**Data integration report by Maz**

Nowadays, contactless payment methods are at the wave of our hands, with watches giving us a notification from our bank that a payment has been made from our account by the time we put our hands in our pockets. This is an example of data filtering through in real-time to execute output and the final outcome, all done by data integration.

Data can be refined or filtered during the relevant integration of data. Data integration is the process of consolidating different data sources into a dataset which is single and unified, with the main aim of users being provided with access which is consistent and that delivers data over a range of subjects along with structure types, meeting the data requirements across every application and processes of the business.

Another situation where data has been filtered to underpin a business objective is: how when almost any website retail shopping website uses features such as optional cookies or access only after registration.

This can lead to not only initially checking your user agent ID fingerprint of mainly the non-functional requirements of your device. This will commence from filtering data to display the correct format for your device's screen along with time zone and optional language to cater, along with optionally directing you to download the company's app. Once you accept the company's terms and conditions, is where your buyer’s journey profile begins with fine-tuned algorithms based on data-oriented decisions that give the buyer a better choice along with increased sales for the company and stakeholders. These decisions are based on fetching information from databases based on the historical behaviour of the uses, demographics and metrics, which may include giving recommendations and offers based on this data. The saving of cost compared to a brick-and-mortar store and the potential of a wider multi-national customer base have changed organisation's views of data since the dot com bubble, including in the world of data giving rise to a polyglot persistence of not always using traditional methods and adapting to changes. However, as times change, it seems companies and legislation are now protecting customers' data rights by giving options to opt-out along with web browsers such as Brave browser paying users if they opt-in to view ads instead of blocking. At the same time, in the world of finance, recognising not only customers' data to help them make a decision but the same data to protect them against fraud. Organisations recognise suspicious behaviour based on algorithms and newer technology, now have several layers of authentication, keep them ahead in the cat-and-mouse game with scammers, who will carry on spoofing.

Functional necessities are what a product must do, including its features and how it functions. Functional requirements are first distinguished and analysed using various models, such as activity diagrams, process maps, business data models, state diagrams, ETL maps, dimension models, etc.) using system analysis and business techniques. However,

Non-functional requirements describe how the general properties of a system, also known as quality attributes or what some may call “ilities” as a collective term, which may include attributes of functions such as speed, efficiency and costs. If a system cannot fulfil just one vital non-functional requirement (could be linked to availability, capacity, speed, security, scalability and time etc.), then there is a potential risk that the system will get outdated or not deliver in the current fast-paced digital era.

A data integration policy is a strategy of data integration that looks at an organization’s types of data, along with the use cases for integration and addressing pain points, that are the best solutions for data integration across applications and platforms. A good data management policy assists in minimising potential errors by processes established and usage of policies for building trust in data being used across your organization to make decisions. The reliability of up-to-date real-time data can make companies respond more competently to customer needs and market changes.

The ISO/IEC 25000 standards framework outlines non-functional requirements by way of system quality and software quality requirements. Having the best practices follow certain recognised industry standards is a good way to keep an organisation running like a tight ship.

Integration can still have issues arising from Policy issues such as; Pricing, support for the legislation, policy consistency drivers and priorities based on CSR(company social responsibility) and sustainable development.

Additionally, legal issues range from the copyright and intellectual property rights to cross-border data access and privacy policies, restrictions, frameworks, and the definition of rights and responsibilities. Furthermore, social issues with diversity amongst stakeholders, cultural issues, along with poor capacity-building activities

Another way is using or creating your analytical tools to monitor.

* A dashboard is a visualization, typically a high-level summary view of the data on a single page, that may be collated from various reports and different sources, giving an overall indication of the situation ‘At A Glance’, without going into detail, whereas an online dashboard may provide underlying data.
* A dynamic chart is linked to a data feed update triggered by a timed frequency or change in conditions of the feed, showing a real-time current status or a rolling average.  A common use in the IT field is displaying key servers and network links status colour coded in highlighting problems that could potentially arise.  A further example is how call centres show metrics important to the minute-by-minute management of the centre, breaking down the number of live agents in calls, compared to other stats such as those in the wrap-up, waiting for calls, logged off, current call volumes, callers in queue / on hold, then other figures such as mean, mode and median relating to different variables.
* A data dashboard is a tool an organization uses to not only track but analyse and then display data, such as visualizing particular key performance indicators (KPIs) to give an insight into the organization's well-being, department, or specific process or goal. Dashboards are about infographics and data visualization. They quickly help users overview performance metrics, notice positive or negative trends, and measure efficiencies.
* A scorecard is a dashboard form comparing actual values to a predicted or value target.  An example is a company achieving all its output targets but not achieving the desired outcome. Measuring outputs alone, without measuring outcomes, can produce the “watermelon effect” this is where reports and dashboards are showing green, but when you delve deeper, reports on the achievements of your outcomes are all red, so something might not be right such as customer satisfaction. This quickly draws the reader's attention to those areas most in need of attention.
* A data quality scorecard is a set of aggregate scores assisting in making sense of various error reports made during the course of a data quality assessment to further enable data quality improvement.
* A data governance scorecard is a compilation of agreed-upon baseline and metrics reported on a stipulated frequency to the data governance program sponsor and any stakeholders.

You can build your own balanced scorecard by identifying your strategic objectives in each industry perspective of learning and growth, internal processes of business, customers and finances, then create a strategy map and outline the measures.

The rationale for integrating data from multiple sources into one coherent form is for analysis. Additionally, several sources of data sources help keep up to date on current trends, identifying behaviours of buyers; and their buying journey to accelerate sales. Also, multiple data sourcing provides unprecedented insights about the buyer and their buying journey. Integration is a strategic investment, as a connected business is a smart business, enabling a rounded view of your customer, data, and the health of your organization, creating a better experience for the customer and improving internal workflow. The statistics and plain facts of business during business operations are data to measure/record/audit business activities of a wide range internally and externally. Although it might not be very informative, it is the basis for reporting and is vital in business.

Data supports companies in forecasting trends, identifying opportunities and staying ahead of their competitors by providing insights into the behaviour of consumers. Along with market conditions before they actually happen. For businesses to grow and prosper, data is essential. Business objectives which might be better understood by filtering data to improve overall customer satisfaction could be: reducing costs by identifying staff absence records to give support or take necessary action. Another way is by identifying underperforming product lines along with business units and then taking appropriate action on how to make them increase future company and stakeholder revenue.  
Increase sales by comparing high-performing regions with low.

There are various Data integration techniques, such as:

* Application Based Integration is the process involving when: software applications locate then, retrieve and integrate data by creating data from various sources and systems compatible with one another.
* Middleware Data Integration is a data integration technique involving the where middleware application would act as a go-between, where data would be moved between source systems to the central data repository.
* Cloud data integration was migrating along with modernizing data workloads in the public cloud with an architecture that spans across on-premises and on one or more cloud ecosystems (hybrid/multi-cloud), enabling optimal cloud resource usage.
* Operational data integration that supports transactional or operational data integration use cases which may include master data management (MDM), synchronizing data related to critical business processes, inter-enterprise data acquisition and sharing B2B data sharing, along with supporting data governance initiatives.
* Manual Integration, which is also known as Common User Interface, is the process of when a person is manually combining, filtering and summarising data from various systems. A common example could be your mobile phone's telephone contact list in the form of a CSV file compatible with loading them into a spreadsheet program such as Microsoft. Excel or desktop database such as Access, where you can then use lookups along with formulas processing data for visualisation to be recognised to be read by a device which could be even voice-controlled, as the possibilities could be endless based data.
* Virtual Integration which is also known as Uniform Data Access, basically leaves data in a source system and defines a set which can provide a unified view to various customers across a platform, where a separate store is not required for the consolidated data under this technique. Virtual data integration technique uses the source system’s direct links by ‘canned queries or views connected through an API (Application Programming Interface) or database links to obtain data analysis when required.  This is advantageous as your looking a real-time data instead of keeping being sent up-to-date copies.  The disadvantages of not seeing historic data, in comparison, may lead to extra requirements of resources.  This can also lead to possible scenarios when systems are designed for small and microtransactions, along with prediction and future forecasting but are unable to see black swan events causing an unforeseen event such as a major crash. Communication channels are a way this data is transferred.
* Physical Data Integration which is also known as Common Data Storage with ETL, stands for extract, transform, load; and these three steps are expended to blend data from various sources, which is often in building a data warehouse. ETL is the physical data integration of datasets being taken from source systems and moved to a specific analysis or reporting platform, which is often a data mart or data warehouse.
* The extract phase includes copying the data from the system's source and then put in a staging area, where the data can be filtered in a phase of new data, as the previous extract as previous data target platform they may already be on.
* Then transform phase makes it more suitable for reporting of the data that needs to be manipulated, which involves denormalization, creating summary values and data conversions. (An example would be Elon Musk allowing Twitter to only accept dogecoin cryptocurrency as its only value, resulting in all other currencies being covered or transformed)
* The load phase is when the dataset moves to an analysis or reporting platform, which could be database tables, a spreadsheet, or even an OLAP (Online Application Processing) cube, which will often involve creating objects such as indexes and materialized views to support queries used in reports.

All the various methods of techniques, just like their industry standard tools, have a purpose and use. However, open questions remain on algorithms and the complexity of processing data depending on the structure of the data with mutually inconsistent sources to learn rules that allow for automatically mapping data items in different sources in real-time of a real-world object that possibly machine learning of artificial intelligence to create a tamper-proof bridging software program on the blockchain setting the standard as an open-source self-service or commercial.

Further discussion could be put forward for the advantages and benefits of mixed methods as Fielding (2012) mentions; “Integration is really the heart of the whole mixed methods exercise because the purpose of mixing methods is to get information from multiple sources and so the issues in bringing together the information are crucial” (p. 127).