CAN YOUR ORGANISATION PROFIT BY SPENDING?

Technical Debt Management and Carbon Waste Reduction

Glue Reply's approach for tackling technical debt is focused on reducing costs and limiting carbon waste.
This white paper explains what technical debt is and how it occurs, it explores the implications of technical debt and how companies can mitigate the impact it has on their spending while developing sustainable approaches.

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1 WHAT IS TECHNICAL DEBT?

Initially described as part of Software Development process

Technical Debt is a concept in software development that reflects the implied cost of additional rework caused by choosing a limited solution over a more comprehensive approach that would span a longer development timeframe.
Technical Debt is the deviation of a system from any of its nonfunctional requirements.
At a system level, Technical Debt is a conscious decision of delivering a minimum viable product, over the complete functionality or complete non-functional delivery.

However, it impacts the whole IT Landscape

Often CIOs and Enterprise Architects expand the scope and definition of Technical Debt across the organisation to include any change within IT not conforming to a defined strategy. These changes can be within Design, Architecture, Coding, Testing, Hardware & Software Maintenance, Operations, Security as well as Contractual & Commercial changes.
Similar to monetary debt, if not paid, tech debt can accumulate 'interest'; taking that analogy, before paying the main loan, the interest has to be paid off.
A company that spends more than half of its IT project budget on integrations and fixing legacy systems is likely to be caught in a tech-debt spiral in which it is paying interest only.
A greener cloud utilisation implies lower cost of resources and less emissions but the less performant the system, the further it falls from being compliant with greener technologies and technical advances.

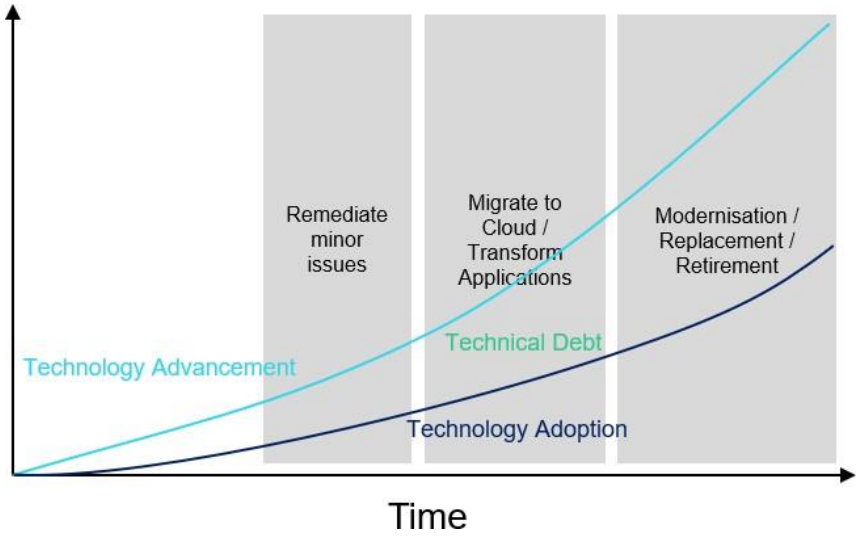


Figure 1. Increasing Technical Debt between Tech Advancement and Implementation

Tech debt experiences exponential growth with passing of time by creeping up as the difference between where the progress line is and the actual implementation.
As can be seen by this illustration, the remedial actions for technical debt sometimes become significant, such as totally writing-off the debt and having to start again on a new basis (the replacement scenario).

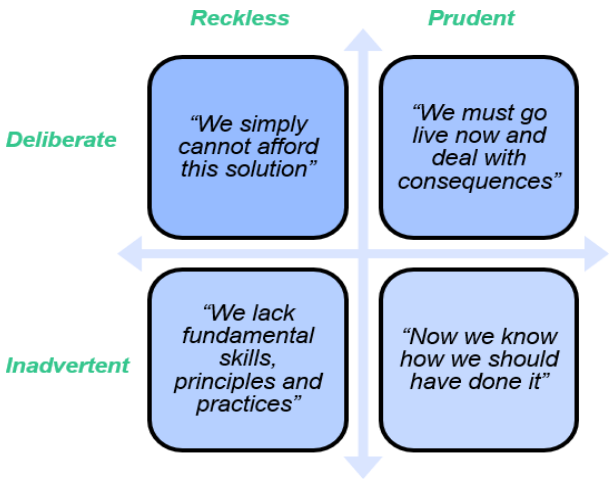
Source: https://www.toptal.com/finance/part-time-cfos/technical-debt

1.1 HOW IS IT CLASSIFIED?

Martin Fowler's Technical Debt Quadrant explains the nature of tech debt classification.

Deliberate & Reckless: Making a conscious decision with understanding the significant impact near medium to long term.
Deliberate & Prudent: This time decision makers are fully aware of how to tackle the debt in the future so that they can waiver it for now.
Inadvertent & Reckless: Scenarios where decision makers are stuck in figuring out what went wrong.
Inadvertent & Prudent: Scenarios where best practices followed or technologies used, however not meeting end users / customer requirements in an effective way.

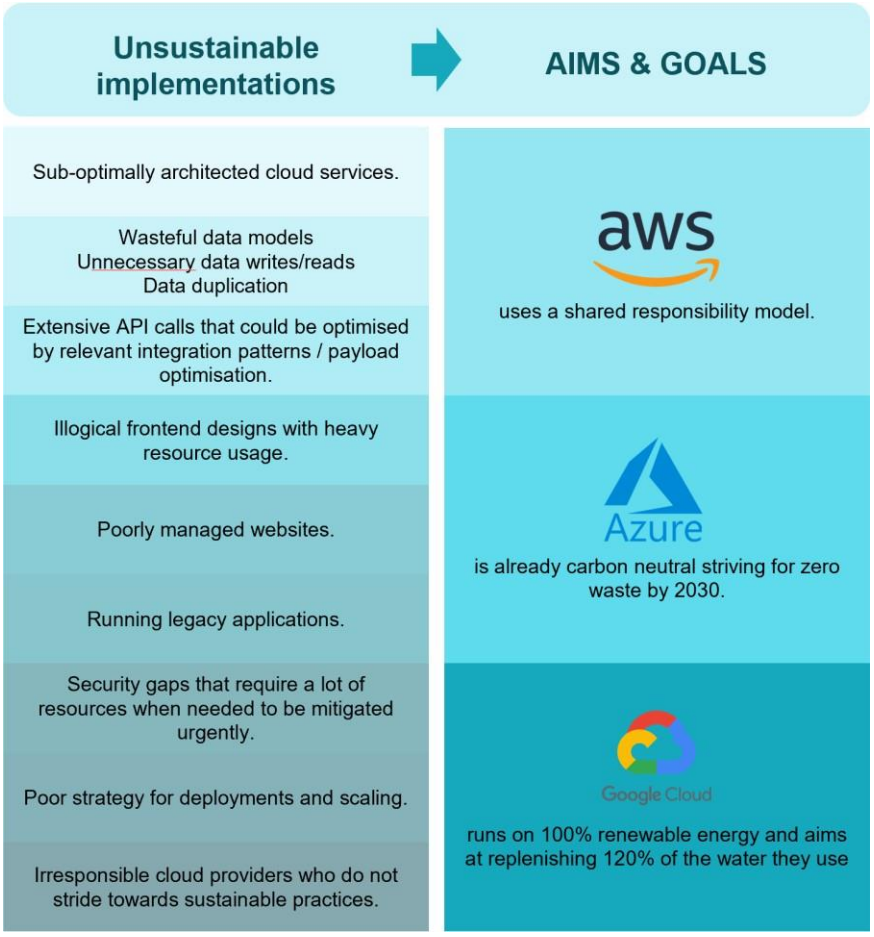
Figure 2. Martin Fowler's Technical Debt Quadrant



Source = https://martinfowler.com/bliki/TechnicalDebtQuadrant.html

1.2 HOW DOES IT IMPACT THE ENVIRONMENT?

Inefficient systems have a higher carbon footprint and bigger energy consumption by using up unnecessary resources:



2 WHAT CAUSES TECHNICAL DEBT?

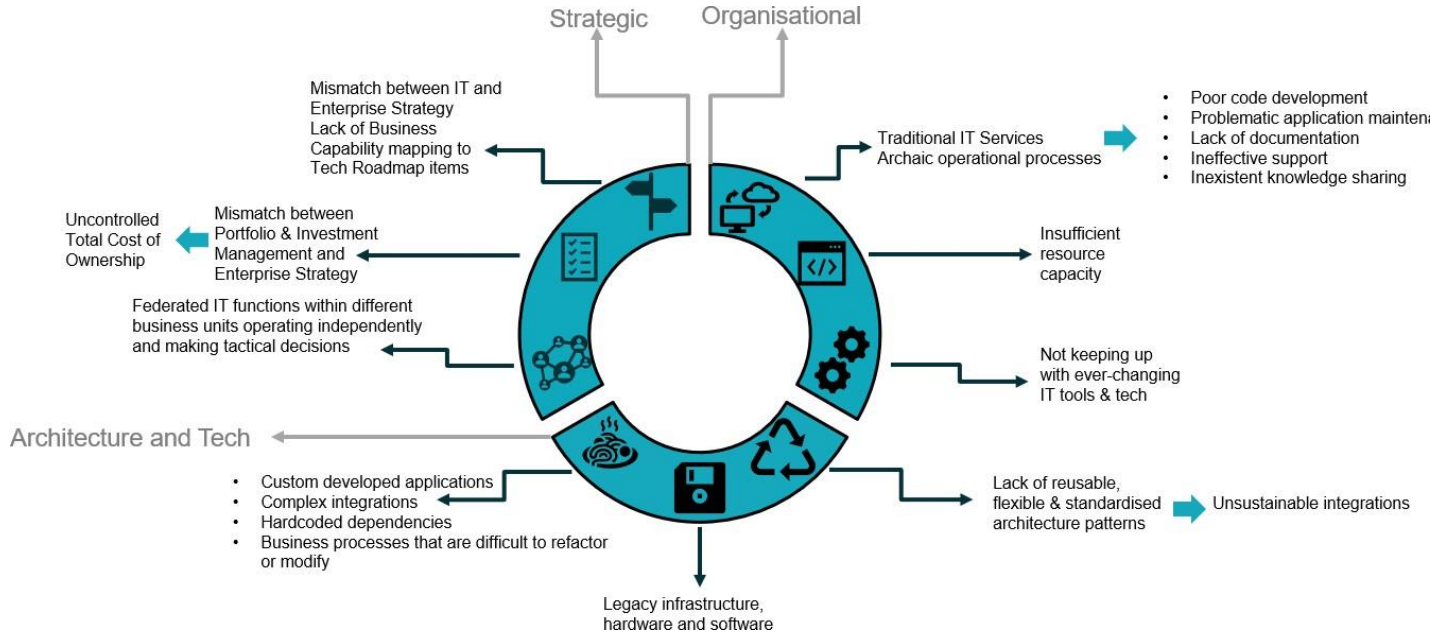


Figure 3. Causes of Technical Debt

This diagram illustrates how and where tech debt is created and the main pain point areas. These can occur at any point in the SDLC and the factors to consider span across the entire environment. The main three domains identified are Strategic, Organisational and at implementation level, in Architecture and Technology.

3 WHAT CAN BE DONE?

3.1 A 3-step approach

Tackle existing technical debt in order to cut costs and use resources mindfully to achieve accelerated result.

1. Collaboratively with the client, establish a definition of technical debt & criteria for assessment, resulting in setting the foundation for assessment and creating a **Technical Debt Register (TDR)**.
2. Analyse the applications within the product family to **identify all technical debt.**
   This is performed collaboratively through workshops, questionnaires or 1-2-1 interviews. The outcome of this process is a populated TDR.
3. Producing a **prioritised roadmap** for resolving the technical debt.
   The TDR is collaborated, analysed and an agreed roadmap produced.

The TDR finds close links to the Business Capability Model to understand which capability of the business is suffering the most and where remediation needs to be prioritised.
The TDR is also overlaid with the TRM (Technical Reference Model) where technologies that have been left behind will be highlighted and will show where the lifecycle of the application needs to progress either into improvement or into decommissioning.
An application catalogue can be useful to understand the granular aspects of where the optimisation has slipped and created a gap with greener technologies.

3.2 How to manage Tech Debt

Tech debt is managed by prevention and by implementing stringent mechanisms such as:

- Making use of the sprints cycle in Agile delivery to control expansion and implement mitigation through continuous development and integration.
- Creating a governance mechanism that actively prevents or manages technical debt.
- Using a waiver process signed off by senior management that provides a control framework and structure for managing towards compliance.
- Ensuring budget is ring-fenced in the future to remediate.
- Making an individual accountable for removal.

This makes the topic explicit and enables prevention of technical debt proliferation.
Technical debt needs to be analysed holistically by looking at all aspects of the enterprise:

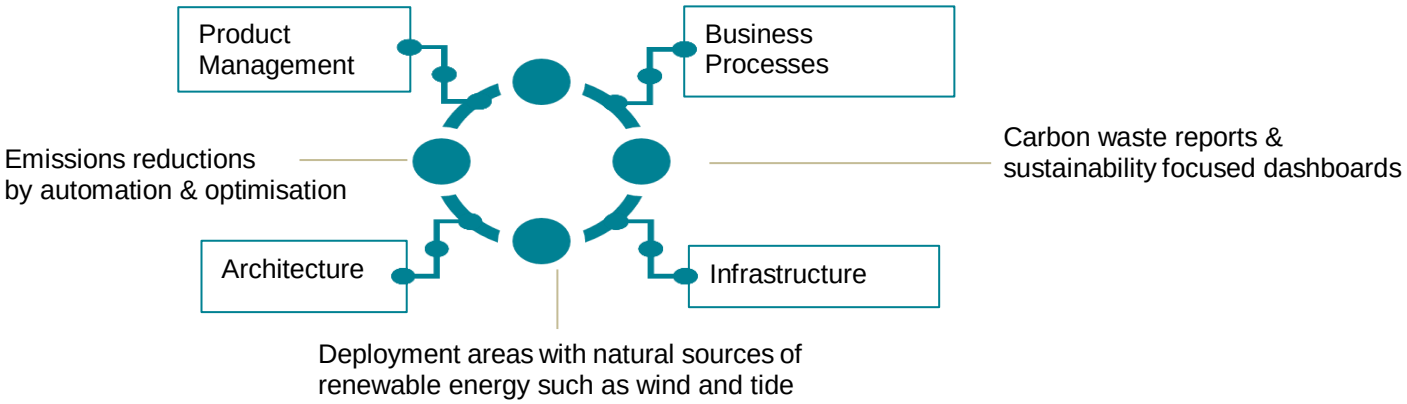


Figure 4. Holistic Enterprise management of Tech Debt with sustainable practices

Each tech debt item goes through an outcome-based evaluation process and gets placed where it belongs onto the remediation plan and prioritised correctly as per step 3 of the 3-step approach.

Looking at the enterprise holistically from all angles ensures that the industry standard of Well-Architected Framework is implemented, following its six pillars:

- Operational excellence – throughout the enterprise levels.
- Security – using sustainable cloud providers ensures security standards are met.
- Reliability – at the infrastructure level ensures following a green architecture and avoidance of extra resource deployment for remediation.
- Performance efficiency – working hand in hand with reliable green architectures.
- Cost optimisation – starting at the Architecture & Business Processes levels and following through in the implementation of the Infrastructure, using governance mechanisms to keep on track.
- Sustainability – understanding impact throughout the enterprise by using the right responsibility models and design principles.

This leads to architectures that maximise efficiency and reduces waste.

CONCLUSION

Employing greener tech in a well architected manner is a shortcut towards optimisation and waste reduction. Realising a number of relatively simple changes can help a business strive towards sustainable practices and carbon neutrality while working on reducing tech debt which will lead to cost reduction.