthen the community of SPE ICL and provide a platform for continuous learning and growth in preparation for the evolving energy industry.

VP: Hani Hamoud

Hani is the Vice President of the ICL SPE Student Chapter. He graduated with a BSc Geology degree from Imperial College London in 2021 and decided to stay at Imperial to pursue an MSc in Petroleum Engineering. After completing the bp Widening Participation Programme in 2020 and an internship with Tullow Oil in 2021, Hani decided that joining the energy industry would most suit his character and interests. With his experience, networks, dedication and optimism, Hani aims to make sure that the section's students at ICL SPE learn more about the evolving energy industry and build a strong network to aid their future careers.

SPE Imperial Committee 2021/2022... continued

Treasurer: Polina Putentseva

Polina is currently pursuing a double MSc in Petroleum Engineering at Imperial College London (UK) and Kazan Federal University (Russia) sponsored by bp and Rosneft. She has been a member of SPE for the past five years since she started her undergraduate studies as a petroleum geologist at Novosibirsk State University (Russia).
As treasurer at SPE ICL, Polina will be in charge of the chapter's finances, including fundraising for various social events. These activities will mainly focus on engaging students in the petroleum industry.

Field Trip Coordinator: Antonina Barsukova

Antonina is an MSc Petroleum Engineering student at the dual diploma program of Imperial College London and Kazan Federal University. She received an integrated MSc in Petroleum Geology in the Tyumen Industrial University and worked as a geologist for more than five years. She is keen on incorporating data science and machine learning into the petroleum industry. At the Imperial SPE chapter, Antonina is responsible for organising the SPE-sponsored overseas field trip. She also actively collaborates with team members to make the Chapter's life as active and insightful as possible, and believes SPE is the main link between students and professionals.

Social Director: Adil Al-Sharif

Adil is the Social Director of the ICL SPE student chapter. He gained an IMechE accredited Bachelor's degree in Mechanical Engineering and is now pursuing a Master's in petroleum engineering at Imperial College London. Adil hopes to get other student engineering disciplines involved with SPE and the oil and gas industry in general. For his bachelor's final year project Adil was part of the UH team competing in the Shell Eco-Marathon; designing and building a vehicle to run on one litre of fuel for the purpose of the global competition. Adil is passionate about involving MSc students in various extracurricular activities.

Membership Officer: Mohammad Arslan

Muhammad is an MSc in Metals and Energy Finance student at Imperial College London. He holds a Bachelors degree with first-class honours in Mining Engineering from Selcuk University, Turkey and had various opportunities to undertake studies and internship exchanges in Europe. He is passionate about the sustainable exploration and extraction of mineral resources and their financial appraisal. He is currently serving as a Membership officer for the Imperial College SPE student chapter and aims to support productive engagement and professional excellence for all the society members.

Secretary and Digital Officer: Wissem Khelili

Wissem is a F26-year-old French student at Imperial College (MSc Petroleum Engineering). He graduated in 2019 as a mechanical engineer and did a two years graduate program with Total in 2019. He then joined Imperial College to complete his program. Wissem is passionate about energy topics, and believes the industry will have many challenges in the next few decades and wants to be part of it. His goal with SPE is to join a professional network and tackle the challenges facing the oil&gas industry in the next decades, such as the growth of energy demand and the CO_2 sequestration.

Net zero 101:
Scope 1, 2 and 3 Green House Gas Emissions

As you'll be aware, our carbon footprint is a measure and quantification of the greenhouse gas emissions (GHG) produced during our day-to-day activities. For an individual, knowing how much CO_2 they generate allows them to understand their impact on emissions and whether or not they chose to do anything about it; the measurement and the action remains voluntarily. This overview is provided by Harry Simmons, who is a member of SPE London's Net Zero Committee.

Who?

For UK businesses, depending on size, recording and reporting has become mandatory and, we can imagine, will continue to develop in scope, breadth and detail to meet our net-zero target by 2050. This target is already a stretch. The current UK position builds further on earlier requirements as now set out in The Companies (Directors' Report) and Limited Liabilities Partnerships (Energy and Carbon Report) Regulations 2018, and the Streamlined Energy and Carbon Reporting (SECR) implemented in April 2019. There is a host of detail within these requirements as you might expect. If you're really interested (really interested), settle yourself down for a weekend and have a read…

The requirements were introduced for quoted and large unquoted companies and limited liability partnerships to disclose their annual energy use and greenhouse gas emissions. While remaining voluntary for those not deemed 'large' – based on metrics such as turnover, balance sheet and employee numbers – the UK government still encourages all other companies to report similarly. Approximately 12,000 companies in the UK fall under the reporting requirement at the moment. Exemptions exist for all companies, for example, where energy use is 'low', which is less than 40MWh or less over the reporting period (normally a financial year). As a really rough guide, and to put that in to context, 35MWh is about the same energy that each of us will use in a year.

Why?

In essence, the SECR aims to allows companies to see the benefits of carbon and energy reporting. It may not be instantly obvious how a higher reporting burden can bring benefits, but in this instance it aims to encourage companies to understand their use of energy and manage this more efficiently, cutting costs, improving productivity, translating to fewer GHG emissions.

It also makes emissions data for companies visible to the investment community, ever more aware of the sustainable, low carbon economy and looking to compare green credentials between competitors. And herein lies a bit of an issue; there is no prescribed methodology on the calculation of these figures within the UK, or indeed globally. Efforts are underway to agree consistency of data, with all the implications this has for net-zero targets and the investment community judging 'like-for-like'. Such truly international agreement can be extremely difficult.

What?

However, there is broad agreement on how we attribute and understood where our GHG come from and they are captured under Scope 1, 2 and 3 emissions. There is a consistent understanding of what a company is directly responsible for, indirectly responsible for and consequently what and how it can influence those emissions. In the same way BOE allows oil and gas to be considered in one number, 'CO_2e', captures all of the key greenhouses gases (carbon dioxide, methane, and nitrous oxide) as a 'common unit' and allows for easier, more consistent comparison across organisations, industries and countries.

So how are the 'Scopes defined'? The process developed for industry sees emissions reported in three categories by activity, most commonly as set out by the Greenhouse Gas Protocol (**https://ghgprotocol.org/**).

Net zero 101: Scope 1, 2 and 3... continued

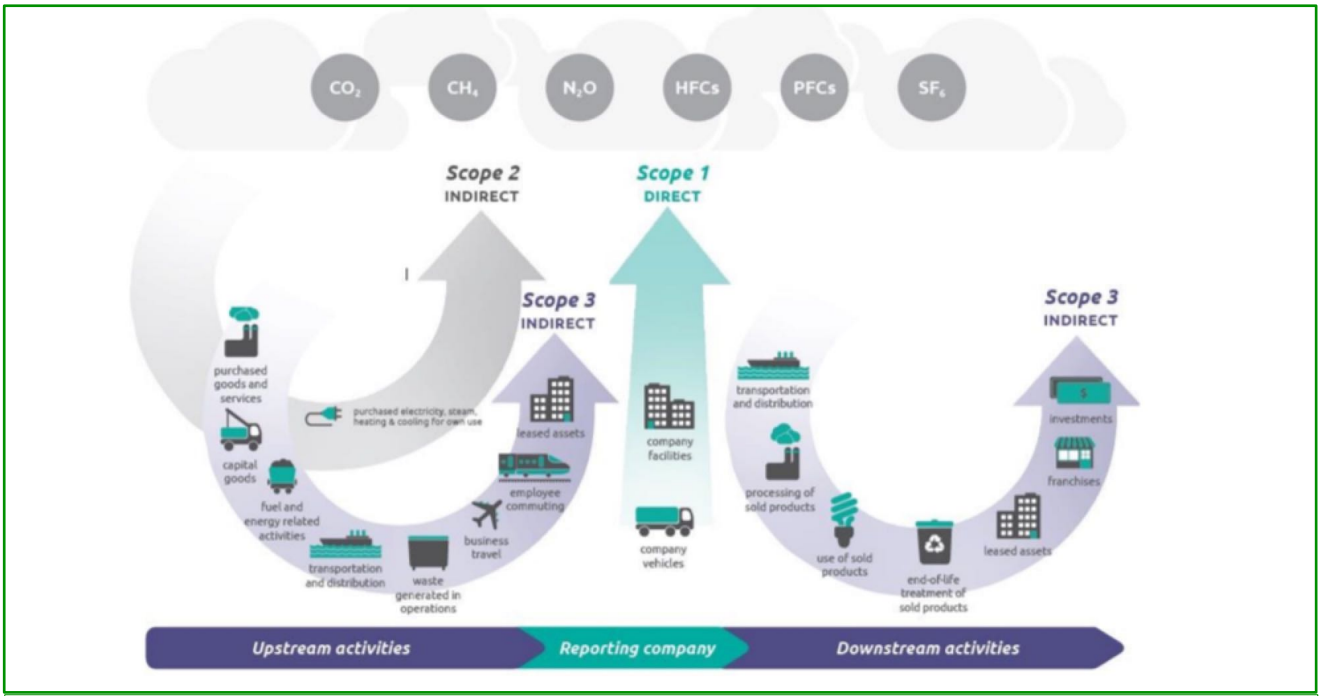

Figure 1. Reproduced from https://ghgprotocol.org/

Each category is a 'Scope' – thus Scope 1, 2 and 3.

The Scopes are captured by the location of GHG activities – upstream, at the reporting company itself, and downstream. The Greenhouse Gas Protocol graphic helps illustrates this.

Scope 1: Direct Emissions are produced from the direct activities of an organisation, or under their control. Direct emissions include fuel combustion on site from equipment such as gas boilers used to heat the offices, fleet vehicles and the imaginatively named 'fugitive emissions' which may come from air-conditioning leaks or methane releases. Scope 1 emissions are directly under the control of the company.

Scope 2: Indirect Emissions come from electricity purchased and used by the organisation. These are emissions created during the production of energy elsewhere and eventually used by the organisation at site. This includes electricity from the energy supplier to power computers, the coffee machine, heating and cooling.

Scope 3: All Other Indirect Emissions from activities of the organisation, occurring from sources that they do not own or control. Covering emissions associated with business travel, procurement, waste and water. For many companies Scope 3 emissions may account for around 80% of their reported GHG emissions, so not surprisingly are a major focus. You are most likely to hear about these in the workplace. They lie outside of a company's direct operations so addressing them can be a challenge and yet, given their impact, also present opportunity for collaboration through the supply chain. There is huge activity within industry to understand and work to reduce these emissions. Expect to hear more about them!

Harry Simmons has 25 years of experience in technical, commercial and management roles in the E&P sector. As Country Manager and Directeur General, he led the Algerian business for Hess, managed the non-operated portfolio in the UCKS, and was the Business Advisor for the Europe Eurasia region.
With Burlington Resources he was the Planning Manager and Operations Engineer for the assets run from the UK. Harry is currently undertaking a part-time distance Learning M.Sc. at Heriot-Watt on Renewable Energy Development. Harry is excited to work as part of the SPE Net Zero Committee and help develop an understanding of the part both our industry and individuals, current and future, have to play in a sustainable future.

Production gains from digitalisation

In the 21st century, project management needs the combination of newly available technologies with human decision-making. This article aims to introduce project management in the 21st century and how data-driven and automated solutions can result from financial gains and boost decisions.

The author is David Gonczi, Reservoir Team Lead at DATAGRATION.

The continuous data flow and their utilisation in the oil and gas industry are significant challenges. Many companies are flooded with data that are barely used for surveillance, analysis, or optimization purposes, and they are not managed consistently. Often critical decisions are prepared in spreadsheets that were never designed to accommodate continuous data and automate decision-making processes. Transforming how the companies operate using real-time information, adding automation, improving decisions in a collaborative environment to meet production targets is still a crucial challenge.

The success of a project is highly influenced upon decisions made at early stage. The following figure shows that making appropriate decisions early and poor ones late can define whether a project will achieve the desired internal rate of return (IRR). The best decisions can only be chosen if several options are considered. Therefore, the evaluation of multiple scenarios is needed to be able to rank projects and select a portfolio.

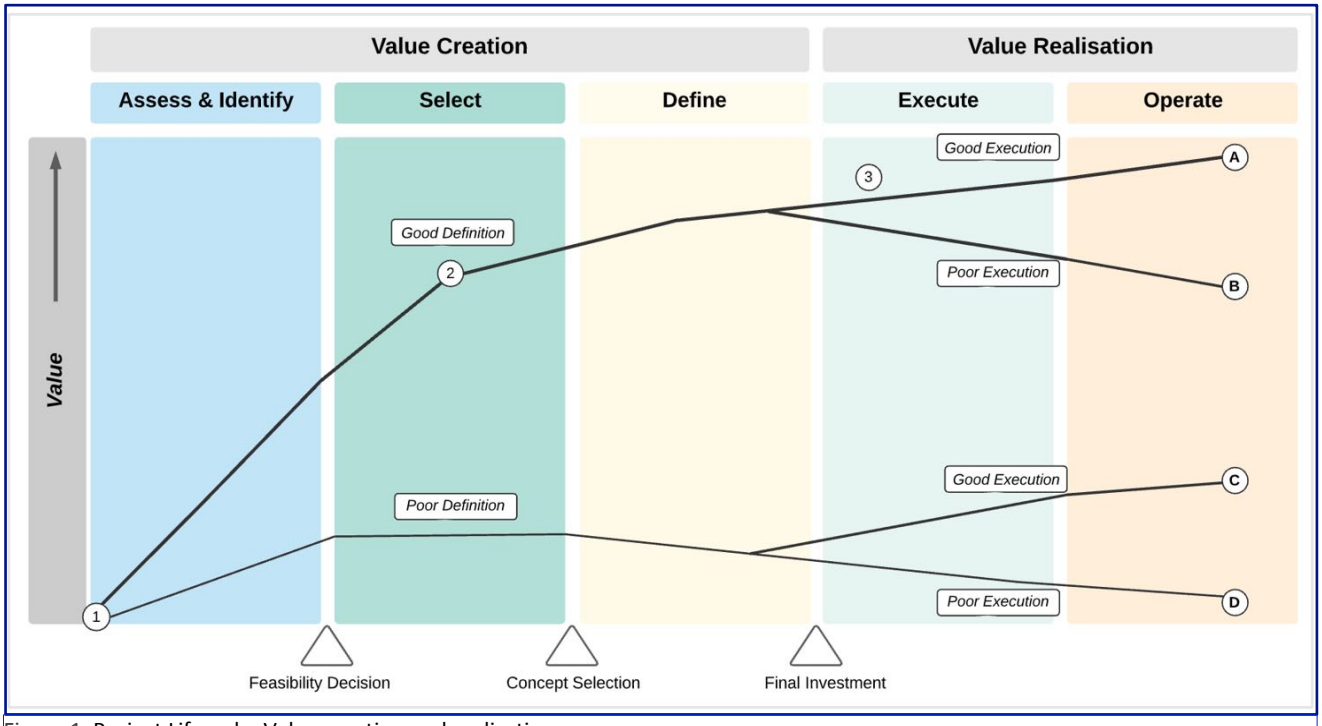

Figure 1. Project Lifecycle: Value creation and realisation

Using a combination of physics-based, artificial intelligence-driven solutions and automation tools, we can screen thousands and millions of options so that the best opportunity can be selected. Using a hybrid approach to evaluate each development scenario reduces the risk of improper early decisions.

According to a study, 60 to 80% of the time is spent finding and preparing data instead of focusing on improving the quality of the decisions. The survey pointed out that data management and integration are challenges in the petroleum industry. Also, the top challenges included managing large volumes of data and lack of integration between work processes, significant computation times, and a lot of manually driven tasks.

Production gains from digitalisation... continued

However, teams often find difficulties establishing digitalisation, including new technology solutions and practical methods to measure the required value to accomplish a full field implementation.

Measuring success rate of digitalisation

The World Economic Forum and Accenture prepared a case that one of the most significant impacts of digital adaption would come from operations optimization and predictive maintenance.

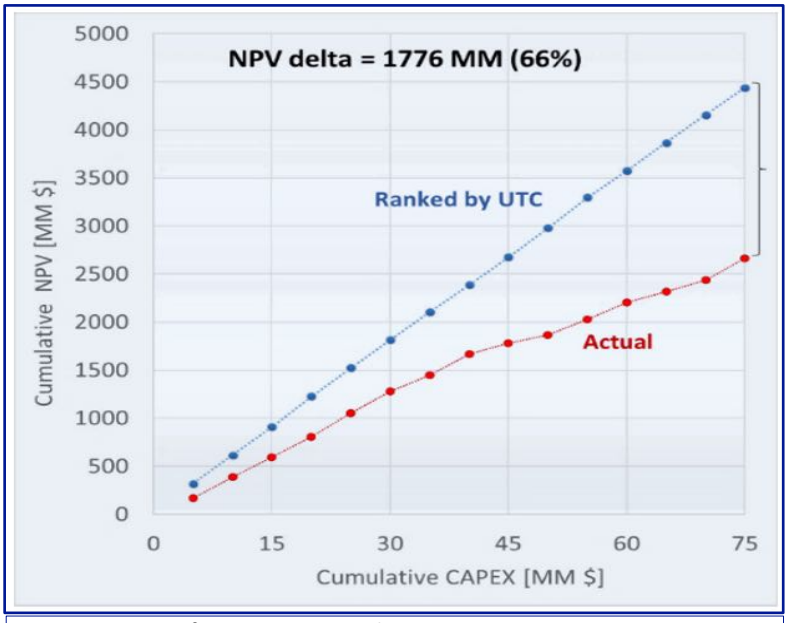

Figure 2. NPV gain from using UTC ranking

A comparison is performed using our automation software and where we ranked the top sidetrack opportunities based on their UTC ranking versus the operator manually selected well bores.

Analysis showed that 1776 MM $ (66 %) NPV gain could be achieved over ten years at the exact cost of US$ 75 MM if the top UTC-ranked sidetrack opportunities could have been executed.

Therefore, we successfully established and demonstrated a system that automatically generates a sustainable, standardised, and comprehensive portfolio of subsurface opportunities within hours instead of weeks or months with a reduced risk of failure.

Financial Impact of Digitalisation

A study was performed in 2017 by World Economic Forum and Accenture in the oil field equipment and services (OFS) sector. They analysed the estimated projections of financial impacts to the oil and gas industry from digitalisation and technology adaption. The main dimensions include incremental revenues to upstream operators, CAPEX reductions, and operating expense savings.

According to the study, incremental revenues to upstream operators can add $376B in annual revenues to the upstream industry on a “normalised” annual volume of 100MMbpd and assuming only $50 oil price. Assuming a year, the industry generates revenues of $1.8T based on the assumptions. The potential impact to production and efficiency gains from digitalisation for a low case is 5% ($90B), Mid case is 25% (~$460B), while a high-end expectation from the survey might lead to 32% (~$580B). The mean of these values would be $376B.

There are other value metrics which can be estimated and highlight the potentials of digital oil field applications including improved efficiency, deferred production, production gain, operational violation tracking and increased recovery.

Old ways of collaboration often, engineers only use spreadsheets for problem solving and innovations. Spreadsheets are hard to maintain, lack integration, and difficult to automate over a long period.

In addition, oil and gas industry has lost many senior engineers and experts over the last few years, including their innovations and analytics. Therefore, our industry has a critical need to change our best practices and way of problem-solving.

Production gains from digitalisation... continued

Collaboration in real-time

Our integration with a communication platform helps organisations to be more productive & collaborative by providing a better way to share messages, files, and information to establish a base for digital transformation.

For instance, we can review integrated operations dashboard in communication platforms, making it accessible via any location using our phones, tablets, or laptops. The same standardised information is available for the operations, engineering, and management team if needed. Alarms and bots are helping in daily decision-making by notifying users when a well is underperforming or reaching unhealthy operating conditions. In this example, the potential for flow assurance risk was estimated and gave the user prescriptive messages.

How to Improve Decision Making Process

A unified data model secures the base to create an automated advisory system which enable humans to become quicker, more precise, and more accurate in critical decisions. The same standardised logic can be applied across all assets. Thus, we can automate many petro-technical workflows with an automation platform using artificial intelligence driven decision making, which provides unified, modern, and cost-effective solutions to run our business and produce from the fields more efficiently.

Therefore, optimal use of available technologies and resources during project execution ensures working efficiently, getting project costs under control, and improving communication is a critical component of proper project management. The current trend of extensive use of automation, artificial intelligence, machine learning-driven solutions is associated with project management and becoming a fundamental part of the success of the projects.

David Gonczi is a reservoir team lead at Datagration Solutions, responsible for production and reservoir engineering roles via the integration of PetroVisor software to technical projects.

Formerly, he has been involved in software development for fractured reservoirs, data analysis over 20 projects and history matching processes of several fields globally from lab to field scale. Currently, he develops numerous automated AI driven workflows and dashboards for production and reservoir optimization.

Political sustainability – Better Practices, Better Development, Better Government, Better Capitalism

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 seventh 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.

Political Sustainability and Base of the Pyramid; Sustainable Development Goals

This article will cover the second Sustainability Perspective, Political Sustainability, with its pillar of opportunity ensuring the interests of the Capitalist Society needing Doing Good and the Technical Sustainability desire of Doing Right – achieving Global Sustainability through Inclusive Capitalism & Markets. 'Partnerships', 'Fragmentation', 'Systemic Thinking', and 'Doing Right, Doing Good, Doing Well' will be covered – with the Tragedy of the Front-Line needing the raising of the Base of the Pyramid to help address humanity's Misery & Poverty and climate physical Loss & Damage to the already vulnerable living on the Planet's Boundary to Nature; People Climate Nature.

For readers who want a 22-seconds outtake:

"The transformative power of Capitalism seeks out the best ways for Value Creation and Wealth Creation. Capitalism can deliver Global Sustainability through Continual Innovation and by being inclusive with good Political Governance. Global Sustainability needs Global Partnerships to access the necessary Financial Capital & Social Capital. The Limitations to achieving Global Sustainability can be cast into keystones: 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. Systemic restoration & regeneration – our footsteps have mattered particularly into wilderness stock. The Apollo Space Mission did not get to the moon on Apollo 1 but Apollo 11. Taking an elephant-like leap to the Green Utility is not currently possible and will need lots of prototypes – failures will be high, successes few; we know that as otherwise the Urban World would be more sustainable today. We have the blueprints for the Blue Utility, created by the handprints of the industrial revolution through technical succession; then enabling moving at pace from the secured Blue Economy to the new utility of the Green Economy. Our transition to 2030, developed through the recent COP26, addresses Global Pollution & Global Emissions, being Coal Cash Cars Trees Oceans. Engineers apply experience, insight and wisdom in manufacture, production and delivery overcoming associated risk through risk management, which is also a competence of Corporate Governance & Investment Governance too. Better Development will hopefully save Our Living Planet; Global Sustainability."

The last Article ended with defining the **Sustainability Mission** as "*the desire to produce, to manufacture, to deliver **Sustainability Value** through endurance and limits, physical & environmental, attaining **Global Sustainability** creating **Sustainable Value** built on **Capitalism** (the productive use and reinvestment of the **Capitals Stock**) overcoming limitations imposed through Continual Innovation and by being inclusive with good **Political Governance**"*. This summarised the first six **Articles** based on **Integrated Thinking** of Sustainability. **Limits**, physical & environmental, are the core strategic element to Sustainability effecting

Political sustainability... continued

activities & actions to achieving the desired 'destination' and five keystones were discussed in the previous Article. **Limitations** are the core strategic element to achieving Global Sustainability. These **Global Sustainability Limitations** can be cast into five keystones and will be discussed in the remaining **Articles**:

1: Present State of Technology
2: Political & Financial [Political Governance & Responsible Investment]
3: Base of the Pyramid [Economy Development Limitations]
4: Social Organisation [Population, Demographics, Land Use]
5: Global Prosperity [Inclusive Capitalism & Total Capitals Stock]

How successful these **Global Sustainability Limitations** are overcome will dictate the future of the Natural World and Urban World; **Prosperity People & Planet (Climate, Nature**) ('3Ps'); **Our Living Planet**.

To achieve the Sustainability Mission at a Global scale needs **Partnerships** and to overcome **Fragmentation** by applying **Integrated Thinking** with the additional use of **Systemic Thinking**. '(This) New emphasis has been given to complexity, networks, and patterns of organisation…'[(1)] Global delivery needs more than innovative, enterprising, compliant, responsible **Technical Sustainability**, but, also the perspective of **Political Sustainability**. **Global Sustainability** cannot be achieved without **Global Partnerships**, which needs **Global Finance** (i.e. **Financial Capital**) **& Global Funding Networks** (i.e. **Social Capital**) creating financial mechanisms, processes & systems (**Financial Services**). The perspective of **Financial Sustainability** will be discussed in the next Article. **Continual Innovation & Entrepreneurialism** will then be framed in the penultimate Article.

Political Sustainability is the perspective which creates pillars of opportunity that brings together countries with different economic, political, ecological/environmental and social circumstances; developed countries and developing countries in a manner that reflects equity and the principle of common, but differentiated responsibilities and respective capabilities; in the light of different National & States circumstances to achieve **Global Sustainability.** This is achieved primarily through creating **Partnerships** ensuring that our activities and actions today do not limit too severely the range of economic, social, and environmental options open to future generations. Good **Political Governance** is the key requisite. **Technical Sustainability** is the key means.

Global Partnerships on Human **Misery** and **Poverty** have been ongoing way before 1964 when United States President Lyndon Johnson launched his "War on Poverty". The redoubtable 18th Century philosopher Jeremy Bentham was well known for his moral insights on the topic of 'Misery'. **Global Partnerships** on Climate **Mitigation**, **Adaptation** and **Loss & Damage**, primarily through the **Conference of Parties** ('COP') are now a necessity with millions living on the Front-Line of Climate Change. A living social tragedy as well as ratcheting-up ecological/environmental happenings. **Mission Critical** is to reduce our Urban World **Emissions Footprints** and our **Human Footsteps**, reforming our behaviour while restoring **Natural Ecosystem Services** in line with **Human Population**; renewing **Natural Resources** and maximising the regenerative nature of the **Natural World,** particularly the **Oceans;** the **Blue Planet** of **Nature Stock**.

Global Partnerships focus on the demise of the Natural World need real action urgently now on **Pollution Reduction**, with 'our toilet' flushing into rivers, resulting in polluting the oceans which effect **People Climate Nature**. An urgent need to reform **Human Nature** protecting our planet's boundaries between the Urban World and the Natural World.

The **COP** is a great example of a Global Partnership in action, organising 26 annual United Nations Climate Change Conferences with today some 197 "signatories", or "Parties" (National Governments) representatives, plus many associated States present contributing too. Also attending, the private sector, foundations, international organisations, academia, NGOs, UN agencies and many others. Outside the 'activists' gather, increasing in number and voice as the pace of action seems 'breath taking' provincial; despite the frenetic 'merry-go-round' inside the halls and meeting rooms. This Conference draws upon global knowledge, specialisms and legal & negotiation expertise to promote and 'drive' positive, solutions-driven approaches to

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combat Climate Change; to highlight transformational Climate Action through **Action Plans** linked to their **National Determined Contributions** ('NDCs') and to improve public understanding of the issue. Global Partnerships, like COP, also helps "Parties" to do Better Government; evolve their Political Governance competence. This year, a One Government approach to planning was articled: "Parties to further integrate Adaptation into Local, National and Regional planning"; Scape, Scale & Scope. Clearly 'talking' about 'joined-up government' was 'just' talk.

As witnessed in the Glasgow COP26, this November, shepherding fellow Parties can all hinge or come down to one legal word; 'down' not 'out' in 2021; 'end' to Coal. Paris COP21 came down to '1.5' vs '2'. Pure politics driven by in-Vested assets & interests (**Article 6**), lack of sleep and adrenalin 'highs' to achieve the deemed necessary 'progression'; where were the **Statesmen** called for by regal insight? Shepherding Global Partnerships needs more than a few negotiating 'sheep dogs', technical 'whistle' and nature based, climate hardened 'crook'. Pure drama right 'down' to 'end'. At the end, a new 'base camp' had been built, 'COP26' with its new legal 'pact' now clearly along a pathway to the next 'camp', on route to advocates' envisaged 1.5^{o}C Net Zero destination. As a minimum in legal Articles, by "signatories" of the "Parties". At 1.1 or 1.2^{o}C today, no wonder the 'activists' are encircling the 'camp fires', inside 'COP26'. Inside, all have to agree or nothing till the following year – a political drama; a party of equals yet with differentiated responsibilities and respective capabilities – just a common purpose, but, this year many more accounts of the vulnerable living on the **Tragedy of the Front-Line**. Living on our Planet's Boundaries to Nature's and the Natural World's wildernesses just got high **Exposure** to ratcheting-up happenings; for some extremely **Hazardous**. Political Custodianship in the 'flood-light'. Regal insight mattered. Was that the COP26 announced new climate Partnership between United States and China? Was this brokered by the seemingly absent 'Statesmen'?

A **Developing Country** 'Just Energy Transition' Partnership on South Africa was also announced during COP26 with the United Kingdom, United States, and EU (Germany & France); supporting South Africa's decarbonisation efforts now they encounter **Day Zero** water outages -- so not enough water to run the capacity of their coal powered electricity generation plants. More insights from the **Tragedy of the Front-Line**.

So why is good **Political Governance** so important? As a start it is a 'no-brainer', who does not desire to breathe clean, fresh air – free from particulate matter; swim in seas, sewage and plastic free; knowing the thriving, flourishing colour filled deep oceans, **International Waters**, are full of fish and other more important 'inhabitance' of the Natural World in this wilderness, delivering much needed **Natural Ecosystem Services**; the **Natural World** beyond the **FootSteps** of the majority of **Our Urban World**. **Our Living Planet**, respecting the Planet's Boundaries, working with Nature – **Vision of Sustainability**. To the **Capitalist Society** this is a core desire based on Liberalism to achieving Global Sustainability, more than need. Only 'advocates for change' at the table can secure this desired Vision. 'Activists' lack precision shouting from the outside perimeter fence observing into the 'camp'. Humanity protects The Markets & Capitalism, why not The Commons & Global Cover too?

Good Political Governance also delivers respect, promotes obligations on human rights, the right to health; the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations as well as gender equality, empowerment of women and intergenerational equity; right to development of local communities and Civil Society; accelerated action on the basis of the best available scientific knowledge and equity, reflecting common but differentiated responsibilities and respective capabilities, limiting the Tragedy of the Front-Line to climate change; and continual efforts to eradicate misery & poverty; the importance of ensuring the integrity of all ecosystems, the forests & soils, the oceans and the cryosphere, and the protection of biodiversity, recognised by some cultures as 'Mother Earth'. Quite a **catalogue for reference**. The new base camp 'COP26' certainly delivered a lot of articled ambition! Desire or just Need? A **Just Transition** is still being pursued by politicians for the **Developing Countries. Fair Transition** in the **Developed Countries?**

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In My Back Yard ('IMBY') or simply *My Back Yard* ('MBY') **Tragedy of the Front-Line** Social 'Respondibility', built from Social Responsibility, means those in the Developed Counties articulating 'Just' or 'Fair' Transitions need to be also offering **Inclusive Capitalism** or otherwise those exponents can look to easily 'needy', 'selfish' or 'self-centered'. Millions of People are now effected - Island States, Coastal Habitats & within the Urban Boundaries, like Farming, etc, etc. Loss & Damage is increasing, ratcheting-up; this is also the end of just the start of mass **Climate Migration**.

Visible Hands in the marketplace are now active; some proactively. **Sustainable Value**, at global scale, is clearly beyond the reach of our current unsustainable Urban World life-styles, needing reform of **Human Nature**. The current 'market transformation' will be enacted over delivering **Sustainability Value** using intrinsic data & information creating greater understanding and insights into shifting demands linked to non-linear changes in consumer **Values & Behaviours**; shaped by political policies (Visible Hand of 'The Market'), emerging technology at scale, operating at physical & environmental limits and through enacting core Sustainability Practices. Our **FootSteps** matter particularly into wilderness stock. We must understand what we can achieve from Capitalism predominantly focused on **Wealth** and what we can deliver through The Markets predominantly focused on **Value**. Simply put, again, when Human Population increases, so too should the Natural Ecosystem Services be increased – not decreased by humanity through its **Human Nature**. This calls for actual reform of Human Nature now we are living with both 'physical and environments' limits & limitations due to now having to produce, manufacture and delivery at global scale; **Planetary Scale**.

Environmental Justice is the fair treatment and meaningful involvement of all people, regardless of race, colour, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental Justice is a **Political Policy**, ideology, behind overcoming Climate Change. But are we seeing, globally, enough **Climate Policies** being enacted?

Is this COP process, having a **Chief Shepherd** herding 197 Parties with their herds sufficient? Based on the **catalogue for reference** described in the paragraph above of what constitutes **Good COP** governance, the pace of action can only be 'breath taking' provincial; despite the frenetic 'merry-go-round' inside the halls and meeting rooms. Six years later the 2015 COP21 Paris Agreement Articles (ie Paris Article 6 & Article 13) have been finally agreed in 2021 – the 'Paris RuleBook' and the 'Rules for International Carbon Markets'. Yet take the latter, is that just for Developed Countries or do all Developing Countries possess the 'respective capabilities' to effectively pursue this or are they actually 'differentiated' by their lack of 'respective capabilities'. Time will tell, but funding **Adaptation** matters. At least One Government 'Adaptation Planning' has been legally cast; Local-Regional-National.

Nation 'Parties' with small emitting 'herds' can only be meaningfully at the table, by best shepherding – **Political Stewards** to the main 'actors'. The Pope was one of the originators of the importance of **Stewardship** in 2015. He knows Nature matters too, to achieve Global Sustainability. **Global Pollution** matters just as much as **Global Emissions** – circular, not linear ("treating Nature as our toilet"). The activists outside certainly realise the urgency needed for material Climate Action; the world has moved on from pasturing herds & 'mobile' camps 2000 years ago. As the Pope knows, just lock the "signatories" into a very warm, comforting and nice 'space' and wait for the **greensmoke**; and S**tatesmen** emerge. That would signal the 'end of the beginning'. Pace will then be key. When might this happen? Probably between two to six COPs away based on the current 'projectory' of future 'base camps'.

The **elephant in the room**, **Nature** (Stock) was finally understood at COP26, particularly the importance of Oceans; **People Climate Nature**. How can that have taken 26 COPs? Well who at these COPs represent the 'state' of **International Waters** – only 1/3 of Our Planet? This 'elephant', **Nature Stock** is for the first time cast transparently into the Glasgow Pact: "…the importance of ensuring the integrity of all ecosystems, the forests (& soils), the oceans and the cryosphere, and the protection of biodiversity, recognised by some cultures as 'Mother Earth' (Nature)."

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To fund solving **Global Pollution** & **Global Emissions** will mean the $130 trillion private finance committed to the **Glasgow Finance Alliance for Net Zero** ('GFANZ') will be pushed to its **financial limit** – as the next **Article** on Financial Sustainability will frame. Remember this is Global Financial valued based on **Financial Assets**, so needs a valid 'proposition' to engage. Counties experiencing the **Tragedy of the Front-Line** will still needs **Global Funding Networks**, currently standing at only less than $100 billion per year. No wonder COP is now entering an annual 'merry-go-round' on 'Parties' NDCs Accounting & Finance. Cash matters to the Front-Line.

Doing Right (Markets & Capitalism) – Doing Good (Base of the Pyramid) – Doing Well (Natural World)

For humanity to survive in a comparable form and with functions as **Civil Society** has established to date, means Capitalism must deliver **Global Sustainability** by creating systemic **Sustainable Value** through Continual Innovation & Entrepreneurialism; and being inclusive with fit-for-purpose Political Governance. **Civil Society** is typically characterised by a shared set of norms & ethos, under the 'rule of law'; **Liberalism**, promoting individual rights, civil liberties, democracy and free enterprise.

Global Sustainability is a much more superior term in all respects than any other suggested to actually fully encapsulate the Brundtland Commission's concept ideology. That ideology became that of **Sustainable Development**, that of overcoming "(global) **limitations** imposed by the present state of technology and social organisation on environmental resources and by the ability of the (planetary) biosphere to absorb the effects of human activities"; plus adding in the need for **Political Governance** particularly for efficient & effective Capitalism -- basically a four prong approach: Economy Society Environment (Political) Governance. Conceptually, Sustainable Development was supposed to deliver a more sustainable world; **Global Sustainability** built from the **Quadruple Bottom Line ('QBL')**.

Sustainable Development's (Global Sustainability) most common quoted text being: "Humanity has the ability to make development sustainable to ensure that it meets the **needs** of the present without compromising the ability of future generations to meet their own **needs**". These complex interactions of Economy, Society, Environment and Political Governance, all based on QBL **Needs**; different from Sustainability's **Desire** to reach a 'destination'; build from the **Triple Bottom Line** (Economic, Social, Environmental). To achieve 'Sustainable Development' needs focus on the four central ideology of Human Equity; Environmental Justice; Realignment of Opportunities; and Redistribution of Wealth. These are not upper most in the perspective of **Technical Sustainability**!

We live today in a very unsustainable world so basically since 1987, when the Brundtland Report[(2)] was published, entitled "Our Common Future" – Political Sustainability has simply not delivered on its own. For example, Sustainable Development ideology is still crafted in 'essence' within the text of the COP26 Glasgow Climate Pact agreed on the 13th November 2021. But **People Climate Nature** only represents 2Ps of Sustainability, **People & Planet**. Many sector **Roadmaps** have the same 'flaw of conceptual thinking' of just representing the goals of **People Climate Nature**. It is not just all about **Doing Good** 'constraining and expensing' the Wealth created from **Doing Right** on others. Therefore 2Ps, as such, represents **Fragmentation**. Fragmented concepts, not a representation of the whole 'needed' or 'desired' **Systemic Thinking** of Global Sustainability and **Integrated Thinking** of Sustainability. **Prosperity**, the 3rd P is missing. Sustainability (micro: Local, Regional), particularly Global Sustainability (Macro: National, Global) conceptual framework is defined by **Prosperity People Planet (Climate & Nature)**, and without this systemic, integrated approach, progression will not endure; as observed by Sustainable Development 'nerds', obsessively and with great attention to detail.

Enterprise (Business Sustainability) – **Doing Right** creates 'Value through The Markets' (**Article 5**) and accumulates 'Wealth through Capitalism' (**Article 6**) has very, very rarely Global or even National presence. 'Production' 'Manufacturing' presence (**Manufactured Capital**) is centred within the **Shires & Provinces** (the Scape of Sustainability Prosperity) – only 'Delivery' has National, Global presence in companies &

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corporations. It is very hard to have National production and manufacturing. Delivery, yes. Some Big Banks do have a National context, very few however can be said to a have truly Global Presence unless enacted through Global Partnerships. But Sustainable Development is National – Global, all about 'constraining and expensing' the Wealth created from **Doing Right** in **Shires & Provinces** - spread through **Doing Good** (based on Human Equity & now Sustainable Development Goals) with the 'Redistribution of Wealth' to maintain the **Base of the Pyramid** plus encouraging the 'Realignment of Opportunities', **Better Practices**; or to actually raise the 'Base' as needed now to protect and provide care to the Front-Line against Climate Change through **Environmental Justice**; effecting People in our Urban World. That sounds a bit 'nerdy' too.

The **Natural World**, however, is not **Doing Well**. The demise of **Nature Stock** is seriously effecting Natural Ecosystem Services flows -- needing reform to our **Human Nature**, our **Values & Behaviour**. Humanity protects The Markets & Capitalism, why not The Commons & Global Cover too? Humanity needs to restore **Natural Ecosystem Services** in line with increasing **Human Population**; renewing **Natural Resources** and maximising the regenerative nature of the **Natural World** to build up **Nature Stock.**

Wealth is actually predominantly in **Real Assets**, only a percentage is in what can be deemed 'liquid cash'. Assets can be monetarised but at a transaction cost; so there has to be a real commercial 'proposition' to do so. Wealth Redistribution, a part of Capitalism, may be the 'engine' of Sustainable Development (Global Sustainability) but can only succeed based on **Prosperity** fuelling its ever ratcheting need. That is the 'design fault' of Sustainable Development – built from fragmented ideology; only 2Ps delivering **Fragmentation**. Enterprise matters – through Exploitation and now **Stewardship**. Prosperity cannot be simply whitewashed out because the associated 'work done' is by people with specific discipline specialisms. Successful enterprise still needs **Doing the Right Things** and **Doing Things Right**; **Why-What-How-With-Marked** by **Societal Scrutiny** today to still create Prosperity in the future. 3Ps is **Systemic** built from the **QBL**, not from **Fragmentation**.

Resources & Products produced and manufactured through enterprise are due to specific **Sources & Resource**, like Champagne and Whisky; like Hydrogen from Industrial Hubs. **Champagne** was a Province in the northeast of the Kingdom of France, now best known as the Champagne wine region for the sparkling white wine that bears its name in modern-day France. **Speyside** is quite simply a Whisky distilleries heaven. By far the largest producing and arguably the most famous of Scotland's Whisky regions, this breathtaking area sits in a fertile valley of rivers and secluded glens and is home to over half of Scotland's distilleries. Champagne & Whisky are delivered all over the world.

Shires are strongholds of traditional enterprise culture, a principal area with commerce associated with local Sources & Resource; building specific knowhow. Traditionally rural, quarrying to mining, fishing, wells, and associated enterprise based on market trade & commerce. Creating enduring specialisms & heritage industry -- delivering **Sustainability Value**. Prosperity matters to **Global Sustainability** along with the complex interactions of Economy, Society, Environment and Political Governance (QBL).

Global Sustainability will only be achieved if Capitalism becomes inclusive to all, **Inclusive Capitalism**; **Developed Economies** and **Emerging Economies** through **Better Development**. **Covid** was a wake-up call how fragile humanity actually is when disease effects everyone, globally. The environmental challenges from **Climate Change** and **Biodiversity & Habitat Loss** will be faced by all of society, civil or not. All three will be eclipsed by the fourth great challenge, **Polluted Water**, particularly **Oceans** (International Waters) and **Seas** as so much food today is delivered through their **Natural Ecosystem System Services**; plus **Oceans** *play a critical role in the stability of our climate*. 'Scientists estimate 50-80% of the oxygen production on Earth comes from the Ocean. The majority of this production is from oceanic plankton - drifting plants, algae, and some bacteria that can photosynthesise. One particular species, **Prochlorococcus**, is the smallest photosynthetic organism on Earth. But this little bacteria produces up to 20% of the oxygen in our entire **Biosphere**. *That's a higher*

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percentage than all of the tropical rainforests on land combined.'[3] **Coal Cash Cars Trees Oceans** – the transformational plan to 2030. Just need the **greensmoke**; and the **Statesmen** to emerge – Global Pollution & Global Emissions sorted together; People Climate Nature; **Doing Right**, **Doing Good**, **Doing Well**.

In space, humans create waste, mainly metallic. Unless abatement starts soon, in some thirty years' time, it could affect our future presence and participation in that great wilderness too. Oceans & Space challenges, being wildernesses, can simply be solved by **Valuing Nature**; particularly **Nature Stock**. Particularly with **Good COP** governance, with their now full **catalogue for reference** one can only hope that over the next two COPs they focus more on **Outside-the-Box** thinking rather than the current **Inside-the-Box** 'situation' they have accumulated, 26 'base camps' later.

Transformational Change to Net Zero - Overcoming Limitations

Climate Change is actually simply moving from one utility stock, Manufactured Capital built on old thinking economics of just **market borne costs**, creating associated long-term externalities, to **full costs** incorporating these externalities internally within the new utility created expenditure. For Nuclear sourced energy, **total costs** need to be considered where typically the costs of decommissioning nuclear radioactive waste and infrastructure create new 'local market' needs, often lasting more than 100 years after a nuclear power-plant stops being a meaningful contributor to solving society's energy needs. Nuclear **full costs** alone account for their associated electricity being the highest tariff in any countries energy mix. If **total costs** were added in too, society upfront would not agree to any new nuclear plants' promise of a new source of electricity without considerable **Societal Scrutiny** hence enter stage "Government Policy & Subsidies". Even politicians and government ministers invoking 'in the National interest', Nuclear energy will never get above more than 10-20% of a National electricity capacity (France & Sweden being outliers) competing against today's lower associated market borne costs from Renewables or regenerative sources, such as Hydroelectricity & Geothermal.

A large proportion of our planet's Humanity reside in Emerging Economies which fundamentally need **Better Practices** towards their environment and their Natural Capital; and that will be where the hopes of achieving Global Sustainability reside. China, India, Africa, Latin American. North America despite being a Developed Economy with good experience of the **Better Practices** needed to be developed at a planetary scale, has such a proportionately high planetary thirst for energy built through historical self-sufficiency in its National sourced Natural Capital of highly impactful fossil fuels, therefore, needs to be added to the list with these Emerging Economies because of the scale of *their* transformation. By comparison, the UK only contributes some 2%, or less of the total planetary Green House Gases added annually, to the ever ratcheting-up Global Carbon Budget.

As pointed out already, **Global Sustainability** cannot, therefore, be achieved without **Global Partnership**, 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 will not just be Government-to-Government 'doings' (Doing Right, Doing Good, Doing Well), particularly state-owned companies in Emerging Economies. The Private Sector, Business-to-Business who deliver to Society, for us, the goods & services we need, want and sometimes aspire such as the newly achieved **Space Tourism**; too must move to this new utility by **Doing Right** which the **Capitalist Society** now desires; full of **Better Practice**.

This company transformation change has to be documented in annual Sustainability Reporting, particularly by corporations – especially those with transnational, near global, representation. Companies have to demonstrate that they too desire the same outcomes as Society desire or **Responsible Investors** will move their Financial Capital into others, using their ESG as a guide. **Investment Governance** through ESG does *genuinely* **desire** to solve these great planetary environmental challenges of Climate Change and Biodiversity & Habitat Loss for the sake of future 'social' generations; **Governess**. ***Their future depends on it – Capitalism***.

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Hence why **Corporate Governance** is so key to **Sustainability** as good governance will add value through internal funding of 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 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**.

So what would a good steward (**Stewardship**) along with this global transformation to new utility 'doings', look like. Should hard to abate 'high carbon' creating or using industrial sectors move straight, in an *elephant-like leap*, to the new deemed **Green Economy** or actually take more measured steps-plural to a **Blue Economy** – innovating from the current **Grey Economy** which the Urban World enterprise currently calls 'business as usual' now; then moving at pace from the secured **Blue Economy** to the new utility of the **Green Economy**. Embryonic thinking of a 'step like' approach was behind the COP26 UK Chief Shepherd's '**Coal Cash Cars Trees**' slogan to get us to 2030; enough to halve Global Emissions by then, keeping advocates' 1.5^{o}C alive. 'Coal Down' vs 'Coal Out' did matter but not as much if **Global Pollution** was seriously addressed with **Global Emissions**; **Coal Cash Cars Trees Oceans**. Reducing **Methane**, that matters, is just **good business**.

Continual Innovation & Entrepreneurialism, the **Blue Economy** will be discussed in the penultimate **Article** following Financial Sustainability – particularly the need for Goddess Nigella! sparking the necessary new utility, at scale, transforming through systemic **Re-Architecture,** systemic **Restoration** but more importantly systemic **Regeneration**. To move from Grey-to-Blue-to-Green will take more Global Partnerships, need more Global Finance & Global Funding Networks but has considerable less risk which is how Engineers 'build to get across streams'.

The Apollo Space Mission did not get to the moon on Apollo 1 but Apollo 11, which actually had three spacecraft: the Command Module Columbia, a Service Module and the Lunar Module Eagle. Engineers apply experience, insight and wisdom in Manufacture, Production and Delivery; 3-by-3! **Risk & (Technical) Risk Management** is not only a core competence of **Engineering Stewardship** but also a competence of **Corporate Governance** & **Investment Governance** too; **Risk & (Asset) Risk Management**.

Scientists & Society-at-large, particularly activists are understandably irritated – even Queen Elizabeth II; 'not amused' by the provincial pace. But 'elephants-a-leaping' is not engineering practice. To develop new utility – particularly the **Green Utility** will need lots of prototypes – failures will be high, successes few; we know that as otherwise the Urban World would be as Sustainability as the Natural World – even though Humanity does not value its 'neighbour' sufficiently as yet. We already have the **BluePrints** for the **Blue Utility**, created by the **HandPrints** of the industrial revolution building technical **Succession** since George Bruce leased a mine coal in shire of Culross, Scotland in 1575.

To leave Natural Fossil Resource in the **Hidden Commons** is a **Public Responsibility,** orchestrated by **Political Governance**, supported by majority **Public Decision** (**Societal Scrutiny**), enacted through **Public Policy & Commerce Regulation** (& Standards). So not easy – with political politics played too; hence 'orchestration'. Transparency so far has not been a 'card' well played yet. Public Policy will include increasing associated Carbon 'Taxes' over time – a **Developed Economy** approach; 'thinking' as discussed already. But in Emerging Economies, **Carbon Markets** are effectively non-existent at scale to date, just 'concept products' in a tool-box to potentially help fund future **Adaptation** – beyond **Global Funding**, something that is starting to recognise the growing pains along the many pathways-to-scale. **Stress points** as Adaptation gains momentum over the next decade. **Mitigation** of Climate Change is actually the main planetary 'game-in-town' in the Developed Economies as they are instigating and enacting **Better Practices** now. Pollution Reduction is not deemed critical - that's why those countries have Developed Economies. For most Emerging Economies, however, this

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represents a mirror image, **Pollution Reduction** is more pressing than Emissions Reduction. **Better Practices** do not come cheap and are 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]) than currently articled in most Global Partnership's **catalogue for reference**. **Technical Limits** based on competence matters too, as well as **Physical Limits** & **Environmental Limits**.

Better Development, not growth, delivers higher standards-of-living, and Societal Wellbeing. Developed Society is deemed 'rich'; Developing Society is deemed 'poor'. That's why **TBL** and **Social Oriented Business Purpose** ('SOBP') wins hands down over simple shareholder primacy – 'profitability' & 'growth' ideology; 'directors' take all – company's fail faster.

Carbon Offsetting, another Developed Economy 'thinking', hard-to-abate emissions can be traded off against natural means to sequestrate their carbon (Natural Ecosystem Services – Natural Sinks) or 'engineering-ly' capture the carbon emissions, transport and 'store at scale' back in the Hidden Commons' net storage capacity (CCUS – Carbon Capture & Underground Storage). 'Engineering-ly' capture is very expensive with very limited **cost reduction** possibilities! **Natural Sequestration**, by planting trees or improving soil management, is a great concept on the pathway to **Valuing Nature**, but, as a commercial process is thwarted 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 Warning** 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**, especially by activists; and even worse more delay. As will be discussed in the next **Article** on Financial Sustainability – we have now very nearly reached the **Limits of Finance** to actually provide enough 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 least a 'statesman of Financial Capital' did appear at COP26, leader of GFANZ. **Greensmoke**; 'Aladin' with $130 trillion in his Gfanz **chirag lamp** – how many wishes? Is three enough! (Production, Manufacturing, Delivery). However, un-remarkedly the IFRS failed on the urgency for **Global Sustainability Reporting Standards**, now due 2023(?) once the new committee start-eth. The EU seems to be more focused on Environmental Sustainability Reporting Regulation, through Taxonomy. Crafting Nature-by-Rules has proven not to be a simple matter, with that approach. GAAP as usual seems 'un-transparent' to date, news hopefully will follow soonest. TCFD, driven by the same 'statesman of Financial Capital', seems to be the private sectors' best practice approach to Sustainability Reporting, built on the back of SASB and GRI.

Government **Emissions Trading Schemes**, where permits are bought and sold do 'tick the box' on trustworthiness, with the associated 'thinking' that this type of market approach will lead to emissions reduction, over time. However, with hard-to-abate sectors such as Steel & Cements, it is hard to see how they can become 'low carbon' sectors without massive investment in risky new processes, needing a lot of experimentation through research & development; building of prototypes leading to demonstrations, dissemination, design; on to deployment (R&5Ds) before achieving commercial full deployment.

Is **Public Responsibility** really going to forgo near term future Steel & Cement production and Oil & Gas combustion 'destination' Resources & Products without a majority **Public Decision**? The Steel sector typically only survives regionally by Politicians invoking the 'National Interest' command. The Public Decision on **Oil &**

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Gas combustion Resources & Products looks now set for the post 2030 to 2040+ transition 'bucket' list; once the Coal industrial & power sector 'use' heads for the 'end'. **Oil & Gas non-combustion Resources & Products** 'use' should survive – very much like those 'stones' we still use today, post the **Stone Age**. In 2050, will that generation look back in 'horror' that Humanity combusted so much liquid 'black gold' when it is such a valuable **Source & Resource** as part of so many other 'Products'?

Inclusive Capitalism – Serving the Base of the Pyramid

The transformative power of Capitalism seeks out the best ways for Value Creation and Wealth Creation. Capitalism can deliver Global Sustainability through Continual Innovation and by being inclusive with good Political Governance; **Inclusive Capitalism**. Much research and written content since around 1997 has focused on 'bettering' Capitalism such as these 3 conceptual models: **Reinventing Capitalism** (Hart), **Sustainable Capitalism** (Porritt) and **Reimagining Capitalism** (Mazzucato).

In 1997, Stuart Hart started the conversation[4] 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'[5] focused on "**Reinventing Capitalism** and Companies for a Radically New World". Hart's reinvention was cast as a new form of **Stakeholder Capitalism** – at a time of big questions on the relevance of **Profit Maximisation** enacting the 'Principle of Shareholder Primacy', which had morphed in maximising **Shareholder Value**; just post the 2008 Global Banking Crisis. So a simple question was asked, 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**.

Sustainable Value is created by four key focus areas[6]:

> "First, firms can create value by reducing the level of material consumption and pollution associated with rapid industrialisation. Second, firms can create value by operating at greater levels of transparency and responsiveness, as driven by Civil Society. Third, 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. Finally, 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."

By assessing an enterprise's range of activities, actions and non-actions in each of the four quadrants of the **Sustainable Value Framework**, Business and Corporate Governance can assess the degree of 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**; 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**, incubate 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**,

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small experiments, pilot & demonstrations projects (**Market Testing**) are far preferable to a single big investment in **Consumer Markets**. As discussed early, **Emerging Economies** are more focused on Pollution Reduction, than Emissions Reduction. These initiatives should be evaluated for funding using a new crafted sets 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 **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.

Capitalist Means, 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. **Political Sustainability** is a **pillar of opportunity**. When taking action to address Climate Change, the respective obligations of the rights of indigenous peoples and local communities should be respected, promoted and considered; **catalogue for reference**. 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. Liberalism.

The ever ratcheting-up of **Environmental Limits** are creating the need to change; **Transformation to Sustainability**. Same with **Global Cover** – charge Entry Tolls to space travel & associated work done in cleaning up existing redundant debris over-head. The new **Top of the Pyramid** ('ToP') will have to pay their **full** costs if they want their associated **ToP Markets** to still flourish in the new reality, still creating **Value**. **Space Guardianship** means not at the expense of others, **full** costs paid along with those **Land & Forest Guardians** and **Ocean Guardians**; protecting Nature Stock. Some refer to the ToP as the 'Tip of the Iceberg', but, the very 'tip' is what funds **Philanthropy**. Samuel Johnson, born 1709, simply defined **Philanthropy** as "love of mankind"; **Good Human Nature**. This definition still survives today. So not an 'iceberg' scape.

One of the biggest **Global Sustainability Limitations** is sustained **Global Prosperity** inclusive throughout all economies. Hart[4] considered there are three (mega) economies: **Developed Economy** (ie Developed Countries), **Emerging Economy** (ie Developing Countries), and **Surviving Economy** (ie **Traditional Village Life** who are subsistence oriented and meet their basic needs directly from Nature; Living with Nature). The main technical difference between Developed & Emerging being Developing Countries needing **Better Practices**. Emerging Economy countries are typically the big emitters creating 'Products' outsourced ('offshored') by the Developed (Consumer Driven) Countries. Developed Countries Companies typically have reducing emissions - why - they often see **International Carbon Markets** as a big business opportunity over their **Incumbent Firms**; creating Comparative Advantage. However, Developed Countries purchase many 'Products' which need **Better Practices**, which up till recently went below the emissions 'radar' in these Developed Countries, Government Sustainability Performance statistics. Transparency matters. The main technical difference between **Consumer Markets** with **Traditional Village Life** is that the rural poor are **Unserved Markets**, typically now living on the **Front-Line of Climate Change** having once been sustainable before the current excessive cumulative emissions of the **Industrial Revolution**. **Loss & Damage** matters.

Hart[4] 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. Clearly, public policy innovations (at both the National and International levels) and changes in individual consumption patterns will be needed to move toward (Global) Sustainability. But Corporations can and should lead the way, helping to shape Public Policy and driving change in consumers' (Values &) Behaviour. In the final analysis, it makes

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good business sense to pursue strategies for a sustainable world.' GFANZ certainly has **The Power** to more than 'influence' just Political Policy.

Sustainable Capitalism, not reinventing it, was more Porritt[7] 2007 vision for his **Sustainable Capitalism Framework**, built on the **Capitals Stock**, the **desirability of change** in terms of improved quality of life, greater security, and more fulfilled ways of working and living (**Article 6**); **Wellbeing**. To save Humanity through Capitalism, firstly, Porritt points out that politicians need to step-up and to actually consider the longer term; particularly addressed through Political Policies (**Political Governance**). **Doing Good** based on **Needs** cannot be underestimated globally, effecting all Urban World consumers. So if National Security (ie Defence) is worth expensing 2% of National Income, then, surely similar by comparison should be worth expensing on the poorest of Humanity (**Base of the Pyramid**) and the **Natural World** effected through biodiversity & habitat loss. **Global Security** just needs its meaning to be renamed from 'global aid'. Secondly, the necessity to obey the Laws of Nature, the Urban World has to live sustainably too on this Planet with increasing **Human Population** & **Human Pollution**. Thirdly, the political imperative, Political Policies through Political Governance, needs to aspire so that the Urban World improves our material 'standard of living', year on year, raising the Base of the Pyramid. This will need Doing Good and the desire of Doing Right at global scale. These imperatives have never been more urgent even since Porritt's book was first published. United Nation's Sustainable Development Goals ('SGDs') did not exist when Porritt was completing his contribution to the **Capitals Stock**. SDGs are now cast in flagstones so the Needs for Global Security are in the political 'headlights' today.

Mariana Mazzucato[8] book "Mission Economy" considers the four essential elements needed for her **Reimagined Capitalism** to achieve Global Sustainability, Capitalism being inclusive, sustainable, having Continual Innovation and shaped by Political Governance. "A healthy economy that works for the *whole* of Society must tilt the playing field consistently to reward behaviours that help us achieve agreed and desirable goals". Good **Political Governance** is 'a prerequisite for restructuring **Capitalism** (necessary to achieve **Global Sustainability)** in a way that is inclusive, sustainable, (resource efficient through Global Markets) and driven by innovation.'[8]

This is **Political Sustainability**'s big perspective pillar opportunity. **Article 4** argued that firms & corporations need a **Social Oriented Business Purpose** to ensure the **Triple Bottom Line** is enshrined into current Enterprise **Value Creation** (**Article 5**)**,** enabling global **Wealth Creation** (**Article 6**); inclusive across all economies. 'It means changing the relationship between public and private sectors, and between them and Civil Society, so they all work symbiotically for a common goal (Global Sustainability). The reason for the emphasis on rethinking **Government** is simple: only Government has the capacity to bring about transformation (to Sustainability, one of the five **Sustainability Limits**) on the scale needed. The relationship between economic actors and **Civil Society** shows our problems at their most profound, and this is what we must unravel'.[8]

Merging these three concepts into the 'better', more Social Respondible, **Inclusive Capitalism** should address the **Society** issues built around the base of the community & societal income pyramid (**Base of the Pyramid**); the main reason why these Capitalism 'conversations' started: global poverty, rising inequity linked with environmental degradation. **Inclusive Capitalism** has to solve the downsides of Capitalism (People, Climate, Nature) as well as continue to deliver the upsides of Consumer Markets; **Wealth Creation**. The realisation of a more inclusive form of Capitalism characterised by two-way dialogue, **Collaboration** and **Partnership** with the previously overlooked or ignored members of our Society (eg radical environmentalists, shantytown dwellers, the rural poor, etc, etc) can only help to open up new pathways for **Better Development**, particularly in currently **Unserved Markets**. Listening to the voices of the poor and disenfranchised can be a source of creativity and innovation. Those at or near the **Base of the Pyramid** lack attention and capital, not ingenuity and aspiration.

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Inclusive Capitalism must address the **Environment** issues built around Global Pollution, needing Civil Society to engage with Pollution Reduction as well as Emissions Reduction. The *elephant in the room* is that Our Urban World needs to **Work with Nature**. Oceans matter, we know that now – science is however too far behind on this content to guide forcefully enough. Humanity needs to act now based on best judgement. This 'elephant', **Nature** is for the first time cast transparently in the **catalogue for reference**.

Doing Well building Nature Stock requires **Systemic Re-Architecture** (of The Markets – **Valuing Everything**) and **Systemic Restoration** & **Systemic Regeneration** of the Natural World. Lovelock[9], in 1979 highlighted how poorly Humanity understood Nature, considering the future implications of (Goddess) Gaia, endurance; and **Governess**. Gaia has a metaphysical presence which for scientists at that time was not appreciated well. Lovelock highlighted that everything in Our Living Planet is interconnected. The Natural World's complexity had kept our climate stable until the **Industrial Revolution** started. Science, today, is still catching up as so much of the Oceans are below 3000m water depth, needing very specialist technology to access, to just research.

Inclusive Capitalism needs good **Political Governance** to minimise **Limitations**, maximise benefits from **Global Partnerships** and re-architect **International Markets** to **Value Nature** through global political collaboration and policies. Bringing together countries with different economic, political, ecological/ environmental and social circumstances in a manner that reflects equity and the principle of common, but, differentiated responsibilities and respective capabilities; **Political Sustainability**.

One Government

The reason for the emphasis on rethinking **Government**[8] is simple: only Governments have the capacity to bring about Global 'Transformation to Sustainability', **Sustainability Limits & Limitations** on the planetary scale needed. **Global Sustainability** is mainly about protecting us from the "Climate, Injustice & Planners". Poor Local Governance has ignorance of residents & communities; with Local Planners often 'out of line' on National Governance; causing Society-at-large to reflect poorly upon 'Government'.

There is today embryonic **One Government**: National Governance (made up of collaboration of Political Parties), State or Country Governance, Regional Governance (eg County Councils) & Local Governance (Local Councils). To re-architect **One Government** means these different 'governance', based on 'scape, scale & scope', have to make connections, forge cooperation, collaboration based on capacity, and co-organisation – forging relationships and **Partnerships**; particularly networking within local communities, with trade associations and technical institutions. Overall good **Planetary Governance** as 'one' organisation is 'one' needing innovation too!

If this **Political Capacity** has the means to plan, perform tasks and to achieve transformational change this will require diverse mind-sets, attitudes and behaviours. Ignoring existing Capacities in Emerging & Surviving Economies and to attempt to replace them with knowledge and systems produced elsewhere - a form of 'development by displacement', rather than 'development as transformation' is certainly one key limitation ; overcome by 'Social Respondible' based on Collaboration & Partnership.

So how can this change, or evolve. Most importantly, the **Circular Economy**[10] has to be front and centre of One Government **competence**; Circular, not Linear into Landfill, Pollution & Waste Reduction. Ellen Macarthur's Circular Economy - one of the tools in the Sustainability tool box. The Circular Economy has been very successful since published in 2012 being predominantly focused on 'flows'; mainly helping to contribute to a sustainable supply chain within specific sectors. The Circular Economy 'wings' focus primarily on organic process flows (Environmental) and inorganic process flows (Social) so have great synergy with **Global Quadruple Bottom Line** ('GQBL') analysis: Economy, Society, Environment, & Political Governance; **Systemic**

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Thinking. The Circular Economy matters to Emerging & Surviving Economies 'Capacity Building', so a good place to start collaborating & partnering! Might just save the Oceans too…

A 'One Government' hierarchy structure would be necessary with **National Government** setting the Sustainability Strategy, Policy and overall Political Governance. **Regional (County) Councils** responsible for End-of-Pipe Waste, Regional Transportation & Health and Regulatory Compliance. Finally, **Local Councils** responsible for Local Community Services, Local Planning (in line with National Policy) & Green Commons, and Local Governance (Local Budgets, Taxes, Residents & Business, Welfare & Health delivery). A small part already articled in the catalogue for reference.

Sustainable Development Goals

In 2015, Jeffrey Sachs[11], with the foreword from the Secretary General Ban Ki-moon of the United Nations published "the Age of Sustainable Development", including the final 17 Sustainable Development Goals ('SDGs') adopted by the UN General Assembly on September 25, 2015 (**Figure 1**). A historic day for Humanity. These SDGs further the Brundtland commission's work on economy, society and the environment, but, most importantly add 'Political Governance'[11] explicitly to 'the Age of Sustainable Development'. The **Base of the Pyramid**, primary needs being Clean Water, eradicating Poverty, access to Food (Stock), Health & Education and now Security on the **Tragedy of the Front-Line** of Climate Change. **Needs** define these Sustainable Development 'prospectus' Goals. **Desire** define the attaining of Sustainability ('the destination').

With Sustainable Development Goals, these flagstones enable very important conversations & collaboration to occur over a common landscape "platform" of Society, Environment & Political Governance; **People Climate Nature**. **Sustainable Development?** is a question that needs answering as discussed in **Article 5**; SDGs 17 core flagstones enable 'needs' around societal core questions to be discussed. How are we performing? Are we, as an enterprise, acting like good citizens? How are we progressing, addressing society's wider needs? What new or enhance practices, processes & systems would be more enduring? Do we as an organisation understand what a Social Oriented Business Purpose actually means? Can SGDs guide us collectively, listening to all the flagstones on view? How do our current limiting **Values & Behaviours** need to change? …over what timeframe?, at what pace?
When you study the SDGs cast in **Figure 1**, however, as discussed earlier, these SDGs are only based on **People Climate Nature** thereby only including **Society** (SDG1-12), **Environment** (SDG13-15) and **Political**

Figure 1: United Nations Sustainable Development Goals

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Governance (SDG16-17); the downsides of traditional Capitalism. But **People Climate Nature** only represents 2Ps of Sustainability, **People & Planet**. As pointed out many sector Roadmaps have the same 'flaw of conceptual thinking'. Therefore as such they represent **Fragmentation**. Fragmented concepts, not a representation of the whole 'needed' or 'desired' **Systemic Thinking** and **Integrated Thinking** of Sustainability; **Endurance**. **Prosperity**, the 3rd P is missing. Sustainability (micro: Local, Regional), particularly Global Sustainability (Macro: National, Global) conceptual framework is defined by **Prosperity People Planet (Climate & Nature)**.

The missing **Economy** ('SDG18') is the Prosperity created being 'Life below the Ground' – the **Hidden Commons**, an ancient subsurface geological wilderness. Basically where all the wells & mines exploit and extract the Urban World's **Natural Resource** and Our Planet benefits from soils, peat bogs & aquifer gravels; **Nature Soil**. The **Hidden Common** need Mapping, Discovery, Development, Production, Stewardship & Management. Energy is the fuel for **Prosperity**; typically 80% **Molecules** originating from the Hidden Commons vs 20% **Electrons**.

The other Commons are the **Living Commons**, another ancient wilderness where sustainable natural regeneration & evolution occurs (Natural World); and the **Green Commons**, a tamed ancient wilderness, made orderly as part of Our Urban World (**Figure 2**). We need to ensure the regeneration of **Nature Stock** in the **Global Cover**, the atmosphere the Urban World shares with the Natural World; and the most precious **Blue Planet**, the Ocean's Nature Stock.

For **Our Living Planet**, the **Urban World & Natural World**, to survive we need to protect **The Commons** & **Global Cover**, as we have needed to protect and regenerate **The Markets** & **Capitalism**, particularly since the dawn of **Our Industrial Revolution**. It is more complex than simply needing 'constraining & expensing' **Wealth**, the **Capitals Stock**, on achieving 17 SDGs through repurposing **Global Security** expenditures. **Doing Good** is a good place to start, these SDGs have the same **Milestone**, 2030; plenty of **needs** to have an enduring, Living Planet.

Liberalism: Necessity, Tolerance, Desirability, Opportunities; Guardianship of the Planet's Boundaries

Political Sustainability came of age this year, 2021, with COP26 dominated by Global Political Governance need to meet the Paris 1.5°C temperature rise 'obligations'. At 1.1 or 1.2°C today, no wonder the 'activists' encircled the COP26 'camp fires'. Inside was pure political drama; a party of equals yet with differentiated responsibilities and respective capabilities – so many accounts of the vulnerable living on the **Tragedy of the Front-Line**. The Next Generation populous growing with age and their increasing percentage of the population mix. Global Partnerships on Climate Mitigation, Adaptation and Loss & Damage now a ***Political Necessity*** because the Urban World has to live sustainably on this Planet with ever increasing population & pollution; commerce production at Environmental Limits. ***Political Tolerance*** is developing though openness

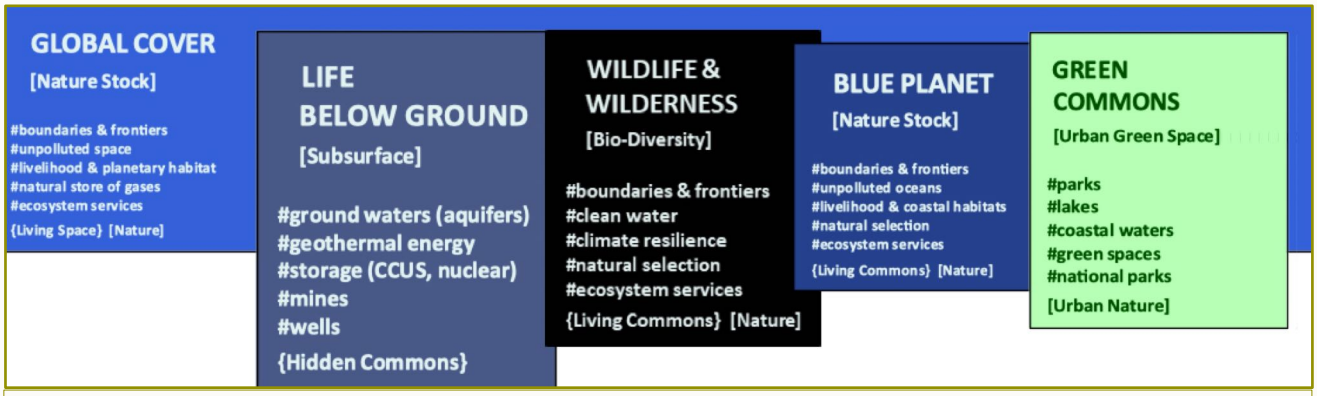

Figure 2: Our Living Planet: The Commons, Global Cover & Nature Stock

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to new ideas and with willingness to respect or accept behaviour or opinions different from one's owns, even to **Blah Blah Blah**; **Planet B** in previous COPs. ***Political Desirability*** is strong because it is finally politically good to be **Doing Good**. ***Political Opportunities*** due to the old traditional 'species' economies are waning – Oil & Gas Sector has seem the 'great crew change' come and go; Coal Sector is simply a commodity mainly extracted where Climate Physical Risks are the greatest, now on Phase 'Down' towards Phase 'Out'.

The new Green Economy promises new opportunities for Liberalism 'Labour 1886'. The political history of Liberalism in the twenty years after 1886 was dominated by two great concerns: the need to find a unifying platform (in 2021 now Prosperity for **People Climate Nature**) which would be capable of sustaining it as an effective political force as in the post-Gladstonian era and the need to come to terms with the growing economic and political strength of organised Labour (in 2021 now **Human Capital** - provision of the work force; and **Social Capital** - provisions of Markets & Social Infrastructure plus better access to Public Goods & Services). It was axiomatic then, and now, that the two concerns were closely connected and that **Social Reform** was the crucial link between them; **Levelling Up** & raising the **Base of the Pyramid**.

Politically, full **Prosperity** of 'True Sustainability' is now very attractive to the developed Urban World – the chosen destination. For Developed Economies, centralised industrial hubs with Carbon (Governance & Management) and Capture, Transportation, Underground Storage (**CaCTUS**) economies of scale to deliver economic scope where **Political Policy** matches that ambition; decarbonising the Hydrogen Sector at the same time. Currently, the **Grey Utility** produces one molecule of Hydrogen with ten molecules of Carbon Dioxide. The offer of decentralised energy & power in developing urban landscapes should finally deliver **Better Development** too in their poorer communities, a basic 'needs' life-line to enable Emerging Economies economic development to build from cheap, local 'simple' technology sources; **Inclusive Prosperity**.

Political Policy 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 Eco-system 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; **Responsible Investment**. Inter-Governmental and Intra-Governmental consortia **Partnerships** have been set-up since at least 2015 to bring together the right People, Private & Public Sectors, which with leadership has the capacity to deliver **Better Development**. Some governments started earlier such as in the UK through the Stern 2006 Climate Change, "Tomorrow's Climate, Today's Challenge"[(12)].

Politicians and Consumers have a vested interest that **Capitalism** survives the **Transformation to Sustainability**. The **Capitalist System**, regulated through Political Policy, has the greater ideology of maximising Economic Stability delivered by efficient market **Sourcing** and allocation of Resources; even delivering economic **Wellbeing (Prosperity)** as Porritt desired in 2007 through his vision of **Sustainable Capitalism**. Therefore, the desired destination, Sustainability must be achieved within **Inclusive Capitalism**. Enduring Markets must ensure through Resource efficiency that no more or less un-regenerative Natural Capital than necessary is used, in-use, for consumption from Grey, to Blue, to getting to **Green Utility** at pace.

Political Sustainability has to promote **Guardianship**, protect **The Commons & Global Cover**. Only through Guardianship, can Sustainability Practice address Our Planet's limits to Natural Resources & Nature – biodiversity, habitat & human ecosystem loss. **Our Living Planet** is our desired destination. We are seeing Political Governance finally addressing Global Ocean Alliance through 30by30, BUT, this campaign does little to address the enduring **Governess Stock** loss, just attempting to stem **Governance Flows** enduring losses.

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Pollution Reduction at planetary scale is needed. Where does your 'toilet' go? Systematic Restoration & Systematic Regeneration means **Governess Stock** has to be valued, with associated cost to renew again. **Forest & Soil Guardians** & **Ocean Guardians** need financing. **Dynamic Materiality** has to be addressed with Nature & Natural Ecosystem Services as we have achieved so successfully with petroleum, minerals & metals from the **Hidden Commons** (SDG18); our Natural Resources feedstock to delivering Resources & Products society desires but now at **full costs**. Next & Future Generations will have increasing **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!) are not to be less flourishing for the next generations to come; **Governess**.

Our Living Planet, the Urban World and Natural World; respecting the Planet's Boundaries, working with Nature – delivering **Better Development** to save our Planet; **Political Vision of Global Sustainability**.

Investments in all economies carry risk, **Physical Risk**, **Transition Risk** and even **Litigation Risk** -- if the ambitions of a 1.5^{o}C world is not met; societal expectations are ratcheting-up; the **Capitalist Society**, the force of Liberalism. Hence **Better Development** matters. **Article 8** in the next SPE Review will be covering the third perspective, **Financial Sustainability**, with its pillar of opportunity. Financial Sustainability – Responsible Investments through Sustainable Institutions.

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