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Technology Debt

With businesses embarking on an Mand A path for higher revenue growth, the quantity of supporting applications and complexity of their combined entity's technology infrastructure is accelerating. Consequently, there is immense stress on new and old businesses to manage their technology stack better.
Reducing this 'Technology Debt' is, therefore, becoming a necessity.

Introduction

The digital age presents several challenges and opportunities for leveraging IT assets such as applications, databases and infrastructure for enabling business differentiation. The fact that companies have been continously adding new functionalities to their IT sytems has led to complex enterprise architectures. This stems from both increasing business needs and the eruption of new technologies on the market. As demand grows for more agile and innovative systems. IT leaders are always under pressure to squeeze more performance and value from their existing infrastructure and application portfolio, leaving a backlog of maintenance and enhancements related to business change and efficiency. The cost of cleaning this backlog to bring the corporate applications portfolio up to date is labeled as "IT Debt" by Gartner.

Among the available academic literature and other Internet sources, IT debt is often confused with Technical debt, which is solely related to software development.

Understanding a Technical debt

A comprehensive framework of Technical Debt was proposed in 2013 aiming to provide a systematic approach to understand the overall phenomenon of technical debt for practical purposes.
The framework consists of three basic blocks: Precedents, Technical debt and Outcomes.
Precedents of technical debt include pragmatism, prioritization, process, attitudes, ignorance and oversight. If technical debt is not addressed at the first place because of any of the precedents, it will occur and let customer pay back later.
The dimensions of technical debt are comprised of Code debt (not writing clean code), Design and Architecture debt (which requires refactoring in the future), Environment debt (hardware where the software deployed is temporary), Knowledge distribution debt (only the programmer himself knows about the code) and Testing debt (not enough coverage of the code).
Apart from the dimensions of technical debt, the attributes of technical debt are also recognized to reveal additional facets of technical debt. These attributes constitute of monetary cost, bankruptcy, interest and principal leverage, repayment and withdrawal. Each of these dimensions and attributes point to different aspects of Technical Debt which may be Strategic, Tactical, Incremental or Inadvertent in nature.
The outcomes from these aspects may be in the form of Morale, Productivity, Quality and Risk. All of these definitely have negative long term effects with a few like Productivity having a positive short term effects.

> *Shipping first time code is like going in to debt. A little debt speeds development so long as it is paid back promptly with a rewrite. The danger occurs when the debt is not repaid. Every minute spent on not-quite-right code counts as interest on that debt. Entire engineering organization can be brought to a stand-still under the debt load of an unconsolidated implementation, object-oriented or otherwise.*
>
> Ward Cunningham

Concept of Technology Debt

An organization's debt isn't limited to Technical Debt. Here, we introduce the concept of 'Technology Debt', also referred to as 'IT Debt', by Gartner. Organizations with a large and complex IT portfolio often find themselves with several opportunities for optimization via the mix of:

- Duplicate Applications
- Obsolete Technology
- Functional Gaps
- Integration Gaps
- Non – standardized Platforms and Processes

These portfolio inefficiencies and redundancies create 'Technology debt'. Consequently, the capability of IT to optimally support the current and emerging opportunities for the businesses gets hampered and results in a higher total cost of ownership for the IT portfolio.

'Technology debt' hampers IT's ability to optimally support current and emerging business opportunities and a higher total cost of ownership for IT portfolio. All these portfolio inefficiencies and redundancies are reflected through the weighted average of their dimensions.

Measuring the Technology Debt

Before we measure the 'Technology Debt' it's important to define the Precedents, Dimensions and Attributes of the 'Technology Debt'
The Precedents, are the necessary but not sufficient conditions for the Technology Debt to occur and can be listed as below:

- Short Sighted IT Views [Enterprise Architecture and Operating Model]
- Limited Budgets [No Benchmarks for Spends]
- Inappropriate Sourcing Strategy
- Imposing Deadlines [Lack of Better Program Management]
- Process and Service Management Chaos

The Dimensions and Attributes of Technology Debt are:

› Functional Quotient [EA, OM, TCO, SM, PM, SM]	EA OM	Enterprise Architecture Operating Model
› Technical Quotient [EA, OM, TCO, SM, PM, SM]	TCO SM	Total Cost of Ownership Sourcing Model
› Management Quotient [EA, OM, TCO, SM, PM, SM]	PM SM	Process Management Service Model

Technology Debt [TD] =

Weighted Average of

{ Functional Quotient (FQ), Technical Quotient (TQ), Management Quotient (MQ) }

across all the attributes defined above

Every Organization has that optimum level of their Technology Portfolio which augments and supports their speed of business without weighing upon as a 'burden'. This optimum point is the **Zero Point** for Business.

Understanding Zero Point

The Business Velocity for an organization is determined by the cumulative effect of Income Impact (Revenue Excellence, Operating Excellence), Capital Impact (Working Capital, Total Cost of Ownership) and Customer Excellence.

We define IT-derived Business Velocity in empirical terms. We use the below parameters:

Business Velocity = f { TCO, WC, RE, OE, CE }

TCO	Total Cost of ownership
WC	Working Capital
RE	Revenue Excellence
OE	Operational Excellence
CE	Customer Excellence

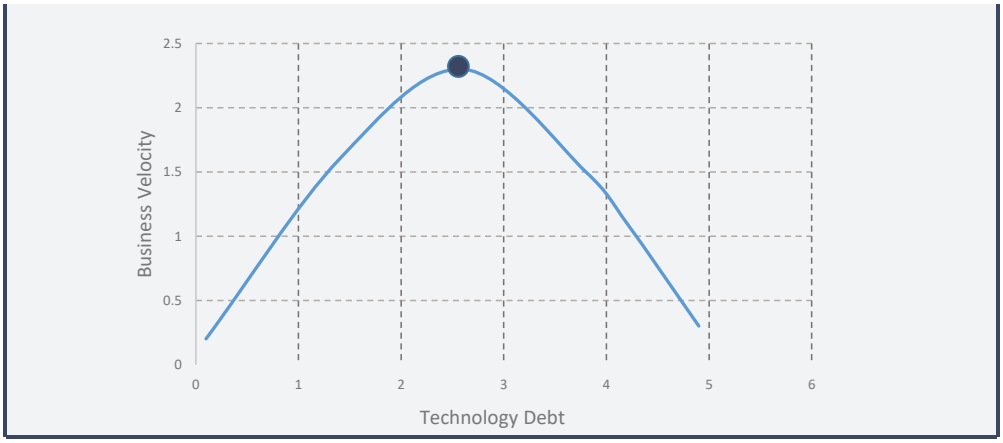
Next step, in this definition, requires an empirical way of measuring Technology Debt.

Technology Debt = f { FQ, TQ, MQ }

FQ	Functional Quotient
TQ	Technical Quotient
MQ	Management Quotient

ZERO POINT

Plotting against each other, we obtain the graph that resembles the concept of diminishing returns. Thus, we define the Zero Point as the peak of Business Velocity with the corresponding Technology debt.



ZeROTechDebt FRAMEWORK

The framework aims at Zero Redundancy in Operations to attain Cost Leadership and business alignment. This is enabled by providing visibility to optimization opportunities and by incorporating leading edge technologies of Self-Healing, Self Service, Self-Validation and Advanced Spend Analytics for managing the IT Portfolio. The proven methodology 'EASE- Explore, Analyze, Strategize, Execute' helps drive various Transformation programs.

Key Challenges to IT Portfolio Optimization

Lack of adequate Visibility to the IT Landscape - The first step in optimizing Technology Debt is to get adequate visibility across the IT portfolio and operating model. Visibility needs to be enabled across key aspects of the portfolio such as

- Business Functions
- Applications Landscape
- Applications to Business Function Mapping
- Infrastructure Landscape
- Applications to Infrastructure Mapping

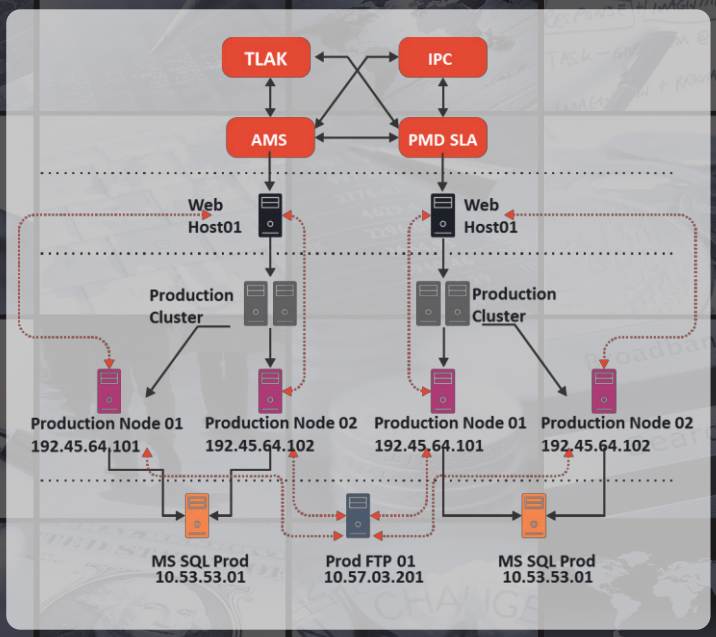
These portfolio inefficiencies and redundancies create 'Technology debt'. Consequently, the capability of IT to optimally support the current and emerging opportunities for the businesses gets hampered and results in a higher total cost of ownership for the IT portfolio.

3rdEye VIEW

A proprietary web based tool for enabling Portfolio visibility by providing a structured framework for capturing and analyzing IT Asset information. This provides visibility across key aspects of the portfolio such as IT Asset Inventory statistics, IT Asset spread by various clusters (Business function, Technology group, Application Type, Criticality, Geographic coverage, Application complexity)

Visibility to the interfaces and dependencies between the various IT Assets (Application to Application, Application to Server, etc.) is captured within the tool and presented in the form of Asset Dependency Diagram (ADD).

The ADD depicts the dependencies for a cluster of applications/servers as depicted in the figure. This plays a significant role when performing 'What-If' analysis.



Key Challenges to IT Portfolio Optimization

Lack of portfolio alignment with business needs – We have often observed that the existing applications may not sufficiently address business requirements and lead to challenges such as automation gaps, integration gaps, siloed data repositories leading to inaccurate analytics etc. The alignment with business needs is evaluated along three key dimensions:

- Functional Quality
- Technical Quality
- Total Cost of Ownership for each IT Asset

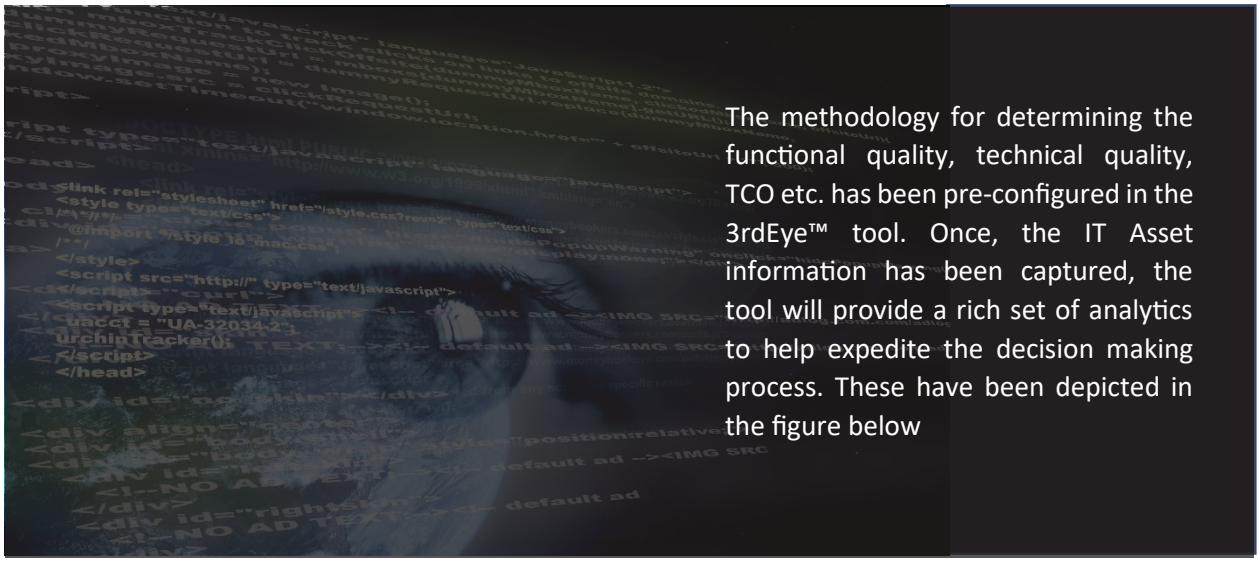
The functional quality score provides the extent of fitment of the application to the current and emerging end user requirements. Apart from functional fitment, the Functional Quality score includes other aspects such as application usability, workflow effectiveness etc. This analysis provides a comprehensive view of the need for functional enhancement of existing applications, building bolt-on to an existing application or building new applications. The mapping between criticality of business function and the respective functional gap provides an objective mechanism to prioritize these initiatives.

Similarly, the Technical Quality of an IT Asset is evaluated in terms of currency of the technology platform, architecture, modularity, security, performance characteristics etc. The need for legacy modernization will emerge out of the technical quality assessment.

The functional and technical quality assessment is supported by a Total Cost of Ownership view of the IT Asset. This would help determine the business case for the functional or technical modernization.

Based on the portfolio and cost analysis, the target state for each IT Asset is determined along with the 'treatment' required to achieve the target state. A snapshot of the optimization analysis parameters has been depicted in the figure below

3rdEye VIEW

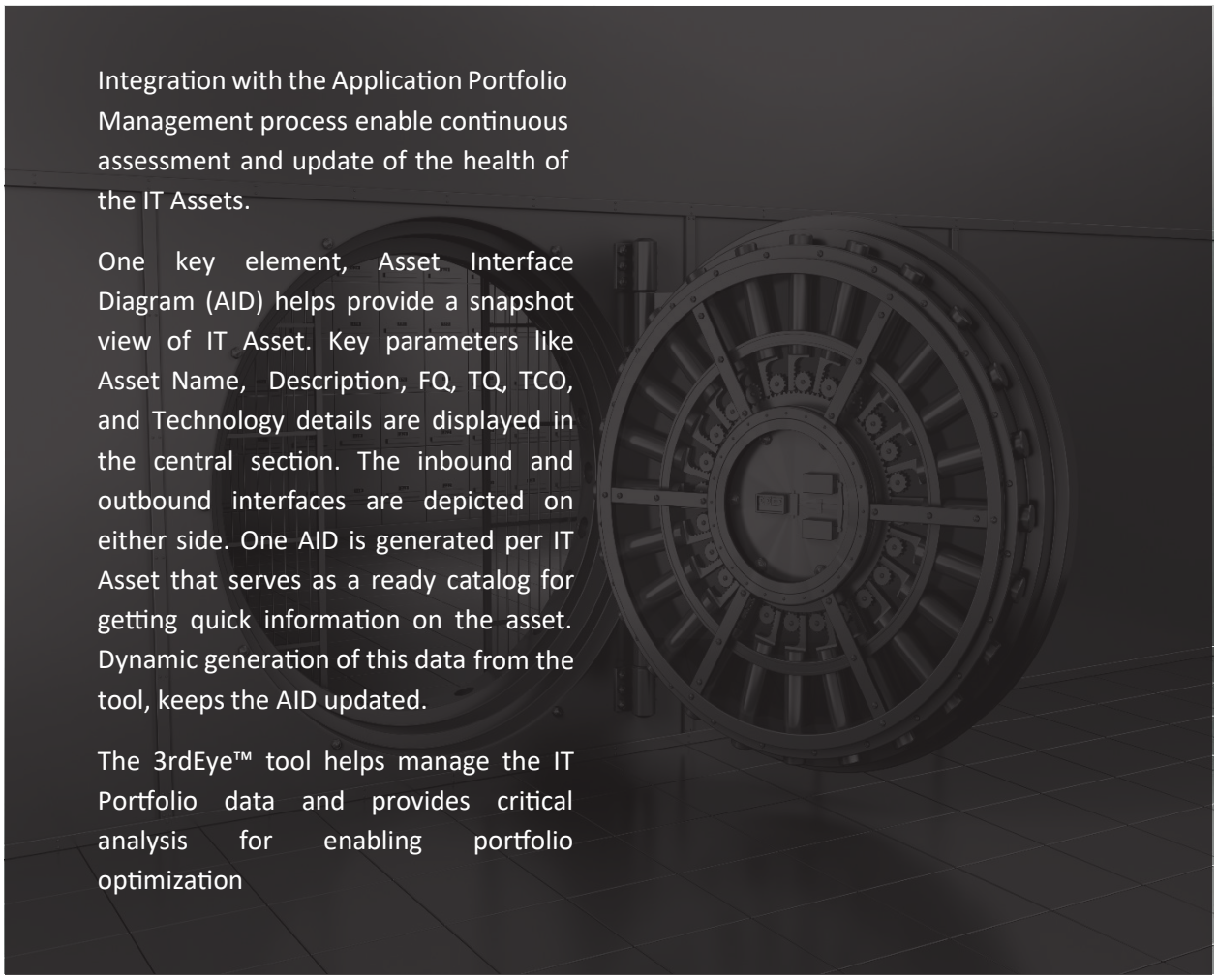


The methodology for determining the functional quality, technical quality, TCO etc. has been pre-configured in the 3rdEye™ tool. Once, the IT Asset information has been captured, the tool will provide a rich set of analytics to help expedite the decision making process. These have been depicted in the figure below

Key Challenges to IT Portfolio Optimization

Need for reducing spend on RTB (Run theBusiness) activities and ensuring ongoing alignment of the portfolio with emerging business needs on a continuous basis - The high IT Spend on Support and Maintenance activities is symptomatic of higher 'Technical Debt' (due to legacy technology, non-standardized platforms etc.) and a lower 'Maintainability Quotient' of the IT Asset. We have also observed significant redundancies in large portfolios in terms of duplicate applications and functionality. This could arise out of multiple reasons such as acquisitions, silo-ed portfolio management etc. Such redundancies are easily identified by means of the Functional Coverage and Functional Overlap Chart as depicted in the figure below. In conjunction with the modernization analysis, this helps identify the IT Assets that need to be decommissioned and the impact of the same on the portfolio cost and complexity.

3rdEye VIEW



Integration with the Application Portfolio Management process enable continuous assessment and update of the health of the IT Assets.

One key element, Asset Interface Diagram (AID) helps provide a snapshot view of IT Asset. Key parameters like Asset Name, Description, FQ, TQ, TCO, and Technology details are displayed in the central section. The inbound and outbound interfaces are depicted on either side. One AID is generated per IT Asset that serves as a ready catalog for getting quick information on the asset. Dynamic generation of this data from the tool, keeps the AID updated.

The 3rdEye™ tool helps manage the IT Portfolio data and provides critical analysis for enabling portfolio optimization

About the Author

Aditya Dikshit heads IT Transformation Services in Birlasoft. His area of expertise includes Managed Services - Solution Design and Implementation, Process Transformation for IT and business processes, IT Strategy formulation, Application Portfolio Optimization and IT Governance advisory. He holds an MBA degree from India's Premier Business School and a bachelor's degree
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