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**Revolutionizing Digital
Transformation by Making
It Data Driven.**

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Revolutionizing Digital Transformation by Making It Data Driven.

With each passing day, another company reports that their Digital Transformation (DX) program has not met its goals. The main reason for this is that companies are launching DX Programs with the goal of improving the business value and efficiency of front office and back office applications, however the critical success factors to attain this goal are not well understood. This paper will describe why and how successful DX programs are data driven.

What Is Digital Transformation (DX)?

The best way to define DX is to start with its goal – that is to say, its business value. Let's take the well-known goal of every modern business enterprise:

Business Goal:

Continuously improve and maximize the effectiveness and efficiency of people, process, and technology

This is what is commonly referred to as “constant improvement” – the general business requirement to continuously improve speed to market, business agility, and reduce development and operational costs. All of this is of course extremely broad and not a new goal of businesses – so what does DX introduce that is different that enables this goal?

It is “how” the business goal is achieved. In looking at the definition of digitalization, it starts to define a new paradigm for transforming the enterprise:

Digitalization:

Enabling, improving and/or transforming business operations, business functions, business processes, and activities by leveraging and expanding digital technologies

This definition is of course very generic without enough meat in it to help truly understand the concept of DX and certainly not how to execute such as program; and, it's where many begin to go off track as they immediately start to imagine an action plan that includes rewriting

existing legacy applications or replacing manual processes with new digital applications.

These are fine goals and they will bear some business value, but will these actions truly differentiate your business from others? There is something missing here that enables more business value to be gained from DX programs that differentiate businesses. So what's missing?

The Data:

The major success factor for a DX program

Why is this? Modern business enterprises use their data to gain maximum insight enabling more informed, intelligent, timely, and effective business actions – this is the most crucial measurement of success in all DX programs.

Start With The Data – Your DX Program Depends On It

When you start with the data, a clearer definition for DX arises:

Data Driven DX:

Rapidly accelerate the effectiveness and efficiency of people, process, and technology through using new and improved sources of data that increase business insight that inform more effective business actions

This definition recognizes that more intelligent business action is the real goal. In this paper, we will discuss in depth the kinds of business actions that are improved with insight – from application design to product management.

Data is the driver of people, process, and technology in digitally transforming your business enterprise to become more effective and efficient. A company's data is its most valuable and important business asset. Maximizing this value is crucial in differentiating companies from their competitors. Missing this is where many make their first error – and it's a critical one.

The pathology of this error is rooted in the belief that DX programs need to start with their existing applications and how they are designed, especially the user interface (UI). DX programs need to start with the data and not the application UI as data should drive application design not the other way around. UI improvements delivering a “OMNI channel” consistency across your mobile and web applications is a good goal, but on its own, it is not likely to differentiate your business. Successful DX programs maximize insight into data to drive UI design and more importantly the content of the application to make it more relevant and powerful which is where true business value is attained. Using data effectively in UI and application design is what will differentiate your company supplying the return on investment for the DX program your business desires and requires. Positioning data in the forefront of DX programs where it can drive people, process, and technology transformation activities is the key to program success.

Data Traces to All DX Program Success

Increased insight into data drives tangible business value, because it accelerates and enables the business goals across all aspects of the business enterprise such as:

Systems of Engagement

applications that operationally display your data to users

- **Example:** A customer facing product website for retail, banking, or insurance
- **Example:** A partner, employee, or vendor facing portal for any industry
- **DX Goal:** to Improve User Experience
 - Resultant Business Value: Increased Brand Loyalty & Sales

Systems of Record

applications that operationally maintain your data

- **Example:** An enrollment system for insurance
- **Example:** A provider system for healthcare
- **DX Goal:** to Improve Transactional Throughput And Accuracy
 - Resultant Business Value: Lower Cost Operation

Systems of Insight

applications that create and visualize analytical data

- **Example:** A clinical measures creation application for healthcare
- **Example:** A dashboard displaying KPI's for any industry
- **DX Goal:** to Improve Insight And Business Knowledge
 - Resultant Business Value: More Informed Business Actions and Decisions

It is crucial for DX programs not to lose sight of the ultimate business value that results from any particular activity in the program. Establish what are the business wins and inventory them.

Things like improving – in a measurable way – brand loyalty, customer engagement, customer satisfaction, product management, risk management, and pricing accuracy are examples of business wins you should be expecting to get from your DX program.

Of equal importance is having every requirement of the program showing clear traceability back to tangible business value with metrics on what constitutes meeting the requirement. What success is for all business goals needs to be measurable. Many large programs in companies miss this very obvious and basic tenet, leading to the success or failure of the program occurring by chance. This traceability needs to go all the way to the data. For example, increasing customer engagement is based on enriching your data to enhance its meaning. The more meaning you have, the more understanding you have. The more understanding you have, the more knowledge you have. And the more knowledge you have, the more insight you have. This insight then can drive the publishing of what content a customer will find pleasing. Each and every desired and required improvement in people, process, and technology is rooted and can be traced back to some level of improvement in the underlying data. With this traceability established, you can start with the data and allow it to drive your DX program.

How Data Drives DX Program Success

We've established that Data Driven DX at its core enables key business value of the program by improving systems of engagement, systems of record, and systems of insight capabilities in a differentiating way, but

how does data impact all aspects of the enterprise? To answer this, question, we must first examine two key dimensions of data:

Breadth:

expansiveness of data sources and types of data

Usability:

quality, integration, harmonization, curation, enrichment, and rendering of data

What do these dimensions boil down to? To maximize the business value of data within an enterprise, it should be as high quality as possible, easily used, and as broad as possible. Let's link these dimensions to the examples listed above to show how data enables the business value required:

Systems of Engagement DX Goal

To Improve User Experience

- How Data Enables This Goal: increased data breadth increases insight into what content is relevant to an individual

Systems of Record DX Goal

To Improve Transactional Throughput

- How Data Enables This Goal: high quality and integrated data increases system performance and lessens errors

Systems of Insight DX Goal

To Improve Business Insight And Knowledge

- How Data Enables This Goal: increased data breadth and richness increases insight by improving predictive model accuracy and lessens false positives

How A Data Driven DX Program Increases Data Breadth

Data breadth is necessary to attain the business value and goals of a DX program by improving systems of engagement, systems of record, and systems of insight capabilities in a differentiating way. In fact, data expansiveness is the most important aspect of successful DX program. The next obvious question is; how do you increase your data breadth for business value?

Ingesting new sources of data into the enterprise will exponentially increase the data points that you can use to improve your predictive models. This brings substantial business value to the business operation both in front office systems of engagement by improving user experience and back office systems of insight by improving business actions in areas such as risk management, pricing, and product management. Do you think you have all the data you need? Not likely! Examples of the kinds of data that help businesses gain this value are:

- **Taxonomical**
(Categorization and Stratification)
- **Sentimental**
(Surveys, Reviews, Comments)
- **Behavioral**
(Web Activity)
- **Ethnographical**
(Cultural)
- **Contextual**
(IoT, Geospatial, Visual Recognition)

- **Ontological**
(Descriptive)
- **Newly Digitized**
(Analog, Off System Paper Records)

These additional and new types of data sources dramatically increase data breadth, but as this data is integrated with your existing transactional data, it exponentially increases the richness of the data which is key to increasing insight.

A Note About IoT – It’s Really DoT (The Data of Things)

We’ve all heard of IoT devices that can capture petabytes of information, but the term “internet of things” really does a disservice in describing IoT, as it is the data that is where the business value is. A more correct term is “data of things”. Successful DX programs use IoT data to increase data breadth allowing it to drive increased business value in a very traceable way. Data breadth is the single most important factor in driving DX program success and IoT data is a great way to increase it.

How A Data Driven DX Program Increases Data Usability

The ability to easily get business value from your data is the goal of a DX program. This starts by documenting the business outcomes that can be attained by data driven DX. Do not expect your business partners to supply requirements to you for this as they have been trained over

the years to think inside the box that legacy technologies and solutions have created for them. Start by documenting the basic goals of your business and what “good” looks like then work with them to define the “art of the possible” based on a data palette that is much broader than ever imagined, driving the ability for both capabilities and insights that are truly transformative to the business.

In the digitally transformed enterprise, data is easily exploited for business value, while keeping to high levels of data governance. These are some key factors in data usability that are central to DX success:

Data Quality and Completeness

This is key to maximizing the business value of your data and all too often overlooked. Querying and profiling data is a crucial and foundational step of any DX program and it drives setting proper expectations with the business. Many DX programs fail because they not only fail to address data quality, but also neglect the greater requirements of data governance, compliance, controls, security in the rush to digitally transform the enterprise.

Data Integration and Harmonization

A great deal of data within your enterprise is used for both operational systems of engagement and analytical systems of insight, but historically operational and analytical data is not integrated together. This is a critical capability of a modern business. Additionally, most operational data is in silos all across the enterprise and outside of it within your vendors and partners. These silos have given rise to duplicate processing and data inconsistencies as well as prolific maintenance costs. Breaking

down disparate data silos is crucial. Harmonizing and conforming integrated data provides for a consistent view of it to the entire enterprise that can be used by operational and analytical applications providing great synergy that dramatically lowers costs. Data dictionaries, business ontologies and taxonomies provide for a standardized data view of your company’s business that can be consumed by all operational and analytical consumers of this data across the enterprise.

Data Curation

This is key to providing consistent trusted data for enterprise consumption. Good data curation means your data is viewed as a single source of the truth and authoritative data source by the business passing high governance standards for quality, balance and control, auditability, traceability, provenance, balance and control, and provenance. Don’t underestimate the value of this in decreasing very onerous and time consuming data reconciliation that comes from using different data sources and processes vs. a single source of curated data. This also provides a tremendous uplift in audit activities which can be very costly without curated data.

Data Enrichment

On its face, this capability seems straight forward – just add some metrics and measures to your data and voila! – it’s enriched. Well, not entirely. Natural Language Processing, Artificial Intelligence, and Machine Learning dramatically increase the amount of generated metrics and measures. How is this done? Semantics. Ontologically driven data enrichment is where your DX program will help your business differentiate itself, because the data points generated from semantic enrichment

exponentially increase the data points that data scientists use to create knowledge from predictive models – delivering better insight into past business actions and driving more informed future actions. In addition, increasing the number of data points lessens the chance for predictive model false positives which are very time consuming to eliminate. Data enrichment provides more data which is crucial to all aspects of the business as insight is increased.

Data Publishing

This is where your DX rubber meets the road as this capability allows digitally transformed data to be consumed by users and applications. Historically, this capability meant business intelligence applications, however these are not designed to deliver data to the operation easily. Data must be published easily to applications and users in any form required such as API's for online applications, SQL, and flat files. A key differentiator in the data driven enterprise is Analytical Functions. This is a key aspect of data publishing as it supplies the ability to expose your analytical data to systems of engagement. This requires the aforementioned integration of operational and analytical data something that legacy enterprises historically have not been able to do.

Understanding Semantic Abstraction vs. Semantic Enrichment Is Key

Having broader and useable data is crucial to DX program success. Using semantics is a critical technique in attaining these goals, but there is often confusion in what semantics

actually is and how to use it. This is rooted in the two basic ways semantics are used – data abstraction and data enrichment. An example of semantic abstraction is meta data that describes a standardized view of your data at the enterprise level. Enterprise data dictionaries and ontologies can be mapped to all data attributes in your enterprise to enable this view. Semantic enrichment however is a way to add more data to your existing transactional set by semantically connecting data points. Both semantic abstraction and enrichment both improve your data in different ways, but are entirely different and illustrate why semantics drives both a single version of the truth and a richer set of data.

A Final Note About OMNI Channel User Interfaces

Broad, consistent, reliable, trusted, curated, and enriched data are crucial for systems of engagement applications and the key factor in digitally transforming those applications. A common OMNI channel look and feel of these applications goes well beyond UI design as it dependent on better data. True customer engagement and user experience requires broader and richer data which drives the differentiation businesses require and expect from DX programs.

Yes, Applications Are Part of DX, But They Are Last

Manual to automated processes and revamping old and outdated applications and processes is absolutely necessary for any DX program, however, it should be last after a broad “data palette” is available to the business.

Do not expect your business partners to supply your data requirements as they have no idea of what is possible. The “art of the possible”, something the businesses has given up on long ago due to the limitations of IT departments, can now drive your DX program. This will mean newer and better operational data. It will also mean broader and richer analytical data. It is important to note that you don’t need all possible data to get early business value – see the below section on choosing the right technology and the importance of development agility. Once data is rationalized including new insight gained, the specifications for business action and changes to applications can be documented – not before.

Start with your data.

Maximizing User Experience with Relevancy – The Key to Personalization

Increasing customer engagement and user experience is a goal of all DX programs. Increasing a user’s experience is to delight your customer or user with relevancy. A key tenet to attain this goal is recognizing that the richer your data is, the more accurate you are in knowing an individual’s goals and desires, putting a person in context of the current moment, being informed deeply about who they are as an individual, and ultimately connecting with them as unique person. Mastering this knowledge is crucial to presenting content that is relevant – which drives personalization success. Irrelevant content, far from being neutral, has a very negative impact on your customer or user and

makes them less likely to return. Using data to improve the content, driving interactions with a person as a unique individual, is called Data Driven Personalization. This is called “smart content” based on insight gained from data. The first step in this is to semantically enrich your data.

Taking the relevancy to the next level is having your content be in context of the moment. Mapping into an individual’s ontology – environmental data, location, and even mood – dramatically increases the accuracy in what content is effective at that current moment of time. This is called “maximum relevancy”. Ultimately, the holy grail of predicting behavior is to predict with decent certainty that an individual might consider purchasing something they did not consciously set out to do a few moments ago. In this way, you could say that the ontology knows a person better than they know themselves!

Data Driven DX Requires A Data Driven Architecture

A modern next generation architecture is data driven. Do you know how to design your enterprise to capture the maximum value from data for business gain? Legacy solutions require a lot of costly and time consuming data modeling and ETL code to integrate data so it can be used effectively. It is critical to have in place the right architecture to maximize the value of data to the business while minimizing delivery costs and increasing speed to market.

In the modern next generation digitally transformed enterprise, new and different types of data are ingested quickly to dramatically increase your data breadth. This can be very

disruptive to the business without the right architecture. A next generation data driven architecture must minimize the disruption to the business caused by introducing of new data while gaining maximum business value from it.

To accomplish this, a key architectural underpin in the data driven enterprise is a **data hub**.

A data hub serves the enterprise with a consistent view of all data as well as saving the cost of duplicate and inconsistent processing across applications. A data hub foundationally supplies data to both operational front office systems of engagement and analytical back office systems of insight thus providing maximum architectural synergy that dramatically reduces the amount code over historically separate applications that need to accomplish very similar things. This synergy is crucial in driving down enterprise costs while increasing speed to market.

Implementing this solution goes far beyond just a Customer 360 view of the data, but an Enterprise 360 as a next generation data driven architecture integrates operational and analytical data together and makes it available for enterprise consumption.

Architectural Synergy Specifics of A Data Hub

Your business expects the digitally transformed enterprise to be cost efficient. Longstanding legacy applications are stand alone with operational applications almost never sharing components with analytical applications, because the SLA's are drastically different, however, the functional needs of operational and analytical applications have a great deal of

overlap that must be exploited in the successful DX program.

This overlap falls in the same categories as the aforementioned section describing the dimensions of data usability that both operational and analytical applications need:

- **Data Quality and Completeness**
- **Data Integration and Harmonization**
- **Data Curation**
- **Data Enrichment**
- **Data Publishing**

All of the above dimensions are capabilities that a next generation architecture underpinned by a data hub fulfils centrally and efficiently with a high level of enterprise synergy thus lower cost. You might ask if all of these things are attained; can a data hub replace a data warehouse or a data lake? The short answer architecturally is "yes", however, a data hub is meant to serve data to the enterprise in a generic way and SLA's and business non functional requirements can play a large role in deciding on physically separating your data hub from your data warehouse and data lake.

Putting aside if a data hub can replace a data warehouse or not, the key architectural value of a data hub is the synergy it supplies the enterprise to meet needs that are very similar if not the same across operational and analytical applications. Do not overlook this since the amount of work to complete all of the above mentioned capabilities is enormous in a large enterprise.

Just imagine a world where your data warehouse processes receive consistent, reliable, trusted, curated, and enriched authoritative data source. Also, imagine your data scientists starting with this kind of data instead of having to do this themselves. Historically, data scientists spend more than 50% of their time preparing the data prior to do any predictive analysis. Do not discount this value to your business in both dramatically reducing the cost of data science, but the increase in speed to market of producing predictive models.

One final note about synergies and single versions of the truth. Using the same data across many applications and processes vs. duplicate processing dramatically lessens the chance to get inconsistent results that have to be reconciled especially during audits.

A Data Hub Needs to Be A Database – Not A File Store

DX program success requires an architecture that meets the needs of the business in the most cost efficient way possible. In the digitally transformed enterprise, a data hub is a data base and not a file store, because it must meet real time or near real time SLA's for the operational applications that it serves. Analytical functions providing operational and analytical data combined are key differentiators in the digitally transformed enterprise. Also, a database has many built in functions that for the most part would have to be custom code if your data hub was a file store. It is important to factor in the ease of supplying usable data using a database management system and reduction in development cost and increase in speed to market.

A Quick Word On Data Swamps – A Data Hub Is The Cure

The capabilities to make your data useable (quality and completeness, integration and harmonization, curation, enrichment, and publishing) need to be done quickly and easily in the digitally transformed enterprise. File based batch solutions can ingest new and different types of data quickly, however, making the data useable is very complex and code heavy in data lake environments. This dramatically increases the cost of the platform.

Many companies create data swamps, because they try to do too much there and don't have the proper architecture and also fail to properly match technologies to functional use cases. They fail to understand the amount of code needed for instance to ensure transactional integrity. Also, companies fail to realize how hard it is to govern data in a data lake. What's missing is a data hub underpinned by a database management system provides.

A data driven architecture underpinned by a data hub using a database separates data preparation from predictive and analytical processing in the data lake by providing a highly governed, broad, high quality, harmonized, enriched, and curated data set quickly and easily. This is done by leveraging built in functions that lessen the amount of code and drive down development costs. This architectural separation allows for the data hub to drop usable data into the data lake that data scientists can start to use immediately with little to no preparation.

Choosing The Right Technology for Your Data Hub Is Crucial

First and foremost, a modern next generation technology must allow you to query and profile data in its raw form (clean or dirty), and report on or remediate it while keeping its original state intact – a key requirement for auditability and a strong Data Stewardship program. This can't be done with a relational database.

Additionally, a next generation technology needs to facilitate and enhance data enrichment by easily supporting the use ontologically driven Natural Language Processing, Artificial Intelligence, and Machine Learning which dramatically increases the amount of generated metrics and measures.

Further, the digitally transformed enterprise must be agile. The technology that supports a data driven architecture must increase speed to market as well as lowering development costs. Traditional relational databases force a large amount of data modeling to be done upfront slowing development and blocking agility. ETL also causes this same problem as it requires data to be processed in large chunks or stages.

These legacy technologies will not work as you will get neither speed to market nor reduced costs. The proper technology is needed that allows for incremental development (down to the data element level) for maximum agility and attention to current business priorities as well as the ability to decorate data in place versus transforming it over many hops, steps, and stages.

Of equal importance, because new data will come in many forms, is for the data hub to be “multi model” to allow for the integration of different types of data, from ontologies to IoT data. It is true that a file store can be both agile and multi-model, however, as mentioned above, it falls down in the ability to publish data in RT or NRT and easily expose data via API's to operational and some analytical applications. Further, as mentioned above, transactional integrity can be a major issue as well as enterprise security which is needed down to the element level with a file store. Lastly, don't underestimate the cost of file processing in performance.

The conclusion is the technology you choose for your data hub should be enterprise ready, have robust fine grain security, be highly performant for the operation, allow for development agility, be able to easily ingest new data and types of sources, easily profile and cleanse, integrate, harmonize, curate, and enrich data semantically with finally being able to publish it in various ways including easily via API's.

A Data Hub Is The Means for DX Success – Not The End

The path to DX program success is not complex, but don't make the mistake in thinking it is only about implementing a data hub, because that misses the point. If a data hub is the means, what is the end? The root of Data Driven DX success is what can be done with better data to meet true and differentiating business goals. This is the end goal that when the program is run correctly, will have full traceability back to the data.

A data hub, being in the center of the digitally transformed enterprise, is positioned to influence both front and back office applications in very positive ways as discussed earlier in this paper, because of the data it contains.

The net conclusion is that broader, richer, consistent, and trusted data that can be used throughout the enterprise enables so many things, because data brings knowledge of the right actions the business may take as well as driving how applications behave and render content.

Don't make the mistake of overly complicating your DX program.

Never Lose Sight of The True Goal – Business Differentiation

Companies must get maximum value from their data to compete in the digitally transformed world. Getting more business value starts with increasing the insight and knowledge into your data which then will drive more informed business actions (the overarching goal). These actions impact the front office operation as well as the back office.

Data Driven DX allows you to maximize the business value of the program by starting with a broad palette of data showing the “art of the possible” capabilities through added insight. This provides the underpinning for good traceability between business value outcomes and the solutions designed to deliver capabilities to achieve those outcomes.

Digital disruptions centered around new and

different types of data sources are going to increase across the business world for many years to come and your enterprise needs to be ready to exploit it for business gain. Disruption for disruption's sake is bad for the business. Handling new and different types of data sources correctly requires never losing sight of the business value of it and establishing clear traceability between this value and the solution.

The Digital Landscape is moving extremely fast. New data is becoming more readily available every day. Will your company be positioned to maximize the value of this data? Your success depends on it as Successful DX Programs are data driven!

Looking to optimize your customer experience?

Get in touch with us at info@tahzoo.com

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Mike Fillion is the managerial lead for Data Services at Tahzoo responsible for solution and service delivery designed to improve user experience, customer engagement, and the accuracy of predictive models. As former Director of Architecture at Aetna covering the Informatics, Analytics, and Big Data technology areas, Mike was responsible for directing multiple architectural teams in support of business programs in excess of 150m annually. Mike has over 35 years of experience in Information Technology supporting Insurance related applications and technologies holding senior managerial and technical positions at The Travelers Insurance Company, Massachusetts Mutual Life Insurance Company, and Cigna.

About Tahzoo

We are a global Customer Experience consultancy focused on creating and delivering digital experiences that make consumers happier every day. We combine creative horsepower, data-driven insights, and technical know-how to redefine how users interact with and experience your brand.

Architects for the Experience Age

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