ENVIRONMENTAL BUSINESS JOURNAL®
*Strategic Information for a Changing Industry*

Vol. XXXIII, Numbers 9/10, 2019 *REPRINT* - ***Natural Resource Management*** Environmental Business International Inc.

# ADVISIAN, THE NEW INDEPENDENT CONSULTING ARM OF WORLEY, IMPLEMENTS DIGITAL TRANSFORMATION STRATEGY

***Advisian Digital*** *is Worley's data science, software and technology business.* ***Worley*** *(North Sydney, Australia) is a global consulting, engineering, design, asset delivery and integrated services company focused on the energy, chemicals and resources sector. Worley is an organization with more than AU$12bn in annual revenue and over 62,000 people. The fields within which they operate cover verticals as diverse as delivering critical offshore wind infrastructure through supporting the sustainable efficient operations of a refinery to the provision of environmental services such as impact assessments and permitting right across the entire value chain.*

*Worley was formed in 2019 from the combination of what was WorleyParsons, and the energy, chemicals and resources business of Jacobs. The combined entity is roughly double the size of the contributing components, which were an unusually compatible operational and cultural fit for a merger of that size.*

*Laith Amin, SVP Digital. Laith Amin leads the Advisian Digital products and technology group for Worley globally, which delivers asset transformation by helping clients access unique, innovative and transformative digital products. Mr. Laith's broad cross-functional range of international experience includes support to asset owners across all areas of digital twinning and implementation of technology innovation.*

*Heather Stewart, Director Products and Technologies. Heather works within the Advisian Digital Products and Technology team, with a focus on products related to artificial intelligence and predictive analytics.*

*Mary Lou Lauria, VP Environment & Society. Dr. Lauria is an environmental consultant with 20+ years' experience in the delivery of community communications, impact assessments, permits and approvals, compliance and monitoring programs.*

**EBJ: Advisian is the independent consulting arm of the Worley Group. Could you provide some background?**

Advisian: We've always had technical and management consultants in the business. Individuals who don't deliver traditional engineering or project delivery services, but whose focus is on solving problems in new and innovative ways. These individuals would be involved in early phases of a project assisting with activities such as strategic decision making, technical, environmental, geotechnical and financial options analysis, etc. In some instances, these individuals joined us through acquisition while others were simply part of the base business. Until 2016, these individuals were essentially distributed through the organization, making it difficult to capitalize on each other's knowledge and expertise. Advisian was created to bring these creative, entrepreneurial, and very specialized skills together, enabling the community to better learn from each other and, ultimately, deliver better outcomes to our customers. This community is relatively small as compared to the rest of Worley, representing less than 10% of our people. Because their services are fundamentally different from Worley's traditional EPCM offering, it is unlikely Advisian would be incorporated back into Worley – with such a small group, we'd also be running the risk of losing that sense of community. Our Advisian business works hand in hand with the Worley group to provide those specialized skills across the lifecycle of a capital project – from its inception all the way to decommissioning.

**EBJ: Can you provide some background on Advisian Digital?**

Advisian: Advisian Digital was set up almost 5 years ago to support the appetite our customers had for better efficiency in delivering value from their new and existing assets. Initially, the focus was on all aspects of 'The Digital Twin,' a digital replica of the entity. And although 5 years on this is still core to what we do, nowadays our participation is much broader – incorporating a portfolio of unique and disruptive technologies that are more transformative than incremental improvement in nature, plus the breadth of 5 years of knowledge that comes from working with many customers on their digital implementation work.

As the introduction above alludes to, most of our work is in implementation of digital transformation. The value that we implement might be 3rd party provided software or relate to our own in-house developed IP, and it might be cloud based or installed on premise, but it always calls for a combination of deep engineering domain knowledge of the asset and its operations, with knowledge of data and technology environments. In many process plant type environments, implementing innovative products and processes carries additional risk, and mitigating this risk is one of the main reasons we are engaged to perform the work versus a pure tech or IT company offering.

Our Digital team is one of the most diverse in the entire company – we have people of all ages, genders, backgrounds and this was very intentional in relation to the way we wanted to set ourselves up to innovate. For instance, we have people with backgrounds in banking and commodities in addition to people with lifetime careers in environmental engineering, this is one of the key reasons that we have been able to develop so much unique IP relative to our peers.

**EBJ: How is the Environmental Industry being disrupted by technology?**

Advisian: Looking at our product portfolio and the sector percentage of our digital transformation consulting work, it is the case that a disproportionate volume of that total activity is focused on environment and safety science.

In safety we have used complex machine learning and data science to create algorithms that can produce human safety forecasts in industrial environments. We have been using this technology to dramatically reduce our own incident and injury frequency rates at our large construction projects, and we have also applied the technology from the cloud for operators across oil, gas and mining sectors. It augments and makes current HSE programs more effective, but ultimately enabling the ability to look forward (rather than back) is a powerful new way to avoid incidents. It is a step change from the way we used to do it.

In Australia, we also provide technology to regional municipalities that allows them to forecast flooding environments with an un-precedented level of detail and visual accuracy by combining large weather data with topographical surveying. It's a simple tool that 20 years ago would have needed a super-computer to deliver.

We also have a technology that can machine auto-detect and quantify fugitive methane and CO2 emissions, reducing or replacing the need for human surveys and allowing for near instant detection of leaks that can be more effectively prioritized for repair. This technology can dramatically reduce the GHG footprint of almost any asset that has process gas and while the technology is smart, its not that expensive these days.

Ultimately, tech disruption in the environmental industry is not limited by the availability of transformative tech anymore – not like in the past anyhow. Now, it is limited by the imagination of the industry participants and the willingness of asset owners to move beyond the status quo. In that sense, paradoxically, tech disruption enablement is an inherently human situation.

**EBJ: How do you think that the environmental industry will evolve over the next decade due to technology?**

Advisian: With cheaper and more plentiful sensing and data acquisition available, we will have more situational awareness which can be assessed and represented using increasingly capable analysis engines. This may be compared to other environmental quality indicators to detect correlation. One example of where we are working in this area is methane. At an asset level, we can get better data on methane releases using local sensors, sensors that cover local areas (e.g. mobile sensors on drones and vehicles), and wide area monitoring from planes and satellites. This data collection not only enables us to recognize where releases occur at the asset level, but presents an opportunity to bring a diverse number of datasets together to get a global view of methane releases across a broad area and detect operational factors, temporal factors, and impacts on overall air quality.

While data collection allows the industry to move into the space of newer and potentially more effective solutions, it also presents challenges around effective and accurate use. We collect a lot of data without the interpretation of what is good or poor performance as the criteria are conventionally regulatory driven. We need to do some work on guidance around how the data is shared, and useful meta-data is preserved along with the measurements.

The environmental industry needs to expand their role in this area to extend beyond impact prediction, monitoring, reclamation. We will need to integrate our broader learnings with asset plans and operational practices to derive empirically supported practice improvements. We see this becoming more of the focus in the next few years.

**EBJ: How does Advisian Digital use the following technologies and how do they complement your Environmental Division with such technologies:**

**- Artificial Intelligence:**

Our fugitive gas emissions detection platform FETCH4, and HSE forecasting tool SaltGrid both rely heavily on supervised machine learning models.

Forecasting techniques used by SaltGrid include ETS (Exponential Smoothing Models with Error, Trend and Seasonal), ARIMA (AutoRegressive Integrated Moving Average), TSLM (Time Series Linear Model), and Random Walk with Drift.

The FETCH4 platform includes an algorithm that predicts the mass emission rate quantification and location based on

Environmental Business Journal ® (ISSN 0145-8611) is published by Environmental Business International, Inc., 4452 Park Blvd., #306, San Diego, CA 92116.  To order a subscription, call 619-295-7685 ext. 15 or visit us online at ebionline.org/ebj. A corporate electronic subscription with internal reproduction license and access to data starts at $1,250 and allows up to five registered users with rates increasing in five user increments. Discounted corporate subscriptions are available for firms with under 100 employees and single-issue access, non-profit or individual subscriptions are $995.

Editor in Chief: **Grant Ferrier**
Federal Analyst: **Andrew Paterson**
Managing Editor: **Lyn Thwaites**
Research Manager: **Laura Carranza**
Client Services: **Moe Wittenborne, Helene Monkarsh**
Writers: **George Stubbs, Jim Hight**

data from multiple gas concentration observations. This algorithm uses a multi-sampled linear regression operation to produce predictions for each new emission 'case': the population of observations may consist of many thousands of 3D points in space along with corresponding observations. The algorithm repeatedly samples the population and makes multiple predictions. The overall distribution of these predictions is then used to make inferences about the emission as well as producing confidence calculations. The platform also includes technologies for the extraction of concentration data from video frame images collected from multi-spectral infra red cameras. This frame data is interpreted using an algorithm trained on semantic segmentation data through a VGG16 convolutional neural network.

**- Physical Automation:**

Another of our products, Assure, connects and makes interoperable / visible datasets that normally cannot work well together. For instance, we can combine the inspection reports of a survey crew with a geo-spatial map, then overlay financial and regulatory information into the same dashboard. Assure connections automate all this to make this a live view, completely replacing the whole reporting activity in favor of a real-time solution.

We have also effectively transformed the process of photo monitoring for animals / plant species to include machine recognition, which reduces cost dramatically.

**- Blockchain:**

We have a supply chain tool, Requis, which uses blockchain technology to track and record complex supply chains. Other than that, we have seen relatively few blockchain solutions produce something genuinely transformative that can cut through the hype factor associated with it.

**- Mental Augmentation:**

While Advisian Digital isn't involved in mental augmentation in the form of nootropics or neurostimulation, some of the projects we undertake fit within the realm of enhancing cognitive efficiency. One example of this is the work we have done in the augmented and virtual reality space. Applied during the design phase of a construction project, augmented reality can help teams recognize design flaws and potential future operational challenges before the plant or facility is constructed, reducing rework and improving safety.

**EBJ: Why is beneficial for clients to have an appropriate digital ecosystem? How does Advisian Digital help clients create digital ecosystems?**

Advisian: This is an extremely important element! Digital ecosystems are the equivalent of business strategy and tactics all rolled into one for the digital environment.

The eco system should play an important role in tying digital technologies into business process, and various technologies together so that they interoperate with each other to produce something more valuable than the sum of the disconnected parts would. Once you know that the portfolio must work together in this functional way, it gives you a unique sense of purpose for the technologies you select / adopt, making the whole effort much more strategic.

There are technologies that perform this important role and help create the interoperability environment. Our experience has shown that this is an essential element.

**EBJ: Please provide some trends on the following natural resources services on an industry level:**

**- Aquatic ecology**

There's plenty of activity in this space. Much of the work is related to habitat compensation, ambient monitoring/baseline type work. The level of diligence here is solid, and it doesn't tend to be susceptible to political influences as much as other areas are.

**- Biodiversity Action Plans**

Around the globe Biodiversity Action Plans and targets are being set by local and federal governments. These are outlining protection plans at a species and habitat scale. We are seeing more interest in protection at an ecosystem scale and more efforts in protection against invasive species which often out-complete native organisms. In Canada we are seeing more government bodies talk more in terms of biodiversity and how larger land owners can play a role in its protection

**- Dams & Power Projects**

South America is a busy place for us in this space right now. We are looking at a true integrated planning approach with our clients.

**- Ecological & Habitat Restoration**

Most of this has been motivated by compensation in the oil sands (in Canada) but some of that compensation can happen remote from the original impact. This means we may be restoring habitat in a different area than where the degradation occurred (e.g. restoring a wetland somewhere in Alberta outside of the oil sands, where habitat has been compromised).

**- Environmental Impact Assessments**

These are as important as ever. We are certainly seeing regulatory shifts around requirements here.

**- Endangered Species**

Focus continues to be here as much as it has been. We've seen assets being closed in due to the presence of endangered species.

**- Fisheries**

Changing regulations regarding fisheries protection and the habitats that act as spawning grounds for species of importance (commercially, Indigenous usage, recreationally and from a biodiversity interest). Species of interest to higher mammals in the food chain are also being afforded more protection. No net loss is the basis of the regulations with the need for habitat compensation and restoration where avoidance is not possible. The use of avoidance is becoming more critical in project decision-making. In Canada there has recently been a change to the Fisheries Act which now includes some 'standards and codes of practice' (SCOPs),

**- Forestry**

We are seeing more interest and need in the management of forests at a large scale from natural events such as wild fire. As our climate is changing the regularity of extreme events is increasing, thus cre-

ating the need for enhancing the existing management techniques implemented and looking for new ways to use technology to prevent destruction, particularly of old growth forests and the biodiverse ecosystem it creates.

**- Natural Resources Planning**

There is more of an integrated process happening, but we are also seeing activism get quite a bit stronger. This can be depolarizing in some instances, so there is more focus on communication and stakeholder engagement than there has been in the past.

**- Lakes and Rivers, Watershed Management, Water Resources Planning**

There's a climate change piece that cuts into this as well as through resource management which was not as prominent as in the past.

**- Marine Ecology**

With the continued exploration in the offshore environment and the use of the marine environment for the placement of floating structures (desalination plants for example) and wind farms we see the ever-increasing interest in marine ecology and its protection. In some areas we see the creation of marine national parks to ensure conservation. As offshore structures move into deeper waters we are seeing the emergence of new protected species and new habitats that were previously unknown. The interaction of underwater noise (from drilling, ships, piling, seismic) continues to be of interest and concern, with underwater noise guidelines emerging in some areas and ship speed being controlled to limit sound and marine mammal interactions (ECHO program from Port of Vancouver)

**- Mining Restoration**

Many more government related requirements than in the past. Mining is growing, but there is a much higher expectation of full recovery of the mined areas.

**- Mitigation Banking**

This system of credits and debits was created to ensure that ecological loss is compensated to arrive at no net loss – something we are seeing has much greater emphasis regarding new regulations. It is an area more often used in the US and one which is of interest to larger groups to ensure habitats are protected at a wider scale. There are several investment and Environment, Social and Governance opportunities for the creation of Mitigation Banks, particularly around wetland protection

**- Natural Resource Damage Assessments (NRDAs)**

These are often completed in the US and we are seeing their greater importance regarding impacts from spills and waste to assess the potential restoration and compensation efforts that may be required.

**- Natural Resource Economics**

We are seeing more value chain focus, including carbon intensity for products as well as some circular economy-type planning.

**- Wetlands**

There are several changes in regulations, which afford much more protection to wetlands and the species contained therein. We are seeing a more growing concern for their protection and the need for avoidance or compensation if wetlands are potentially lost to developments. The protection of wetlands is often associated with offsetting and the creation of new habitats.

**- Coastal Impact**

There has been an increase in sea level and storm level concern.

**EBJ: Who are your main clients and which industries do they operate in?**

## *Worley Doubles Down on Oil & Gas and Restructures Divisions*

In April 2019, **WorleyParsons** paid the consideration to complete the $3.2 billion acquisition of **Jacobs**' 31,000-person Energy, Chemicals and Resources (ECR) division. The new merged business is a pre-eminent global provider of professional project and asset services in energy, chemicals and resources employing 57,600 people across 51 countries. WorleyParsons' CEO Andrew Wood said: "This merger is about more than capacity and capability. It's about opportunity. The opportunity to become the partner of choice for our customers, the employer of choice for our people and to deliver enhanced returns for our shareholders." WorleyParsons has adopted 'Worley' as its new brand and the company name will be changed to Worley Limited. Worley's operating structure of four business units was announced in February 2019: Advisian, Energy and Chemical Services, Mining, Minerals & Metals Services and Major Projects and Integrated Solutions.

Josh Lahre of **AEC Advisors** told *Environment Analyst*: "This seems like an opportunity for Jacobs to divest of a business that was not valued as highly as its other practices (i.e. infrastructure / buildings and federal services), while Worley could strengthen its core and presumably reap the benefits as the price of oil continues to recover.... Jacobs had three major markets: (i) oil & gas/petrochemical (the Jacobs legacy business); (ii) federal services (at group level Jacobs has the 6th largest US federal services business); and (iii) infrastructure & buildings (a business sector we helped Jacobs enter a decade ago through a number of acquisitions); however, Jacobs felt the public markets were not fully "appreciating" this diversification, as the company's stock traded closer to the generally lower oil & gas firm valuations, vs. the higher valuation afforded to the government services firms and infrastructure engineering firms. Additionally, the oil & gas business has traditionally been a relatively lower profit margin practice, as well as inherently cyclical. These factors combined to create a situation where Jacobs' management decided to explore a potential divestiture of the oil & gas business to a buyer who would value it at a multiple of earnings that would be accretive to shareholders, and Worley was an ideal buyer in this regard."

EBJ speculates that it is possible Jacobs has embraced a more progressive posture, and divesting assets closely serving the oil & gas industry in order to appeal to ESG investors as well as its significant base of former CH2M Hill employees was a factor.

Advisian: Energy, chemicals and natural resources industries on a global basis mainly, with a significant contribution from local authorities, renewables and other large-scale industrials

**EBJ: Which industries are having increasing demand?**

Advisian: Gas and new energy (renewables) as part of the broader energy transition that is going on. Chemicals exhibits steady growth too. Certain areas of mining (lithium, copper) can be very vibrant in their own cycles too.

**EBJ: Advisian is working on Microalgae liquid fuels projects. Can you tell us more about that?**

Advisian: In the early 2000s, the research / venture capitalist community witnessed significant interest in biofuels derived from algae / micro-algae. The interest in algae / micro-algae production resulted from the recognition that there is significant cost to harvesting biomass production due to its highly dispersed nature. On this metric, algae-based technologies are attractive because they offer the prospect of much higher biomass productivities per area of marginal land. For certain types of algae production, the CAPEX cost and feedstock costs are also very low.

The use of high rate algal ponds (HRAP) in open raceways emerged as the most versatile and cost-effective solution and is largely recognized as a value adding solution for waste-water treatment. The limitation of this approach is that the scale of waste water supply is 'comparatively' limited. When the algae feed is required to "clean", then the cost of production escalates commensurately.

In 2017, we supported the U.S DoE (via. PanPacfic International Limited) with the assessment as to whether micro-algae technology is still a potential commercial pathway worthy of further exploration. The conclusion was, "Yes, the pathway still has opportunities. Like all biomass pathways there are challenges to be overcome, but when some fundamentals are so favorable, persistence with advancing the technology still has merit". □