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BUILDING THE CAPABILITY OF PROJECT PROFESSIONALS

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INTERNATIONAL CENTRE FOR COMPLEX PROJECT MANAGEMENT

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PROJECT ANALYTICS: TURNING DATA INTO INSIGHTS

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Introduction

Analytics is predominantly used to understand meaningful patterns, determine trends and draw conclusions to make decisions. Traditionally, analytics was used to assess data from machines, business functions and data produced by humans. More recently, access to affordable modern technology, high-performance computing and flexible cloud technologies has resulted in large volumes of data being generated. Such quantities are further compounded by the variety of data sources and the convergence and pace at which such data is integrated on a daily basis. In 2020 for example, the amount of data created, captured, copied and consumed globally was estimated at 64.2 zettabytes[1], with projections that this will grow to more than 180 zettabytes by 2025.

This paper will explore data analytics within complex projects and operating environments. The article commences by introducing the concept of Digital Transformation (DX) as a change agent, prior to contextualising the role analytics plays in providing valuable insights. Using a case study from the car rental industry, the authors from Xynoptik demonstrate how project analytics was successfully applied in the project planning phase to provide critical insights for future project delivery. The paper concludes by providing two key considerations on how project practitioners and leaders can utilise project analytics to inform their decisions in delivering complex projects and DX programs.

1 A zettabyte is a measure of storage capacity One Zettabyte is equal to approximately a thousand Exabytes, a billion Terabytes, or a trillion Gigabytes.

The Digital Transformation (DX) Journey

It is often stated that the origin of DX began in the 1940s with the conversion of analog technology into digital formats. Coined 'digitisation', this transformation largely occurred until the early 2010s, where manual and analog records were largely converted into digital format. Over the last decade, the concept of DX has been understood differently across industry sectors and within the varying levels and functions of an organisation. From one view, DX was seen to be centred around the adoption of new technologies. From an alternate perspective, DX was considered a transient phenomenon addressing specific issues within a particular industry sector. In other cases, DX was targeted to siloed initiatives focused on introducing new technologies to a particular customer segment. Considering these diverse and inexact perspectives, it is unsurprising that over 70% of DX initiatives are unsuccessfully implemented. Irrespective of the view taken, a critical element applicable to all DX projects is the requirement to seamlessly integrate and align the functions of technology, data, processes and people.

To date, digital technologies have continued to rapidly emerge and evolve to the extent that everything we do relies on an element of technology, connectivity and automation. As organisations and individuals continually embrace the new paradigms emanating from the 4th Industrial Revolution (Industry 4.0), the exploration and decisive use of advanced technologies such as the Internet of Things (IoT), augmented reality, digital twins and artificial intelligence/machine learning (AI/ML) have gained popularity. Such capabilities, when deployed successfully, provide organisations with the advantage to accelerate innovation and solve problems in a unique[2], efficient and scalable manner. Despite growing investment and transition to using such technologies, they all have a core reliance on data. This is where data analytics plays a critical role in informed decision making.

2 Recent examples include the various disruptions that have occurred globally: social media disrupting the media sector; streaming services disrupting the entertainment industry; and smartphones largely replacing landlines etc.

Analytics in the Era of Big Data

Data analytics is the process of collecting and analysing large volumes of data to identify trends, patterns and correlations. Its application is vast and cuts across numerous fields, industry sectors, functional roles, organisational tiers and business units. Every interaction with technology, whether active or passive, contains data sets that are either quantitative or qualitative. If captured, stored, governed and analysed appropriately within a particular context or environment, these data points can provide valuable insights. Consequently, this makes data a valuable strategic asset that organisations can leverage to:

- ***Acquire in-depth insights,*** including discovering hidden opportunities such as trends, patterns and behavioural preferences. Such insights could be used to determine root causes, inform design solutions and establish focused strategies underpinned with effective storytelling and communication campaigns. Elements such as 'feedback loops' play an essential role in informing such insights and accommodating emergence as internal and external factors change.
- ***Undertake faster, more accurate decision making,*** through the ability to rapidly integrate and analyse large data sets containing both historical information and live data instantaneously. Such capabilities provide a high degree of confidence as decisions are made using factual information, rather than solely through personal judgement and emotions. Further such decisions can be independently verified to ensure that representational faithfulness and neutrality is maintained.
- ***Visualise information***, in order to provide the right information in a digestible and timely manner, whilst providing flexibility and agility to undertake a deeper analysis of underlying data sets if required. Further, visualisation provides the opportunity to enable data to be organised in a meaningful way that enables the end user to acquire a holistic enterprise view.

Within the context of complex projects, analytics helps project practitioners better understand and respond to the project's environment. Project analytics, the ability to extract intelligence out of project data, provides opportunities to identify and assess risks, determine impacts of internal and external forces, test assumptions and facilitate conducive responses to uncertainty through scenario modelling, simulations and cause-effect recourse. In a nutshell, it offers project practitioners the ability to apply statistical models across multiple lenses and settings to enable precise decision making.

Case Study: Application of Data Analytics in the Car Rental Sector

Industry Context

The car rental sector has traditionally operated within a challenging landscape driven by highly competitive pricing, unpredictable consumerism and an ecosystem that is dynamic, multi-layered and interconnected. With the introduction of new peer-to-peer car sharing entrants, the industry is being forced to navigate through an increasingly complex and challenging market landscape. At the micro level, aspects such as operational efficiency, new vehicle procurement, modern software systems, discounting structures and fleet maintenance are internal elements deemed controllable to some extent. At the macro level, factors such as oil prices, vehicle brand reputation and pandemics are classified as external and uncontrollable. In the case of COVID-19 as an example, the lack of a steady customer base led to car leases being relinquished and procurements cancelled. Whilst some normality has returned, the industry is now facing unintended consequences of raw material shortages, vehicle production backlog and legacy policy decisions made during the crisis.

Project Complexity

This case study draws upon supporting a franchisee within the car rental sector to undertake a DX program to facilitate post-pandemic recovery. The case study demonstrates how project analytics was successfully used in the preliminary phase of the project to reduce complexity and provide data-driven insights to inform the most suitable implementation strategy for future DX phases. Drawing upon Remington and Pollack's model of diagnosing project complexity, Figure 1 reflects the complexity that existed within the project:

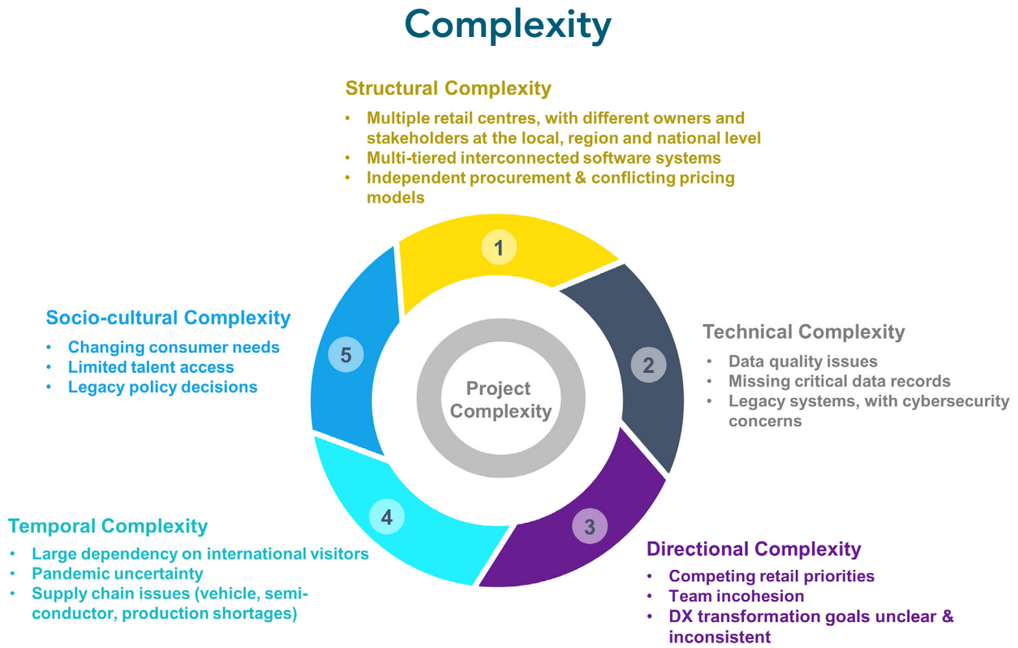

Figure 1: Diagnosis of Project Complexity

Project Analytics

To overcome the complexity identified, a multi-disciplinary project analytics approach was undertaken covering the following: Descriptive Analytics, Predictive Analytics and Prescriptive Analytics.

Descriptive Analytics

The first level of analytics was undertaken to answer the question, **'what has happened to date?'.** Using operational data across a three-year period, the main focus of this activity was to assess current and historical data from various lenses to identify trends, draw comparisons and establish changes that may have occurred. Within this activity, four supplementary analytics were undertaken:

- ***Time Series Analysis:*** Aimed at determining trends and irregular cyclic patterns that may have occurred. This analysis also considered any seasonality impacts that may have caused demand fluctuations.
- ***Factor Analysis.*** Deployed as a technique to reduce a large number of variables into smaller manageable factors. The focus was to assess each pricing model against revenue earned, with a deep study undertaken to determine the correlation between various factors such as discounts, total gross rent, total vehicles and vehicle mileage against pricing. For instance, the discounts provided to certain rental contracts were found to have a high correlation to specific locations and against particular brands.
- ***Cohort Analysis.*** Used to dissect a common dataset into related groups for analysis. This analysis was performed for two reasons: (1) to understand the impact of vehicle brands, models and engine capacity on utilisation and revenue (*Brand Analysis*); and (2) to establish the trends and impact of location on revenue and rental types of daily or monthly rentals (*Location-based Analysis*).
- ***Cluster Analysis.*** This was undertaken as an exploratory technique to identify structures within a dataset for the purpose of sorting different data points into groups or clusters. In this instance, cluster analysis was deployed on the two rental types (daily vs monthly) in order to determine revenue / loss impacts on locations, brands and trends over time.

> Project practitioners have an opportunity to use project analytics as a key enabler to extract intelligence in support of addressing project complexity.

Predictive Analytics

This level of analytics was undertaken to answer the question, **'what may happen in the future?'**. In this analysis, purpose-built Machine Learning algorithms were deployed to predict future forecasting and to enable scenario-based simulations. The algorithms were developed using historical data patterns and trends and then applied to forecast possible future outcomes and the likelihood of those events occurring.

In particular, this analysis was used to narrow the gap between future vehicle supply and demand and to predict future seasonality expectations. Predictive modelling was also used to determine the varying supply and demand of vehicles by location throughout the year to inform the timely allocation of vehicles in response to fulfilling demand requirements at busier stations.

Prescriptive Analytics

Prescriptive analysis was undertaken to answer the question, **'what should we do next?'**. Based on the information acquired from the descriptive and predictive analytics, a comprehensive analysis was prepared that included key recommendations from a structural, management, operations and procurement perspective. Key recommendations provided for prioritisation as part of the next phase of the DX project included:

- ***Predictive Maintenance:*** Initiating dedicated ML models to improve customer satisfaction (by avoiding sudden breakdowns of the rented vehicles) and to minimise fleet downtime. Data for the ML models is to be acquired through wireless sensors installed within the vehicles. Using sensor data, the ML models would predict the wear and tear of various assemblies within the vehicle in advance, thus making preventive maintenance possible.
- ***Strategic Procurements:*** Undertaking a focussed strategy to conduct annual vehicle procurements based on market trends, customers requirements and return on investment. This would provide a comprehensive investment guide with a predictive reference to approach each asset as revenue-generating tool. In addition, the key data insights would inform enterprise-wide negotiations with vehicle suppliers.
- ***Policy and Compliance:*** Policy gaps identified ranged from misuse of discounts to using incorrect pricing for luxury models. With evidence of possible misuse of assets, process automation opportunities were recommended to address the policy and non-compliance gaps identified.
- ***Focussed Marketing.*** Opportunities were identified to apply AI/ML to enable targeted pricing and discount offering based on seasonality, social media sentiment and automated price matching.

Key Considerations for Project Practitioners

This article discussed Digital Transformation (DX) as a mechanism of responding to change, building capability and delivering valuable outcomes. At Xynoptik, we believe the core goal of DX is to change the fundamental ways an organisation operates in order to provide a distinct benefit and advantage. It's not simply about automating or digitising processes – it's about capitalising on the use of technology to fundamentally rethink, strategise and establish coherence across all levels of the organisation. This is particularly important due to the requirement for DX projects to seamlessly integrate and align the functions of technology, data, processes and people.

As seen in the car rental case study, project practitioners have an opportunity to use project analytics as a key enabler to extract intelligence in support of addressing project complexity. Such capabilities also enable assumption testing to occur and facilitate the development of scenario modelling, simulations and cause-effect recourse to address project uncertainty. In addition, it enables framing a problem from different data perspectives in order to ascertain assumptions, beliefs and biases.

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