Business Intelligence through the Application of Data Analytics and Systems Engineering Principles with focus on Project Success [1, 2]

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On a project nothing happens in isolation and all individual "parts" form the whole which is the project. if a project is less successful, it is important to understand the dependencies and interdependencies that may have influenced the outcome of the project. To put more context to this, one needs to look at another complimentary discipline that can be applied in understanding the dynamics of a project. This concept is *Systems Engineering* (SE), and it has a key role to play in the world of project management. Van Gemert states that the project manager and SE adopts a system approach and identify interdependencies and interconnectedness of a project, including pre-planned improvements [1]. Systems engineering (SE) is defined as an interdisciplinary approach and focuses on project success. SE unpacks the user requirements specifications (URS) early in the project life cycle. The SE takes both business and technical needs into consideration to meet customer expectations [2].

It is stated that that SE and project management are closely linked. It is argued that SE management applies common project management principles and indicated aspects such as a work breakdown structure as well as a SE management plan. It is argued that a SE should apply science and technology, technical planning, management and leadership skills and abilities [3].

The second component is data analytics. Data analytics is the process of analyzing data sets to form a conclusion of the information it contains. Data analytics refers to various applications, from business intelligence, on-line reporting as well as different forms of advance analytics [4]. It is stated that both data analytics and data analysis are applied to uncover patterns, trends, and any other anomalies within data. By doing this, it provides the intelligence business needs to make informed decisions. It is stated that data analysis looks at the past whilst data analytics tends to predict the future [5].

The question can now be asked, what is the difference between data analysis and data analytics? Is there a correlation between the two terminologies and what is the relationship? Analytics *per se* is defined as a process that is applied to transform data

[1] This article is based on a presentation by the author during the Project Management South Africa (PMSA) 2021 National Project Management Conference held virtually in November 2021, for which the PMWJ was a media partner. To learn more about PMSA and their events, visit https://www.projectmanagement.org.za/. For more on the subject of this article, see the author's profile at the end of this article and contact him directly.

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into actions through analysis and insight in the context of an organisational decision-making process and problem-solving methodologies [6]. Four different types of analytics are identified, and the question is asked whether there are any relationships amongst these types of analytics. These types of analytics use data to answer different questions and provide answers to those specific analytics [7].

Each of the analytics has a specific role to play in the successful outcome of a project.

- **Descriptive analytics:** refers to the analysis of the real situation without linking it to any data points.
- **Diagnostic analytics:** in this step trends, dependencies and interdependencies are recognised in the data.
- **Predictive analytics:** during this step the identified trends are projected into the future.
- **Prescriptive analytics:** during this step recommendations are made that are based on the trends to achieve the expected successful outcomes.

The best analogy to demonstrate this is a soccer ball. A soccer ball consists of perfectly designed and manufactured pentagons that are put together to form a perfect round soccer ball. If any of the pentagons are not manufactured to the specified requirements, it is no longer a soccer ball, and the trajectory of the ball is unpredictable. In project management it is the same principle as there are dependencies and interdependencies that need to be successfully concluded to have a 95% level of confidence that the project will be a success.

What if something is not going according to plan? Where does one start and what can be done to prevent the project from completely going of the rails. What are the options to minimise the impact? A potential solution is in the application of a data analytics value chain. Figure 1 depicts such value chain.

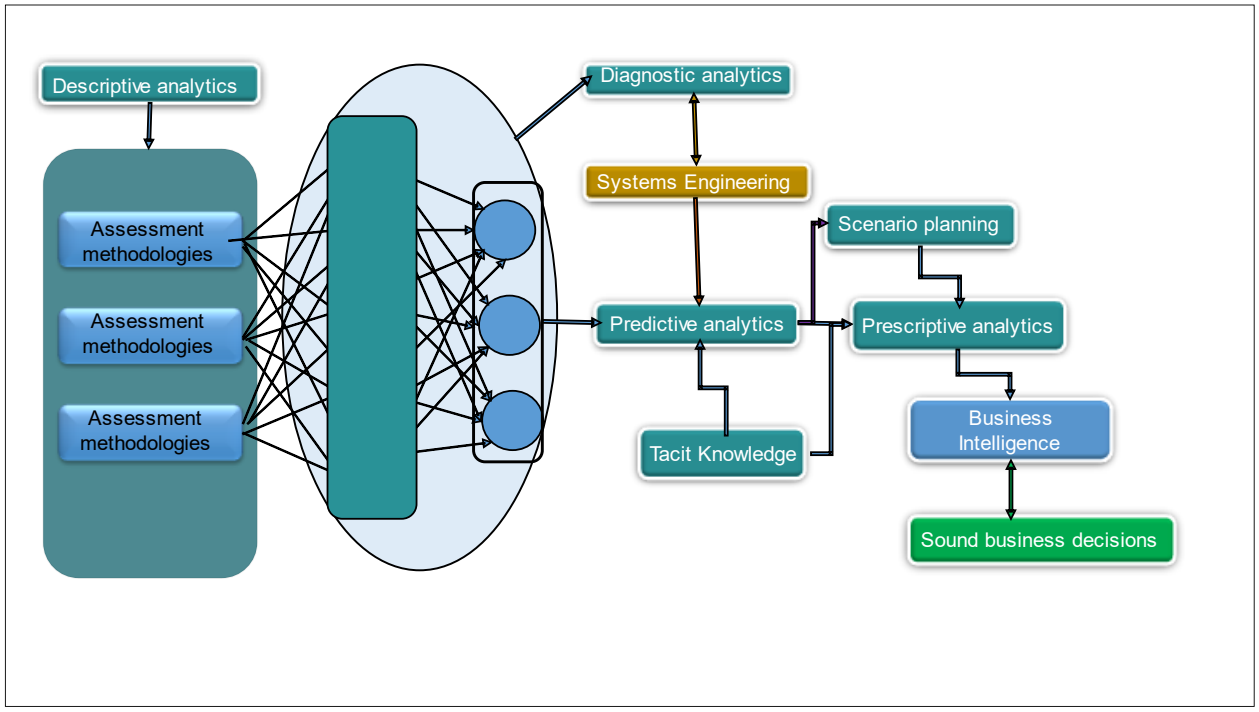

Figure 1. Data analytics value chain.

From Figure 1 includes aspects such as tacit knowledge and scenario planning. Tacit knowledge is regarded as undocumented knowledge (experience). It is believed that as much as 70% of essential knowledge is undocumented. It is also defined as intuitive knowledge and know-how, which is rooted in context experience, practice, and values. Tacit knowledge has the benefit that it is the best source of long-term competitive advantages and innovation [7].

The contribution of tacit knowledge in project management is one of the key principles of successful projects as it is based on the experience of individuals who gained that experience over a long period of time. Scenario planning is a process where the uncertainty of the future is modelled in what might happen and what can be expected, and then mitigating plans developed to reduce the risks and impacts in the various scenarios. This a supportive methodology in business decision making.

If the data analytics value chain is applied in project management it will enhance an organisation's capability of decision-making and enable the project management community to resolve challenges at the origin of the problem, instead of simply addressing the symptoms of the problem. The outcome of the various analysis processes can be captured in a knowledge management repository to guide future projects through the life cycle to identify potential challenges in time and plan around it. By applying the concept of the analytics value chain, the likelihood of project success is high, and the risk of time and budget overrun is reduced.

In summary, it becomes evident that the integration of the assessment methodologies, data analytics and systems engineering principles may lead to a higher degree of Business Intelligence, resulting in informed business decisions to support the strategic and tactical drive of a project organisation. It is not a once off exercise but a continuous process that will contribute to continuous improvement in the project management domain.

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NOTE

References were limited to the discussion in the article.

About the Author

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Danie du Plooy is a senior consultant with Eskom in South Africa and currently Head of the National Project Management Office. He is responsible for the assessment of projects during the front-end planning phases (CRA-ERA) as well as assessing projects during the execution phase. These assessments are conducted by using evaluation tools from the Construction Industry Institute. He has a wealth of experience and expertise in a number of areas including project management, project assessment practices and data analytics, to name but a few.

Danie's career achievements are far reaching and within Eskom alone he has been key to the development of a KM concept, the Project Definition Rating Assessment, the PKHI assessment model as well the introduction of project excellence within the project management fraternity. His professional contributions include the design and development of project management courses, the delivery of papers at local and international conferences including the WANO Conference in Wales, and his registration with professional associations PMSA and SAIChE.

Danie holds a Masters' degree in Technology (cum laude), a MSc Eng Business Management from the University of Warwick and is currently completing his PhD in Project Management. He can be contacted at Danie.duplooy4@gmail.com