GORILLAS IN THE MIST – AN INTROSPECTIVE VIEW

PAPER TO THE AUSTRALIAN PIPELINE AND GAS ASSOCIATION

VIRTUAL CONFERENCE

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Introduction

I have called this paper "Gorillas in the Mist – an Introspective View" to acknowledge, with a similar theme, my good friend the late Jim McDonald, Life Member and President of the APGA and his work in safeguarding the long-term future of our Industry from the external regulatory forces apparent at the time of his writing. For its preparation I have canvassed many across the Industry and I thank them for their contributions which, I trust, I have articulated accurately.

Jim's 2001 APIA paper entitled "Gorillas in the Myths" referred to the dominance of large gas production companies, major gas users and economic regulators orchestrating and driving a policy agenda that was misleading and sought to use simplistic regulatory solutions, the long- term effects of which would not meet Australia's long-term national interests.

The sequel was his 2002 paper entitled "Gorillas in Our Midst" which focussed solely on gas transmission and the economic regulator's overarching desire to implement regulatory "solutions" again without any consideration of the long-term consequences of their actions which, at the time, had undermined and devalued the potential development and growth of the gas transmission sector.

This paper provides insights into gas pipeline industry practices, specifically the regulatory changes affecting the industry and the reactions of some corporates in structuring their companies which, when coupled with an ever-increasing focus on profits and growth, have led to the increased depreciation of the pipeline assets and the people who maintain them.

Increased regulatory scrutiny has captivated management's attention and the recent emergence of internalisation means there is less independent advice providing the necessary levels of introspection required of High Reliability Organisations in order to maintain a vigilant critique of their operations. A lessening importance is being placed on industry knowledge, expertise and competence and the challenges involved with the adoption of diversity targets is resulting in further compromise. There has been a big reduction in the empowerment of the people at the coal face who actually ensure the safe and reliable delivery of energy.

These behaviours lead to more risky and unsafe business practices, which have the potential to be discovered as contributing factors should there ever be a serious catastrophe involving the gas pipeline industry.

Previous eminent authors have spoken to some of these behaviours in the past and although there have been moves by some in the Industry to address them, actions remain slow and complacency would appear to have taken hold. The paper concludes that it is the collective wisdom of the broader industry which has ensured its success until now and a return to the open and collaborative ways of the past, is essential in safeguarding its continued success into the future.

Background

The Australian Pipeline Industry Association (APIA) had its origins in 1968 when a group of contractors came together to discuss the fledgling pipeline industry, exchange ideas and to form a collective representing their common interests. During the mid-1970s, it was expanded to

represent all sectors of the Industry. In 1998, the pipeline owners and operators decided that the secretariat was to be professionalised and domiciled in Canberra in order to be a united representative and lobbying body for the Industry. Membership categories were created with contribution levels set for each category.

In 2015, the word "gas" was added to the title along with the responsibilities of contributing to Australia's gas policy development. Today the Australian Pipeline and Gas Association (APGA) membership includes **pipeline owners, operators, construction contractors, advisers, independent consultants, engineering companies and suppliers of pipeline products and services.**

The APGA secretariat is managed by a Board voted by members whose membership category carries a vote. Its mission is to provide valued services, foster collaboration and to represent the **collective** interests of the membership, an important matter to which I will return to later.

The Association is as broad as it is diverse, it has been blessed and continues to radiate with robust characters, a prerequisite for survival in this Industry. It has thrived on the strong relationships at its core. So strong are these relationships that they endure well into retirement with groups such as the "Gasmeeters" and ex TPA pipeliners which continue to meet on a regular basis. Relationships will feature throughout this paper.

The journey has been characterised by the membership's collective wisdom in its efforts to achieve a fair return for service and more importantly to excel as an Industry in fighting the political bureaucracy, engendering clever innovation both in pipeline products and materials and achieving continual evolution in construction techniques. We have World leading research, the outcomes of which continue to drive an internationally respected standard in AS 2885, which is acknowledged by the Council of Australian Governments (COAG) and the presence of which has to date, prevented overzealous technical regulation. The research efforts driven by the APGA Research and Standards Committee (RSC) morphed into the Energy Pipelines Co-operative Research Centre (EP-CRC) and persist today in the Future Fuels CRC. Such was the recognition and respect for the standards of our research program that a tripartite agreement between the APGA Research and Standards Committee and the European Pipeline Research Group (EPRG) and the Pipeline Research Council International (PRCI) in the USA was made possible. It provides a tributary for the sharing of research outcomes, the benefits of which are felt all around the World, a truly remarkable achievement.

Advances such as the establishment of the National Gas Objective (NGO) and the appointment of a single regulator in the Australian Energy Regulator (AER) along with the institution by the Australian Energy Market Operator (AEMO) of gas trading hubs which operate in a number of Australian States has improved the operation of the gas market by increasing liquidity and making it easier for participants to trade across different pipelines, thus pooling potential buyers and sellers into a single market.

The ACCC's Inquiry into the East Coast Gas Market in 2016 found there **was** evidence a large number of pipeline operators were engaged in monopoly pricing. Dr. Vertigan reported that the operators of existing pipelines did exercise market power resulting in inefficient outcomes that did not promote the National Gas Objective nor did they facilitate the achievement of the Council's Australian Gas Market Vision. In addition, the test for regulation did not appear to be posing a credible threat to the behaviour of pipeline operators.

The outcome was the information and arbitration framework we have today requiring pipeline operators to publish information that gas shippers need to make informed decisions and to assess the reasonableness of the conditions for pipeline access. If commercial agreement cannot not be reached, binding commercially oriented arbitration is mandated in the National Gas Law.

A number of customers have confided that there has been a remarkable turn-around in the manner and respect with which pipeline operators treat them since the framework commenced operation on 1 August 2017. I wonder why?

This political and commercial focus over the past two and more decades has consumed an excessive amount of the resources of our Industry. Pipeline operators and the APGA secretariat have focussed so hard and for too long on these external forces that, omnipresent and potentially damaging internal forces that threaten the long-term survival of the Industry are not treated with the urgency they deserve.

Against a backdrop of pressures including emission reduction concerns with hydrocarbons, a diminishing need for the development of major transmission pipelines as we approach saturation under the current population demography and renewable energy prerogatives which, in the longer term, may place pipelines into obsolescence altogether, it is the relationships and the passion of the APGA membership that must be harnessed for our collective existence in the short term. It is time that the Industry placed a much larger emphasis on addressing these internal factors and in so doing, re-building the relationships, the trust and the mutual respect with which the Industry has flourished in the past.

With this as background, I will now to turn to the subject of my paper, Gorillas in the Mist.

Industry Reaction to the accusation by the Regulators of Monopolistic Behaviour

Privatisation in the 90's and early 2000's heralded a new era for Australian pipelines and the threat of regulation saw some pipeline operators re-structure their pipeline businesses into owners of pipeline assets subject to regulation and asset managers and service providers that would operate externally to those regulations. To add to the complexity, the asset managers and service providers were faced with the amalgamation of workforces from transmission pipelines and networks. Enterprise Bargaining Agreements (EBA's) and associated work cultures crept over the transmission pipeline sector which, up to this time, had largely been a union free workplace.

Under these business structures anywhere between 10% and 25% of the funds originally deployed to operate pipelines and networks were channelled into the profits of the asset management and service provider companies which were mostly wholly owned subsidiaries. Associated cost reductions peddled by the Asset Managers of the day as efficiency gains resulted in the accelerated depreciation of the pipeline assets and more importantly the appropriation of funds away from those normally destined to train, mentor, pay and retain the engine room of pipeline assets, those employed to do the work. Such business structures endure today.

At the APIA convention in 2003, in his paper "Asset Management – Ensuring the Role of Pipelines for the Future", Mark Harper presented a view that the cost of these services would decrease overtime justified on the basis that the risks involved with the operation and maintenance of pipelines were shared with the asset owner and that efficiency gains more than made up for the funds extracted in profit. As most experienced pipeliners would know, operating and maintenance costs only rise as pipelines age.

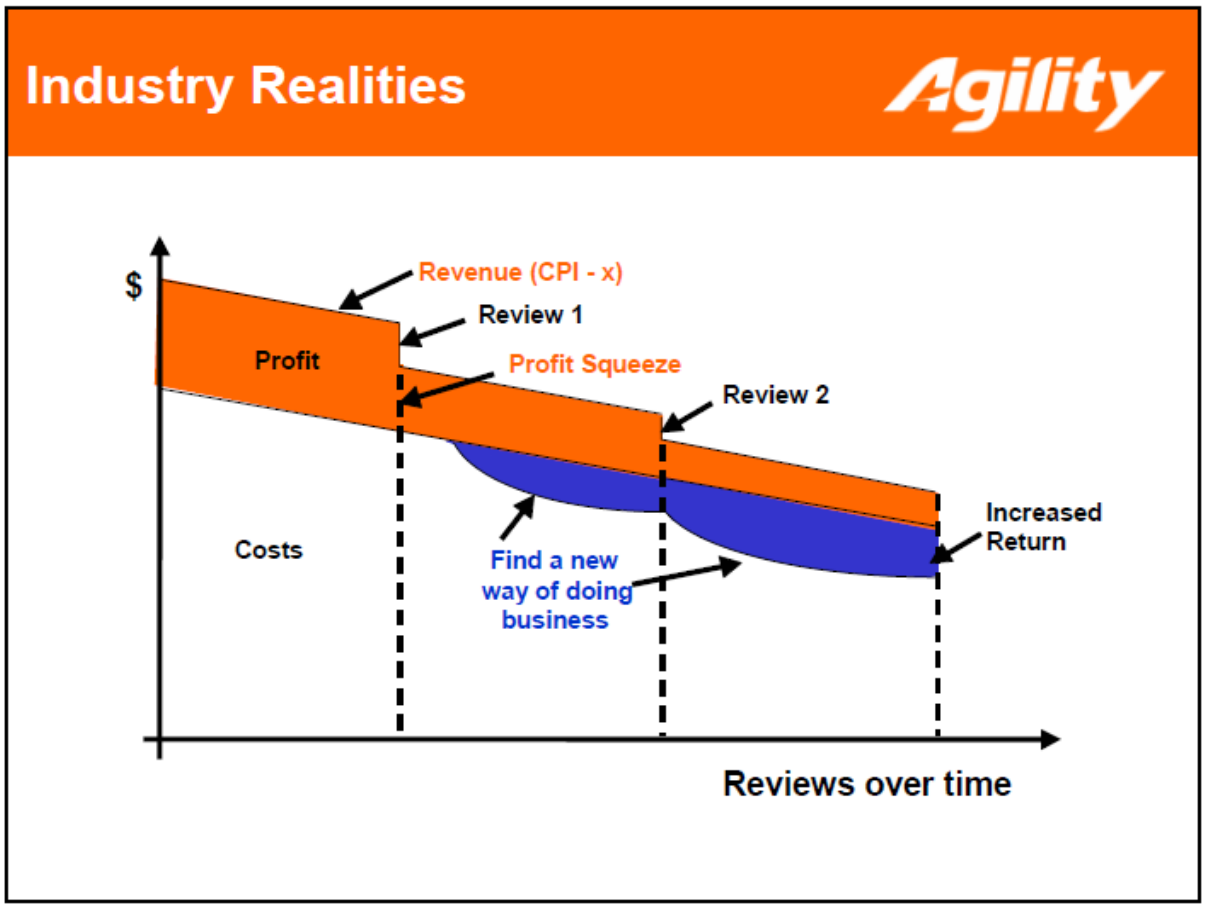

Figure 1 - Operating Cost Reductions Over Time[1]

In the same year Max Kimber, in his paper entitled "Are Our Pipelines Safe and Reliable" addressed the diminishing and disillusioned reservoir of skill seen by the Industry as a cost rather than as an asset, matters to which I shall also return to later.

In a paper presented to the Association soon after in 2004, "Meeting the Changing Needs of the Pipeline Industry" I outlined the deficiencies I saw emanating from the emergence of the asset owner, asset manager, service provider business structures. This was followed with another paper in 2005 entitled "The Hidden Dangers of the Privatisation Rainbow – an Australian Experience".

A step reduction in operating efficiency touted in many successive annual reports of the time was purely miraculous. This may have had an element of truth for pipelines originally in the public sector but it implied that those pipelines that were always in the private sector were inefficiently run in the first place. Nothing could be further from the truth, the Roma to Brisbane pipeline built privately in 1969 was very efficiently run, I know, I worked on it for Bruce McCaul who, as an accountant, was noted for cost containment and strict code compliance.

Today pipelines continue to be treated by the pipeline operators, especially the passive superannuation owners merely as financial instruments. Some years ago, a representative of a certain superannuation company proudly stated in a presentation to the Industry that they were very pleased to be an owner of a pipeline asset adding that pipelines represented a long term and stable asset class which easily met their financial criteria of a 7% return.

[1] Paper to APIA, "Asset Management – Ensuring the Role of Pipelines for the Future", Mark Harper, 2003

Today, the focus remains on the generation of a revenue stream at a level of profit necessary to, not only sustain the organisation's need for profit but also, the insatiable demand for growth. This profit motive, beyond the level that is reasonably required to sustain the safe and enduring longevity of the pipeline assets and the skill base required for their safe operation, continues to be achieved through cost reductions in the operations and maintenance sphere. Integrated asset management, where-in revenue targets are met with equal focus to the continuing integrity of the asset is not widely practiced. The philosophy of maintaining a pipeline on the basis of an infinite life or indeed for a life of over 50 years (the original Roma to Brisbane Pipeline is 50+ years old) is something of an anathema to the short duration of tenure of 3 – 5 years for most CEO's. Today short-termism is vogue and unfortunately as a consequence, future generations are likely to have to compensate for the depreciation in the assets and the skill base of the Industry as the profits and bonuses are voraciously taken today.

The pipeline operator's reactions towards the external effects of economic regulation over the past two decades have had large influences on the Industry in terms of its productivity and efficiency. The seemingly ravenous need for growth has concentrated Australian pipeline assets into fewer companies forming what can only be described as an oligopoly. If anything can be drawn from the ACCC's recent concerns that companies in this oligopoly have set prices, whether collectively or under the leadership of one or more firms, rather than taking prices from the market; it is that the Industry is under surveillance. It is also a concern that the well-known economic and legal concerns associated with oligopolies are operative, they block new entrants, slow innovation and result in increasing prices. The blocking of new entrants exacerbates the Industry's ability to adopt change brought about by competitive forces thus stifling innovation. Whilst the APGA maintains a strong focus on research, the Industry's uptake of the outcomes of that research is slow, perhaps because it detracts from the bottom line. All of these factors combine in the end to harm both the consumer and the Industry that holds the social licence afforded to those who provide pipeline transportation services.

The approach to the management and allocation of risk has decayed significantly and the need to maintain essential levels of competency have stagnated despite the immense efforts put in over the past 10 years since its inception, to the development of the Pipeline Engineers Competency System (PECS).

Management is seemingly too pre-occupied to visit site often enough as are those in the People, Safety and Culture departments who, together with a less than informed management, deploy wholesale policies and procedures without the slightest inclination as to the real consequences of their actions at the coal face. Our technicians, the Industry's engine room, can no longer act with the discretion they used to, there is little trust left as they become more and more disillusioned and jaded with continual business restructures and with policies and procedures that simply do nothing else but increasingly over complicate their work.

Whilst some companies have KPI's linked to site work, our engineers are not as site savvy as they should be, the majority of their time is spent in air-conditioned offices and they lack the relationships with the technicians that bring the practical operational experiences and risk awareness necessary to cement their competency. Procurement departments operate in silos and are deficient in the technical knowledge necessary to quantify and efficiently allocate risk instead relying solely on the warranty, indemnity, liability and damages provisions of contract.

Recruitment policies and a preference towards Internalisation is producing organisational cultures which are closed to outside influences and which exhibit dimensions of elitism. The behaviours of mimitism and normative isomorphism are active and their effect is spilling out of organisations into the broader Industry resulting in sinking levels of respect. Absent are the necessary health checks and balances brought about by the presence of external influence and independent auditing functions that the focus of internalisation precludes.

The Management and Allocation of Risk

At the spawning of all pipeline dreams the project owner possesses 100% of the risk. The owner may sell part or all of that risk but this requires the willingness of a third party to purchase, for an agreed sum and have allocated to it, a clearly defined risk.

To achieve the most efficient outcome, prudence dictates risk should only be allocated to the party best equipped to manage or eliminate that risk. This requires a commanding knowledge of both contracting organisation's levels of competency, and it takes discussion and understanding, a pre-requisite for which is, a relationship.

Prior to this process, the project owner should engage in the risk assessment of their responsibility for (poor) project feasibility, risk mitigation techniques and planning and manage their risk mitigation deliverables using experienced project staff. A return to the practice of conducting lessons learnt workshops as part of the close out of projects would aid a great deal in this endeavour.

In large projects the specification of material and equipment, the tendering and assessment process and the expediting and delivery must be closely co-ordinated so that the construction timetable can be managed efficiently. Time is money, particularly construction time. Relationships between project management and the multitude of suppliers and the construction contractor are paramount to ensuring the seamless delivery and the efficient and quality incorporation of the materials into the works.

When problems arise, the levers are many and varied. When left to procurement departments alone, they resort to what they know best, the fine legal print suitably incorporated into the contract documents by the corporate legal department. The seasoned project manager relies on the relationships created which are treated as partnerships – a pre-requisite to the delivery of projects at the efficient frontier. The executed contract remains on the desk for reference and action if necessary and is not relegated to the bottom drawer as many might assume.

Fixed cost contracting was on the nose in the early 2000's as several projects had ended up in Australian courts. Better and more efficient approaches were necessary. Graeme Hogarth introduced Alliance contracting with the construction of the North Queensland Gas Pipeline (NQGP) in 2004. Relationship management was a key feature of the strategy to meet a target turn out price arrived at with full agreement between the principal and the contractor. The parties participated actively throughout the project and shared risk and reward equally. Contractors loved alliance contracting for the fact that the project owner paid 50% of the additional costs incurred particularly when it was due to their inefficiencies.

I introduced a modified version of Early Contractor Involvement (ECI) into the Industry shortly after in 2006 for the Bonaparte Gas Pipeline (BGP). A maximum bid price was arrived at through competitive tension under the scrutiny of an independent probity auditor who was present

throughout the tender process. The successful contractor then worked with the principal through a series of relationship and planning workshops to derive a final fixed turn out price. Cost efficiencies were achieved through collaborative innovation with efficient, effective and clearly defined allocation of risk between the parties. The concept of risk allocation was extended to material and equipment suppliers.

The suppliers and the construction contractor were fully responsible for their efficiency or lack there-of. The relationships endured through mutual commitment and the BGP commercials were signed off with most suppliers soon after service and material delivery and between the Contractor and Principal two days after mechanical completion. The care factor remained very high with quality outcomes as evidenced by the Direct Current Voltage Gradient (DCVG) survey completed at completion in the wet season which produced one defect. The project was delivered one month early and on budget.

Some of us have worked hard to bring more effective contracting mechanisms that drive efficient risk allocation and it is no secret, enduring relationships are a critical factor. I presented a paper to the contractor's seminar in Brisbane in 2008 in which efficient risk allocation was discussed and comparisons were made between the various contracting strategies operative at the time.

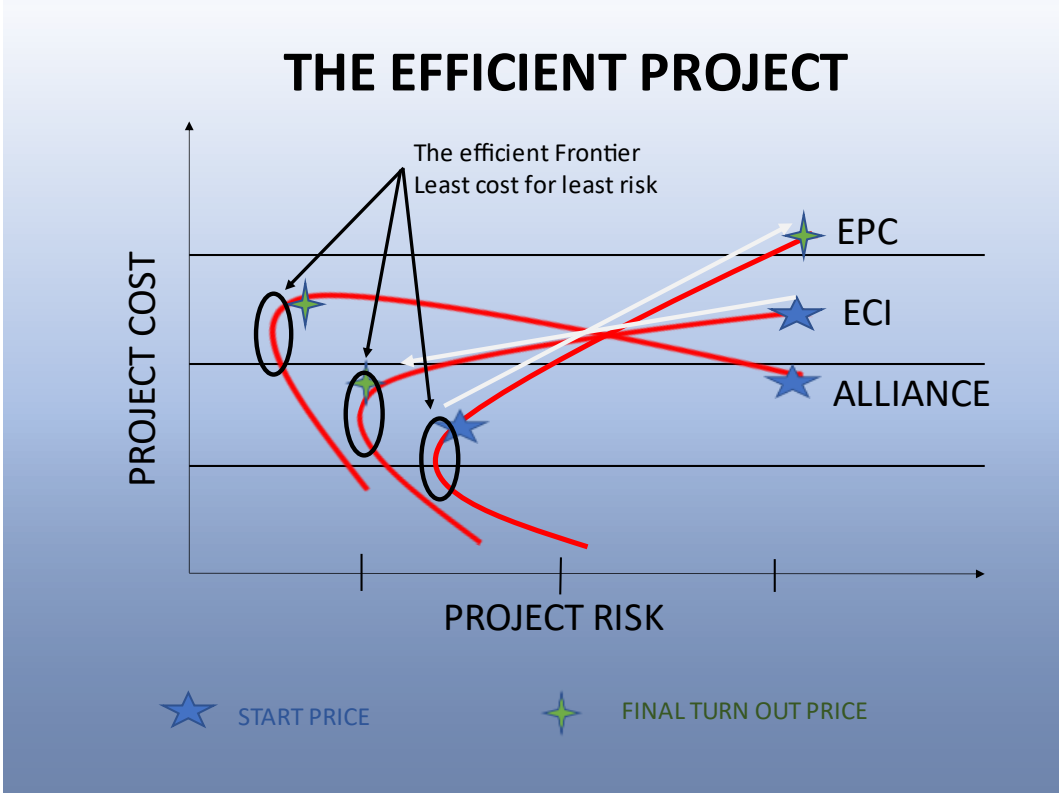

Figure 2 - The Efficient Project[2]

The graph shows the relative movements of the cost and risk equation with time between Alliance, ECI and EPC contracting strategies. Efficient projects using any of the contracting strategies are delivered at a cost for least risk.

The recent approaches of running several parallel competing ECI processes absorbs large amounts of resource and does not appear to have resulted in more efficient and effective project

[2] Paper to APIA Contractors Seminar, "Early Contractor Involvement – Modified ECI", Stephen Dykes, 2008

outcomes. Some have never reached award with ECI participating contractors walking away without adequate recompense. Further, some in the Industry have taken the retrograde step of reverting back to the adversarial and combative contracting strategies prevalent in the past in the mistaken belief they result in more efficient outcomes. Nothing could be further from the truth as has been proven by the success of the NQGP and the BGP projects when compared against the outcome of some of the projects pipeline operators have attempted in recent times.

Going back a decade or two, efficient delivery of projects meant meeting budget and time constraints. Despite the fact that the fundamental premise applied by the economic regulator in the derivation of the rate of return instrument that regulates pipeline tariffs to a fixed percentage is that the expenditure making up the capital base is necessary in delivering the transportation service used, there remains little incentive for pipeline operators to be efficient in terms of their capital and operating costs. The pipeline operator can adjust the regulated asset base at the next 5 year re-set for overspend. It is rare that an element of the asset base is rejected. Such a cost recovery mechanism is not available for pipeline contractors and equipment and service providers, they can only revert to the courts. Over the last decade, project performance would suggest that efficient cost imperatives are no longer important to pipeline operators. The net effect of their current approach to risk allocation is a key grievance amongst industry construction contractors, and equipment and service providers.

One of the ways to achieve fair and equable risk allocation as between the project owner and the suppliers and construction contractor is to work on an open book, cost-plus basis. However, as with Alliance and ECI, this contracting strategy requires an enduring relationship where mutual trust can be sustained. It is time that some of the large pipeline operators re-assess their approach to risk allocation as construction contractors and equipment and service providers to this Industry are unlikely to continue to tolerate unfair and inequitable risk allocation.

Procurement Practices

Recently, upon hearing that yet another re-structure was about to happen, I gave some unsolicited advice to a senior executive of one of our pipeline operator organisations… “the first thing you need to do is to get rid of the procurement department”. Let me explain my rationale.

The driver behind the need for a procurement department in an organisation wedded to growth is a belief that volume and standardisation can result in cost savings and centralisation in efficiency gains – a win/win situation one might surmise?

What really happens? Suppliers and contractors are pre-qualified on various panels to bid for work. Tenders are voluminous legal doctrines exonerating the principal of all risk, required bid responses exclude contemplation of any discussion and the language presents with an adversarial style at the outset. Procurement staff are incentivised on cost reduction outcomes. Under these circumstances lowest bid will always reign supreme.

The other day a pipeline technician told me he required a $20 part for a brand A instrument and when he was authorised to purchase materials, he had ordered this part on several occasions. He is no longer authorised, he fills in the paperwork and some weeks later is advised by a procurement officer he has never heard of in an email that brand A is no longer the preferred equipment, he needs to order the standardised brand which is now brand B. No discussion – the cost was in the several $1000’s for the new instrument, and this does not account for the

materials and labour required for pipework alterations necessary to accommodate the new machine nor the time taken to adopt new operating protocols and procedures. Nothing wrong with brand A, in fact brand A has proven over more than thirty years to be a most reliable instrument. Who is making these decisions and where is the efficiency?

I am reliably informed the quality issues experienced on the Queensland LNG pipelines could fill a book. As an expert witness, I get to study the entrails of various aspects of quite a number of projects in Australia and as a result, I am legally constrained. However, I can refer to a number of transmission pipelines built in the last few years.

Pipe and coating quality has been a never-ending issue since the demise of the domestic pipe and coating mills in Kembla Grange. This is mostly because of the cost imperatives driven by procurement departments but also because of the mistaken beliefs held in the quality of product out of overseas mills proving most misguided.

Pipe supplying companies in Australia can source quality coated pipe from certain accredited overseas mills and yet we still see projects grappling with pipe and coating material defects as the cost imperative forces supply from other supposedly accredited mills. It is eminent Australian metallurgists that have tried and partly succeeded in getting a select few of these pipe mills to produce quality although not dependably it would appear. A recent pipeline supplied with overseas manufactured and coated pipe had over 16,000 defects which had to be repaired as each pipe left the lay down yard at an estimated cost adder of nearly $5 million before the pipe was even welded.

I understand on one major pipeline project there were more people employed on defect detection and repair than there were on the front-end welding crew. At least the repairs were completed before burial as it pales into insignificance when compared with the statistics on the Eastern Gas Pipeline completed in 2001. The post construction DCVG survey recorded a total of 3061 defects of which approximately 800 were above the contracted threshold. These were excavated and repaired at a cost of approximately $40 million. As of 2002, there would remain approximately 2200 coating defects to monitor. The construction contract had been awarded to the lowest bidder. I thought we had learnt something from this disaster?

In contrast, after passionately controlled pipe logistics, another recent pipeline had the odd coating repair required as the pipes left the laydown yard. However, a visit to site disclosed serious defects on the strung pipe sustained during the stringing operation. We still haven't learnt anything? I suspect the return to the combative and adversarial contracting framework together with the deterioration in the relationships forged by the modern procurement approach has contributed significantly to a care factor now approaching zero.

The requirement by project owners for principal contractors to have full accreditation on quality outcomes to ISO 9000 plus the applicable accreditations in the matters of People, Safety, Culture, Environment and the Community is praiseworthy because it sings to the social licence aspects of modern corporate life. This requirement however, is not extended back-to-back with the requirements of sub-contractors. Principal contractors therefore have no obligation to hire accredited sub-contractors.

Most of our APGA member suppliers and sub-contractors are passionate believers in delivering quality and socially conscious outcomes and carry hefty overheads for QA and other socially

responsible accreditation requirements but they cannot compete when price is the only determining factor.

Some procurement departments are staffed purely with advisory personnel, few of whom have any direct experience within the Industry, they are purely commercially focussed and act solely on contractual terms. It's worth pointing out that centralisation in any undertaking is a single point of failure, a big contrast to the very modern practice of smart contract administration driven by decentralised block chain technology.

Not only are current procurement departments seemingly devoid of any need for relationships, they cite matters of probity in support of this approach. Probity can be achieved in many ways and this is a weak excuse. Because they are incentivised to a least cost paradigm, they shy away from the truth and honesty required of a trusting two-way relationship with their construction contractors and equipment and service suppliers.

Further, my experience with their understanding of technical risk and its translation into both a quantifiable and a clearly defined risk that is able to be efficiently allocated to a contracting party is poor at best. Worse, their knowledge of the very technical matters involved in the production of material performance requirements for example, is not good and results in inconsistencies between what they tender for and what can be physically supplied. A technical background is necessary as mere reliance on a specification document prepared by the engineering department is not good enough. With this absent because procurement departments choose to operate in silos, the least path of resistance is taken which is to tender on the basis that the contractor or equipment/service provider takes all the risk rather than to enter into a working relationship, collaborating and allocating risk in a fair and equitable manner. The absence of a commanding grasp of the quantification of technical risk is compensated for in the treatment of warranties, indemnities, liabilities, defaults and liquidated damages (WILD's) which are exceptionally onerous and work to preclude quality tier 2 and 3 contractors and equipment/service providers from bidding for work.

These matters have compounded over the years and relationships with the some of the larger pipeline operators and in particular their procurement departments are strained, if one exists at all. The adversarial nature of the terms of the tender prevails through negotiations, the contract and throughout its administration. I have heard in instances where a contract is silent, for example on the requirements for certain notifications, a moral obligation has been read into the contract, as though it were legally encoded in small print and which seems to only act in one direction, that is in favour of the project owner. So much time and effort on both sides goes into trying to resolve such matters, all of which detract from the turn-out efficiency of the task at hand. Lessons learnt workshops are not conducted between the parties so perhaps contract wordings can be better drafted in future to better express the intent and provide parity. This is morally obsequious and emanates from pure power play. It would appear that some pipeline operators do not see relationships as being at the core of the Industry any more.

Competency

I have often asked the question whilst conducting an interview "in your opinion which comes first, confidence or competence?" There is no correct answer but the response given reveals a lot about

the candidate and their suitability for the position. Sales and commercial people mostly respond with confidence, engineers with competence. One thing is certain, being confident of your level of competence is vital in our Industry.

APGA, with the full support of the Board representing owner members as well, embarked upon and funded the development of the Pipeline Engineers Competency System (PECS) which commenced in 2010 and was completed in 2016. Many experienced, independent consultants gave of their experience and time willingly, passionately **and for free** to develop the competency system including myself.

Why did this initiative come about? What drove the membership to conclude that competency was a problem and needed to be addressed? It was a reaction to Max Kimber's 2003 paper which was followed by Susan Jacque's 2004 paper to APIA entitled "What Does Pipeline Engineer Mean to You?". Whilst it took nearly 6 years for any action to materialise, put simply, it followed a realisation that a diminishing supply of skill, competency and experience was a serious matter the Industry needed to remedy.

Why did the APIA under Cheryl Cartwright adopt the initiative for the Young Pipeliner's Forum in 2006? Again, it was somewhat a late reaction to Kimber's paper imploring pipeline companies to become learning organisations and to tap senior experienced engineers and consultants as teachers and mentors and encourage engagement and knowledge transfer with younger members.

Since the commencement of action in 2010, it has taken over 7 years to build PECS, 7 long years and after all the effort, why has there been such a very slow uptake of the PECS by the Industry to date? Chris Harvey reported in his 2019 paper "APGA's Pipeline Engineer Ten Years On – Where to from Here?" that the uptake of PECS in the Industry was probably 25%. There is no evidence it has increased since. Perhaps there might be a surge in the uptake in order to avoid potential embarrassment following the agreement with the Canadians who have adopted and purchased a licence for the system?

It is a Pipeline Licence requirement that a pipeline operator demonstrate the competence of their organisation in meeting the requirements of the licence and all the relevant Acts and Regulations, I know I own a pipeline operating company. This competency should extend beyond mere compliance to the existential limits of the social licence that comes with a pipeline licence, a reminder for those who have yet to recognise this fact.

Growth for corporates is a necessary key performance indicator and is comprehensively incentivised. Perhaps having reached near saturation in the development of new transmission pipelines in Australia for the time being, some pipeline operators have embarked on vertical integration with forays into power stations at the end of the pipelines and into storage and gas processing plants along and at the inlets. Some contemplate LNG pipelines and regasification plants, hydrogen and some contemplate operations overseas.

It would appear some storage and processing plant projects have not been particularly successful when measured against traditional project metrics. They are alleged to have suffered various levels of schedule delays and budget strain, purportedly suffering most from poor contracting strategies and administration, major process design flaws and poor project definition and execution. Having the necessary competency is a critical project attribute, one that must surely be demonstrated to management and by management at the very first approval gate. It seems

obvious if you venture into power generation that one would embark on a competency drive to recruit the right talent. Why is it not the same for gas production, storage, processing and in the LNG and hydrogen space that is about to materialise?

After former U.S. Secretary of Defence Donald Henry Rumsfeld mentioned “unknown unknowns” (Rumsfeld, 2002), people started using quadrants of knowledge, i.e., known known, known unknown, unknown known, and unknown unknown, to help understand and explain the nature of risk. The diagram below depicts the relationship between two facets of risk management, awareness and knowledge. Where both awareness and knowledge are absent, ignorance exists. If a risk assessment has been completed diligently and all known risks have been allocated efficiently then it is the Unknown Unknowns that are most likely to harm your project. It takes the response of experience to reduce the probability of the unknown unknowns occurring. In fact, experience features abundantly in the response to all four quadrants.

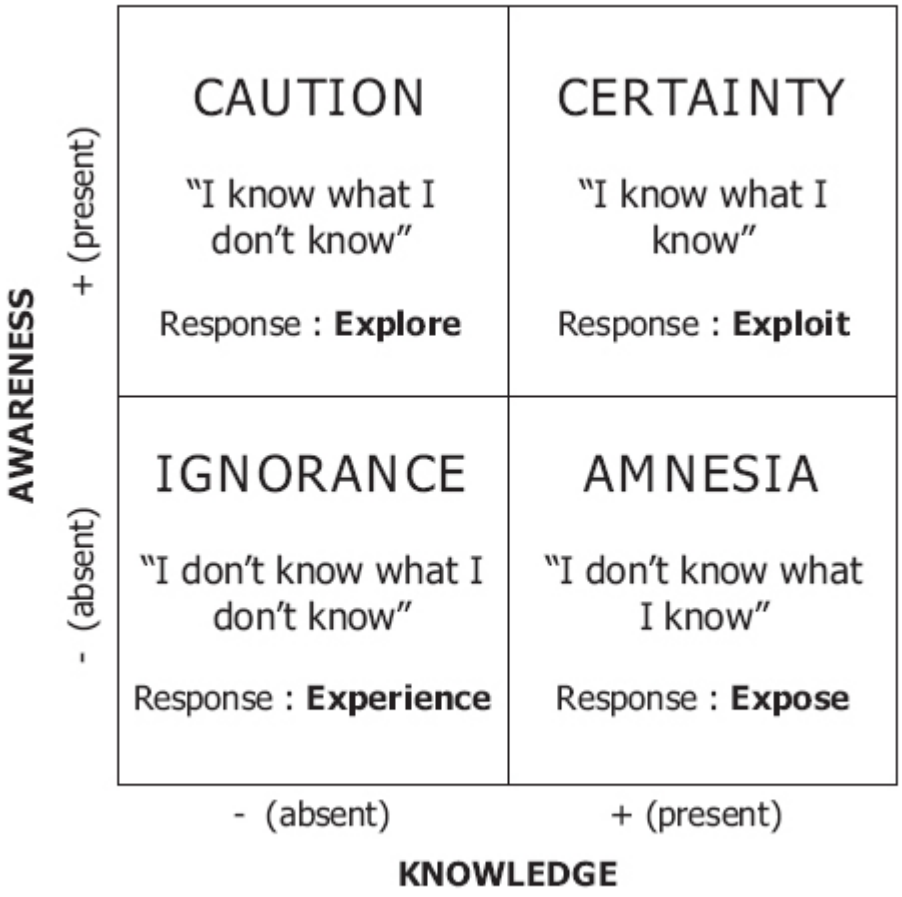

Figure 3- The Nature of Risk

A great deal of engineering knowledge and experience is necessary in oil and gas production and in the management of the reservoirs used during production and for storage and extraction. The same is the case for the storage, transport and regasification of LNG. It goes far beyond having an exceptional knowledge of AS 2885 and related standards and is a much bigger ball game. In my oil and gas production and processing experience, where design flaws emerge in such processing

plants as they are alleged to have recently, there ought to be even more concern as to the aggregate level of incorporated engineered safety purely on the basis that these plants have many complex and mutually dependent systems.

The level of engineered safety is dependent upon the extent of technical and operational competency in the organisation owning and operating the plant regardless of the fact that it is often supplied by an engineering house or a specialist contractor under a services contract. Many such service providers lack the **operational competence** that must be integral in the engineered safety of operating plant. This comes from years of working on site with the mix of skills and talents necessary at all levels to operate and maintain such assets. In many High-Performance Organisations in the oil and gas space, a sector the pipeline industry seems intent on expanding into, there is a position called Chief Engineer. This is where the competency for engineered safety lies.

Just focusing on the competence required to operate pipelines, in his 2019 paper Chris Harvey discussed the changes in the causes of Industry reported incidents which, in previous years had a high incidence of external interference and lightning, (matters managed largely by operational personnel and processes), to increasing incidence of corrosion, earth movement, construction defects and pipeline material defects, (avoided, managed and mitigated against by pipeline engineers). He noted that while all of these causes arise on operating pipelines, much of them are influenced by the quality of engineering in the design and construction phases of a pipeline's life. Pipeline engineers are responsible for operating and maintaining a pipeline, but they are also responsible for the creation of pipelines that are safe, reliable and sustainable.

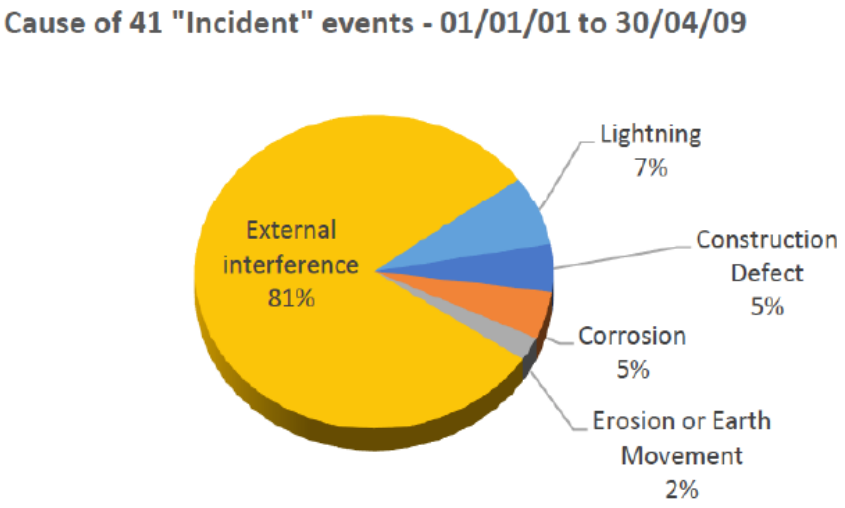

Figure 4 - Causes of Pipeline Incidents 2001 - 2009[3]

[3, 4] paper to APGA, "APGA's Pipeline Engineer Ten Years On – Where to from Here?", Chris Harvey, 2019

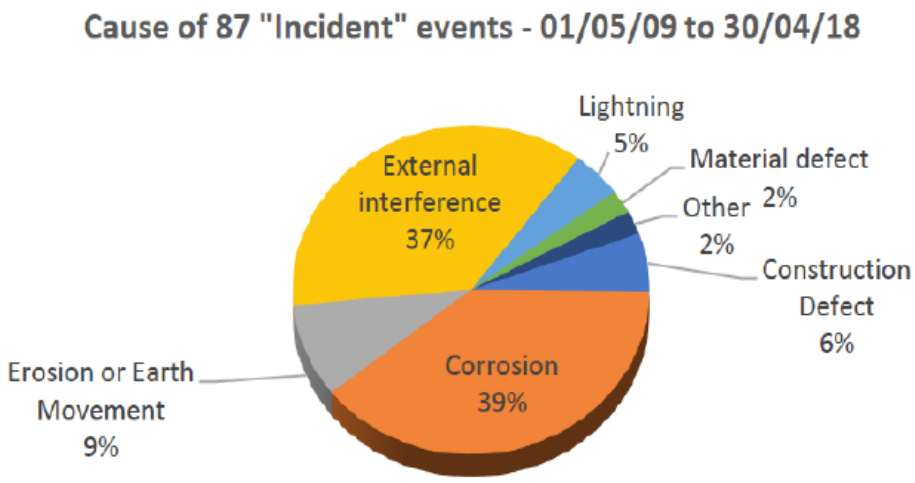

Figure 5 - Causes of Pipeline Incidents 2009 - 2018[4]

In my opinion, "sustainable" means that the pipeline is designed so that it won't corrode or that any corrosion can be readily detected and repaired. Why are we now seeing increased corrosion failures?

Chris Harvey went on to state the anecdotal evidence in the mid and late 2000s was that the awareness of and expertise in AS 2885 was far from good. Whilst this was not the only measure, it is an extremely important one for the Industry. This concern seemed, at the time, to relate to engineers, who were doing the pipeline engineering work.

It resulted in an increase in some pipeline operators seeking training in AS 2885 and related Australian standards. Under the influence of Brian O'Sullivan, PIPeD commenced providing pipeline engineer training in 2006 and Ian Haddow and I did a lot of bespoke training in pipeline operations and maintenance and in AS 2885 between 2008 and 2012. It is now 2021 and we are still debating the absence of competency despite Max Kimber first raising the concern publicly in 2003.

Chris Harvey also noted that there was more recent anecdotal evidence that senior management have poor awareness and knowledge of AS 2885 and its application in the Australian pipeline industry. My own observations support this contention. Indeed, for projects to be successful going forward, knowledge of AS2885 and pipeline competency should be extended as a requirement for procurement staff, commercial practitioners, contract superintendents, project managers, line managers, senior managers and CEOs.

The broad acceptance of AS 2885 by COAG, together with its World leading approach in safety management remains a key factor in the success of the industry and in the reliability to date of our pipelines. The Industry continually espouses to our regulatory masters that we always act in meeting the very essence of the words High Reliability Organisations (HRO). Appendix H of AS 2885.6 captures the very embodiment of what this means:

"to be classed as an HRO, an organization should possess several traits of which the most important is sensitivity to, or pre-occupation with, the possibility of failure. An organization that

operates in a hazardous industry but does not adequately account for catastrophe can never be a high-reliability organization."

In turn society, through the Technical Regulator, gives us the right to operate as High-Reliability Organizations under a social licence.

The need to deliver the design, construction and operation of pipelines competently and safely in compliance with Pipeline Licence conditions, AS 2885 and in regard for the privilege of operating them on behalf of the community is vital to the ongoing success and reputation of this Industry. This becomes even more important as members move into the more technically complex realms of gas storage, raw gas processing and LNG regasification and perhaps even hydrogen applications.

It seems necessary to point out that for matters of the safety of an operating plant, Australian governments have mandated that the Safety Management Plan nominate the position of the Executive Safety Manager. This is defined as "*the senior managing officer of the corporation or organisation responsible for the management and safe operation of the operating plant"*. For the avoidance of any doubt, they have defined the senior managing officer of a corporation or organisation as the person in Australia who is the most senior. There is no hiding from where the buck stops here, the organisation remains culpable for the safety of the engineered outcome or, to read this another way, the outcome of the engineered safety, one and the same thing.

The process of recognition of High Consequence by senior management and the question of engineered safety extends from the discipline of engineering through the process of procurement, to the acts of construction and throughout the life of operations and into abandonment. These phases of a pipeline's life are inextricably linked. Procurement cannot operate in isolation from engineering, neither can construction nor the inclusion of operating expertise, engineered safety does not work like that. Engineered safety is as fundamental to our Industry as the health, safety, security and environmental disciplines and as a consequence, it should have dotted reporting lines to senior management.

A recent project conducted by the Future Fuels CRC included the preparation of an Engineering Practice Guide. The first draft of the introduction to the guide made it clear that management shares responsibility in engineering outcomes for public safety. For that there is no question. I understand there was much debate on the wording to be used in the introduction to the document which emanated from a view held by some pipeline operators that the wording might imply there were existing issues concerning the lack of engineered safety in the Industry. My reading of the commentary indicates there is a reluctance in the management of some pipeline operators for the acceptance of culpability and responsibility for engineered safety. This responsibility cannot be contracted out nor abrogated and our Industry leaders must ensure they have the necessary competencies in their organisations or they must engage external consultants that possess the competence to ensure this critical element of societies' expectations is met.

Equally as important, if a number of Industry participants, coming from positions where they could, and have obviously experienced events where engineered safety has been, is, or is likely to be compromised, whether this is expressed verbally or in documentation, it would seem reasonable to me that Industry would listen and take appropriate action immediately. Matters with potentially serious consequences should not ever be silenced for the sake of reputation.

It is extremely dangerous that some pipeline owners have indicated a desire to dictate the agenda simply by rejecting any and all grounds for such a premise, an act that would not be viewed favourably were there to be a coronial investigation into a high consequence event.

People, Safety, Culture and the Community

What our **people**, the pipeline technicians actually do in tending to pipelines daily has not changed a great deal over the near 40 years I have been associated with pipelines. They do lots of windscreen time, deal with high pressure gas in pipes, operate pigs and clean up the mess, calibrate instruments, inspect right of ways and deal with emergencies amongst other things. Yes, there has been technological change, instruments are more accurate, SCADA systems are more intrusive than they used to be in the days of the Leeds and Northrup 2068 systems and we now have computers.

Ask any technician what has changed and their answer is policy, procedure, layers of paperwork, management attitude, lack of management support, having to go through very inexperienced "office engineers" to complete their field work, difficulties with procurement, endless restructures that threaten their security, lack of consultation in the endless suite of change that is imposed on their lives, the list goes on. Visits on the ground from senior management and engineers are few and far between and if they do occur, it is within the time constraints ensuring a return to the city office by days end.

Work scheduling software like Maximo, whilst a good system, has dehumanised the workplace. The technician is communicated his weekly tasks through a printer. The durations allowed for the tasks don't even account for the travel time involved. There is clearly a need for training, communication, feedback and discussion to make it work effectively. Regardless, there is a loud and growing chorus in the engine room of our pipelines shouting that industry management does not know what it is doing. This is a direct symptom of least engagement with the coal face. Good management involves a great deal of walking around, not just talking about it and making decisions in select and closed management circles.

Max Kimber's 2003 paper reminds us that one of the contributing factors in the Longford disaster was the relocation of plant engineers to the Melbourne office which deprived plant operations personnel of engineering expertise and knowledge which previously they gained through interaction and involvement with engineers on site who also gain valuable operating experience. Our pipelines are potentially subject to the same fate.

The derivation of the policies that modern People, Safety and Culture (PSC) departments dream up perhaps have some relevance in the legal and regulatory bases upon which they are founded. In my enquiries for this paper, not one technician confided in me that a member of the PSC department had visited, talked face to face with them, spent time understanding their role or consulted with them on the policies that may affect them. Worse, management only share the news when policies are in the implementation stage. Perhaps the engine room of the Industry needs to prepare a statement from the heart, perhaps get a voice?

A very experienced pipeline technician recently received an official warning for not wearing a seat belt whilst driving through a cattle gate. On pipeline right of way inspections there are dozens of cattle gates to open and close in a day. In NSW and QLD there is no legal requirement to wear a seatbelt when the vehicle is traveling at less than 25 kilometres per hour, so what is the basis for this policy?

It is easier to make a wholesale policy requiring mandatory use of a seatbelt at all times because the decision fits with the city environment the PSC departments are familiar with. Disciplinary

action is a foregone conclusion. Given the majority of corporate miles in company vehicles are compiled by pipeline technicians it would be courteous and respectful if the PSC department took the time to understand the effect such a blanket policy will have on their roles. Indeed, experienced pipeline managers should intervene so as to minimise the total alienation of the very engine room that facilitates the profits they hanker and are accountable for.

What about the treatment of **safety**? I have long been a laudable objector to the wiring of vehicle headlights into the ignition switch. The premise of such an act is that the driver is safe from other vehicles because it is more visible. This is fact, you are more visible. The driver has several threats to their safety, for example the condition of the brakes and tyres, their health and the visibility of the vehicle is just one other. As with all operations and maintenance work, the technician is responsible for managing these risks for a safe outcome, no-one else is. Wiring the lights into the ignition switch is a form of lobotomy, the driver is no longer responsible, in fact it may amount to a legal defence if the lights do not come on automatically and there is an accident caused by invisibility. So, in the next generation of company vehicles, besides wiring the lights into the ignition, do organisations provide brake and tyre safety sensors? How far do we go? Has the Industry lost the confidence in the competence of our people to the extent that we cannot trust their judgement in the management of risk? Have we let our People, Safety and Culture departments create an illusion that there can be a risk-free World at any cost? The Industry spends inordinate amounts of time in risk assessments and in risk training and we know there is no such thing and yet this contradiction perpetuates.

The fact that we have in vehicle monitoring at all sends a message of mistrust, it is not about safety at all. Has the pervasion of union demands in workplace EBA's partly driven this outcome or is it really about control? Does the Industry seriously think that the technicians don't see through this? It alienates them even more when minor personal use of vehicles as permitted under the FBT legislation is removed and is restricted to work purposes only or the vehicles are placed in pools. Whilst the avoidance of Fringe Benefits Tax is plied as the reason, many of the company vehicles in this category are either not subject to FBT (defined as commercial vehicles) or the conditions under which FBT would be payable do not apply. Pool vehicles have a much higher risk ranking than do personally assigned company vehicles.

The engine room is a precious resource, as are the pipeline assets they operate and maintain. Just ask some of the pipeline operators that cannot source competent technicians and engineers. If you really understood the coal face, you would look after the employees and respect and trust them, and in doing so the pipelines will look after themselves and the revenue streams upon which there is obviously a material dependence, will continue to flow.

The matter of **culture** is addressed in the Internalisation debate below.

On the **community** side, Industry engagement has improved mainly as a result of the statutory requirements that push for sustainability report content and not as an unsolicited social act driven by a prevailing social conscience. Best practice is not achieved as, in general, the project owners delegate their responsibility through to the construction contractor and both hide behind the excuse of short project timeframes. It is my experience that community engagement and promotional budgets exist as a short-term expediency and a placatory tool, often aligned with a view to compensating for the social disturbance associated purely and only with construction activities. In one case, landowner compensation as a result of construction malaise remains an ongoing cost almost twenty years after completion. Once construction is complete and the

operating revenue stream begins to flow, community budgets suffer the same fate as do the biscuits in the coffee room and the training budget.

Most communities want an uplift in economic activity and material actions placed into getting, not just local jobs and business involvement, but how communities that have pipelines passing nearby can get access to the gas for existing industry to use and/or to promote the relocation of business and encourage new business because it is accessible. Future offtakes are rarely considered through sensible route modification even when this would significantly improve the potential of a community to make some future use of the gas. The cost of providing an offtake close by to a pipeline during construction is less than 10% of the cost when in operation. Perhaps the opportunity to include a much-inflated cost of connection in subsequent 5-year settings of the regulatory asset base is the reason they are not considered an integral part of the original project.

If gas supply is not on the agenda, then spending money in the small communities that the pipeline passes by whilst undertaking operations and maintenance is a really good community thing to do. Centralised procurement reduces this substantially as deals are done in the big end of town dominated by large suppliers who can meet the cost imperatives. Small businesses that are efficient yet desperately need the business to ensure the survival of small, local communities miss out.

Tender documents prepared by the procurement department glowingly refer to the imperative for community engagement, the establishment and maintenance of relationships, stakeholder management and sustainability. Such requirements rarely feature in the weighted selection criteria and as a result, community does not rank in the outcome of the tender assessment and is not implicated or emphasized as an important criterion in the mind of the successful bidding contractor. Clearly the Industry is not demonstrating the level of social conscience that a social licence would imply, much less dictate if it were mandated. There is an imperative here to walk the talk.

With the growing sensitivity to hydrocarbon emissions, the winning of hearts and minds for excellent community relationships is paramount to the Industry's future. If the project owner will not pay the relatively small premium to have the contractor allow for these efforts it simply will not happen. Provided with adequate lead in time, most contractors are very competent in this field and are known to have delivered hugely positive outcomes if the price accounts for the time it takes to do the engagement and they are measured on relevant success factors.

The Culture of Internalisation

Since 2015 there has been a growing trend of Internalisation in the Pipeline Industry. Apart from the non-technical disciplines of commercial, accounting, legal and PSC, there is a belief amongst some pipeline operators that they can build and retain the operations, maintenance, project management, engineering and construction expertise in-house. This is of course possible but comes with the outlay of expensive overheads which dilute the bottom line. High-Performance Organisations in the oil and gas space have achieved this but many choose to retain experienced management and hire in such expertise as required.

The factor which enables the latter practice to operate is an available pool of skilled and experienced talent from which to draw upon when the expertise is required. This comes with a mature industry which has generated a self-sustaining level of employment with training

apprenticeships for operators, technicians and tradesmen and graduate intern programs for technical and engineering staff. Industry participants are quite free and are encouraged to move across organisations in the same industry to obtain new and deeper experiences.

There is a big difference between the person who has had 20 years of different annual experiences and the one who has had 20 years of the same annual experiences, the former available with movement across the Industry and the latter generally resulting from confinement to one organisation coupled with a reluctance to move people around the business. Less experience often results in costly outcomes because of poor risk awareness and a restricted sphere of knowledge. As the Industry ventures into more complex endeavours, such as gas production storage and processing and LNG and hydrogen, new and additional layers of competency are required.

A recent move by some in the Industry to implement apprenticeships and graduate traineeships is encouraging but in general, pipeline operators have not been socially responsible in providing the training and apprenticeships necessary to adequately sustain the skill requirements of our Industry, instead relying for many years upon other industries to supply the technicians and technical staff required. This has been true of engineers for a long time too but hopefully it might change with the adoption of the PECS. Regardless, a deep pool of experienced pipeliners does not exist to draw upon as was adeptly demonstrated with the importation of large numbers when the LNG pipelines were built in Queensland. The pending retirement of quite a number of aging pipeliners further reduces the available pool. The Industry remains immature in this respect.

One sector of this pool is the independent consultants and they have and continue to contribute a great deal to the Australian Pipeline and Gas Industry. We need to remember it was largely their efforts that were the driving force behind the set-up of the APIA Research and Standards Committee in 1996. Consultants define research programs that push the envelope of applicable and practical technology to the benefit of the whole Industry. It was Consultants that forged the relationships enabling the formation of the tripartite agreement with PRCI and EPRG placing the Australian Industry and its research programme on the international stage. It was Consultants that were the main driving force behind the successful bid for the Energy Pipelines CRC from which the Future Fuels CRC has morphed. A Consultant has been the Chair of ME-038 for many years. Consultants were largely responsible for the drafting of AS 2885. Consultants serve as industry advisors on research projects and on each one of the Industry Standards committees. Consultants contributed significantly to the development of the PECS. Consultants have served on all the APGA committees except the Owners committee and the Pipeline Operators Group (POG). Consultants act as subject experts for insurance companies and expert witnesses for the legal profession. Consultants provide independent advice and independent audit services. And to do this, except for expert witness work, consultants passionately contribute **freely** of their time and experience through lost opportunity, besides paying for the travel and accommodation costs incurred.

The Individual member category for consultants was reluctantly instituted by APIA some 15 years ago but it does not come with a vote. Some independent consultants paid corporate membership fees (equivalent to corporate bronze today) and were active in both APIA and the RSC until about 2010 with a number serving on the APIA Board. Most of this category of member have now retired and the number of individual consultants without the vote are in decline as well. As a result, APGA today is more representative of just the pipeline operators, large suppliers and construction contractors. Perhaps it is time that consultants in the individual membership category were awarded suffrage.

Under-representation of experienced individual consultants in the key areas critical to the future of our Industry should be of concern to the APGA membership. The number on APGA committees and on those committees focused on pipeline engineering training, knowledge transfer, and providing assurance that the AS2885 suite of Standards continues to provide excellent guidance is declining rapidly.

Individual consultants represented 27% of the RSC membership on average through the years from its inception in 1996 to 2015. As of 2020 it is less than 15%. A decade or more ago, three of the five executives on the RSC management committee were individual consultants, now there are none.

The level of engagement of independent consultants and consulting engineering houses by pipeline operators has dramatically reduced in recent times. Internalisation means that consultants cannot earn a living in the Industry and a number have resigned from both APGA and the RSC as a result. Consulting houses report they have less work in pipelines mainly as a consequence of the adversarial approach and risk allocation prevalent in tender documents combined with the fact that the lowest bid wins, there is little consideration for quality and/or reputation. Some suppliers, once mainstays of the Industry, view it as a minor component of their business now and only tender on the outside chance they might win, there is no longer an imperative to win, it's more of a hassle than it is worth.

When challenged on the matter of engaging independent consultants, pipeline operators' responses have ranged from **too expensive**, to **personality issues**, and to one of being potentially liable for aiding and abetting the **80/20 rule** on annual remuneration from a single source or the long-term engagement of an independent contractor having to be considered as one of a full-time employee. When challenged on the matter of awarding to the lowest bidder every time, the response is, **we like to share the work around**. It would appear from the nature of these responses there is little desire to retain a competent cauldron of independent consultants or a pool of competent contractors, suppliers and service providers within the Industry.

The obvious long-term effects of internalisation include a reduction in the pool of expertise, a reduction in the experience level of that pool and the flexibility that such an experienced pool offers. Take a look, there are few if any new independent consultants hanging their shingles out for work these days. What is less obvious are the cultural effects internalisation can have within an organisation in the longer term.

Mimetism is defined as the copying of the actions of business peers. Normative isomorphism refers to the fact that organizations are influenced by rules that introduce a prescriptive, evaluative, and obligatory dimension which extends beyond work into the social lives of the employees. These behaviours are symptomatic of Groupthink. Irvin Janis described Groupthink as a phenomenon that occurs when the desire for group consensus overrides people's common-sense desire to present alternatives, critique a position, or express an unpopular opinion. The desire for group cohesion effectively drives out good decision-making and problem solving.

Groupthink has recently been a subject considered in the High Court of Australia with Peter Ridd challenging James Cook University for his right to intellectual freedom in expressing doubts about the global warming processes said to damage the Great Barrier Reef. Ridd was sacked because his published theses threatened to embarrass powerful scientific institutions that had already determined the narrative about the death of the reef. Two well-known examples of Groupthink in action are the Challenger Space Shuttle disaster and the Bay of Pigs invasion.

In recent times I have observed these behaviours to be exhibited more and more in our Industry. It stems from a policy of exclusive recruitment accentuated with that of internalisation. Don't get me wrong, all organisations have a right to run a conformist recruitment policy but a big danger is the propagation of an elitist culture, which is not good. When the recruitment policy is driven together with a "respect the boss" normative that produces an expectation that the respect required by the leaders within an organisation apply equally to Industry members outside the workings of that organisation, it is not good either. Senior members of the Industry have publicly articulated such policies in the recent past. Internalisation removes the independent and externally influenced checks and balances and the norm propagates.

Respect for leaders in an organisation may be a mandated requirement of employment but for the near 40 years I have been a member of this Industry Association, respect is not policy driven, it is earnt. This elitist conduct does nothing for enduring relationships in our Industry.

At the beginning of this paper, I mentioned that our Industry has been blessed and continues to radiate with robust characters. It takes strong personalities to work in high-risk industries and in Industry forums they must be allowed to speak their mind. You do not have to agree with all they have to say but it pays to hear them out. By listening, you might learn something. Attempting to gag independents by reference to company policy and/or edict is dangerous and blacklisting them on account that their opinions do not align with the organisations' policies is wrong. It may even amount to being unlawful in some circumstances for example, where professional ethics are at play.

The behaviours of mimetism and normative isomorphism have been evident in workshops I have conducted. The participants are blind to these behaviours as they have become normalised. There are exclamations of surprise when I have called it out and expressed the danger that it can lead to groupthink. Normalisation occurs in other forms too, for example ignoring incessant alarms in control rooms. A policy of internalisation results in a closed environment devoid of external influences and increases the probability of these normative behaviours either escalating into failures or being contributing factors to catastrophic high consequence events such as Piper Alpha and BP Texas City.

Not only are the effects of these behaviours straining relationships in the Industry but coupled with internalisation, they have the potential to manifest in cultural drift and at worst corruption. This was the path of the corporate cultures exposed in the Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry.

What the Industry needs to think about

What really backs up the industry's self-belief in the 'safe and reliable' pipeline industry? Is the Industry really good at what we do or have we just been mediocre with a big dose of luck? A widely held view, for which I find there is good evidence, is that pipeline operators are simply profit and growth driven. In addition, a lack of the necessary experience and a complacency about the maintenance of their pipeline assets is endemic.

The Industry has had some close calls. The Pipeline Operators Group (POG) does provide a forum where these can be shared but I recall a directive early on in my own career where discussion was gagged for commercially sensitive and reputational reasons. The experts in the safety of complex engineered systems advise us that we need to share these stories in order to pass on the

knowledge but, be they incidents or near misses, some in our Industry seemingly want to conceal these events to guard their reputations.

We can learn a lot from the events surrounding the grounding of the Boeing 737 Max. Darryl Campbell from the Verge in a recent article called “Redline, the many human errors that brought down the Boeing 737 Max” stated “it’s a perfect example of the cross purposes at which business, technology, and safety often find themselves. With its bottom line threatened, Boeing focused on speed instead of rigor, cost-control instead of innovation, and efficiency instead of transparency. The Federal Aviation Authority got caught up in Boeing’s rush to get the Max into production, arguably failing to enforce its own safety regulations and missing a clear opportunity to prevent these two crashes”. The two crashes he refers to are the Lion Air flight 610 in October 2018 and the Ethiopian Airlines flight from Addis Ababa to Nairobi in March 2019.

The concealment of design elements, of the successful pilot reactions to the root cause of the plane’s Manoeuvring Characteristics Augmentation System (MCAS) forcing it into a dive which saved one 737 Max from the same fate, an alert following the Lion air disaster which was also designed to conceal the real issue and the ulterior motive behind Boeing’s focus on pilot error to conceal the real culprit are all contributing factors to the death of 346 people. It is a good example of a business cycle where mature companies face the search for new growth and find themselves in a position where failure is not an option and where reputation must be guarded at all costs. Sometimes this motivates them to new heights of innovation and progress. Other times, it prompts them to pull everything back in the name of cost-cutting with the inevitable result that the probability of a high consequence event is heightened.

When the bottom line is a major driver in a ‘high reliability industry’ and the construction and operations components are disconnected and are incentivised separately, where procurement acts independently of technical expertise, and management are ignorant of and perhaps indifferent to the real (and not apparent) matters affecting safe productivity at the coal face, and groupthink is active, serious issues are likely to slip through the cracks, potentially threatening norms will perpetuate and standards will continue to erode.

What will happen when there is a major rupture and a coronial inquest into root causes – are the pipeline operators ready to handle the fall-out? Cancellation of licences, massive fines, imposed regulation, mandated standards and conditions resulting in high costs coupled with a major backlash from communities who are approached for new pipelines when they believe the social licences afforded to these companies have been abused.

I have covered a number of behaviours, there are more that I could bring to the table, all of which I have seen become normalised in our Industry over time. Perhaps unaware, consultants, contractors and suppliers have normalised their acceptance of many as well, not necessarily because they want to, they have progressively had to accept such behaviour to survive and make a living. Some have chosen to capitulate too, the risk no longer being commensurate with the reward.

Normalised behaviour can be good or bad. In the economic regulatory sphere, pipeline operators have been found wanting by the ACCC. This forced the hand of the economic regulator to act to ensure that the monopolistic powers that can persist in oligopolies are not exercised in the markets in which they operate.

As the Economic Regulator and the ACCC have found grounds against the Pipeline Operators, there is no doubt the Technical Regulators will too.

When root cause analysis into a future high consequence disaster is undertaken, as it will be, these bad behaviours are likely be found to have manifested into contributing factors, especially where normative isomorphism is prevalent and where monopoly power has perhaps been exercised within the Industry and perhaps with extension through the industry's representative body, the APGA.

The APGA's mission is to provide valued services, foster collaboration and to represent the **collective** interests of **all** Industry members. To the general membership, the direction in which it appears to be heading is one where the secretariat is seen as subservient to the wishes of the major pipeline operators despite a sincere and obvious credence expressed by the individuals of the secretariat in their mission. I wish to emphasise the fact that the Industry must respect the secretariat is required to represent the **collective** interests of **all** members and not just those of the powerful.

Past presenters to this Industry forum have talked about some of these behaviours and the possibilities regarding the outcomes. They have been accused of "crying wolf" because, as luck would still have it, Australia has yet to experience a disaster in the domestic pipeline industry. The more these behaviours become normalised, the more likely is the occurrence of a high consequence event. The majors ought to listen to the wolves and take action lest the cry be one of, "I told you so".

It is time that the Boards of our pipeline organizations start to think more like the Australian bank boards have lately, that their purpose in life is to generate long term income for their shareholders, rather than chasing the means for the construction of vast empires. This and the removal of executive incentives to grow at any expense might re-direct minds to concentrate on the long-term value of the pipeline assets and the engine rooms that operate and maintain them rather than blindly saluting the short-termism that is vogue today. This would go a long way to meeting Australia's long-term national interests, the very theme behind the late Jim McDonald's Gorilla papers almost two decades ago.

It is also time that our Industry returned to the open and collaborative regime more reminiscent of the past, one where relationships are again at the centre of our business and where the attributes of respect, honesty and trust are again dominant. Contributions from across all facets of the Industry need to be valued and it needs to revert to being an Industry in which, putting individual personalities aside, all can make a reasonable and justified contribution as well as a living.

It is only with the Industry's collective wisdom that its continued existence can be assured along with boosted productivity, a continuing exemplary safety record, more clever innovation, elevated competency, excellent quality outcomes and broad community respect arising from a conscientious acknowledgment and a demonstrated alignment with the social licence generously afforded it.