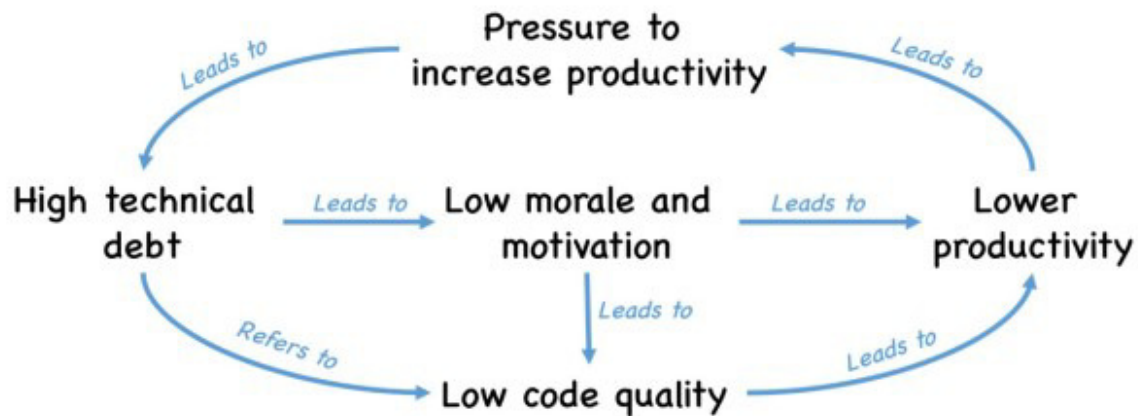


The Insidious Effect of Technical Debt

Technical debt can have an insidious effect on a project – for a while as the ‘debt’ builds up everything looks good from the outside. However, when the crunch comes and the ‘debt’ has to be repaid a major reversal in fortune can occur.



The concept of technical debt refers to the costs of having to go back and resolve problems that arise because an earlier decision was made to take the easy route, instead of the best one. The choice for an easy option is incurring a debt to the project that will have to be repaid later. The concept comes from software development but has wide application.

A current, extreme, example of the effect of technical debt is the Crossrail project in London. In July 2018, its management was reporting that completion on-time and on-budget of the £14.8bn rail project would occur in December 2018. In August 2018 completion had ‘slipped by a year’; the current situation is a delay of 2+ years to the end of 2020 and beyond with a cost overrun of 20%¹.

The main driver of this delay and a good part of the associated costs appears to be decisions made to ignore problems in the signalling system development to keep the project on schedule. Giving evidence to a government enquiry in early 2019, Crossrail’s new chief executive Simon Wright said *“We were testing on incomplete systems. Productivity was under stress, but we fought hard to maintain the schedule and thought all along that we could find a solution to bring it back, just like we have done on countless other problems that occurred during the construction programme,...”*. This is a classic example of management decisions building up ‘technical debt’.

These issues were known for a long time, in 2015 *The Independent* newspaper reported that engineers and rail experts were struggling to create interfaces for the signalling systems. At the same 2019 enquiry, Crossrail’s new chairman Terry Morgan said *“problems that emerged were mostly due to difficulties with developing software to allow Crossrail trains to travel safely at speed through three separate signalling systems”*. The simple fact is the problem identified in 2015, still

¹ For a more detailed analysis of CrossRail see ***Who’s Cross about Crossrail:***
https://mosaicprojects.com.au/PDF_Papers/P204-Technical_Debt.pdf

had not been resolved in 2019, despite wasting time and money testing incomplete systems; in fact, the irrelevant testing probably added to the delay and costs by distracting people from the real challenge.

The current expectation is that to pay back this technical debt the project will incur a delay of 2 years and a substantial part of the cost overrun of £1.4bn! Fixing the problem properly the first time would undoubtedly have caused a delay and cost blow out in the 2016 to 2018 period but in all likelihood the costs would have been lower, the delay would have been less, and the current furore surrounding the project would have been minimised.



The problem with technical debt is very often, people who need to know there is a problem don't get to know about it because it is being covered up through the use of short-term expediency. We will never know what the former chair and CEO of Crossrail (both sacked) really knew in the 2016 to 2018 period, or what their senior managers knew about the build-up of the technical debt in the Crossrail signalling systems². But the problem could have been avoided (or at least minimised) if the concept of technical debt had been acknowledged. When people are unaware of technical debt, they are more likely to identify paths that will result in it being created.

Other causes of technical debt

Technical debt is created when someone decides to take the current expedient option to avoid a short-term issue creating a backlog of work that has to be 'paid-off' later. A typical example is the issues seen with the introduction of "new" technology or equipment to a project without proper support and training.

Management seeks to save money by assuming the workers can learn as they go. The technical debt incurred by this decision to 'save money' may be the loss of productivity and other issues caused by untrained staff attempting to use the equipment, and it may be a far bigger debt caused by the team reverting to the "old" equipment that has been time tested and they are experienced with.

² The previous managers of Crossrail were used to civil engineering challenges. In many situations, particularly bulk civil engineering works, simply spending more money to bring more resources and equipment onto the site will allow productivity to be increased and the problem resolved. This approach does not work in complex technical situations and can frequently make matters worse, see:

https://mosaicprojects.com.au/Mag_Articles/P014_Project_Failure.pdf

Assuming the 'new' equipment used properly will save time and money, the production work is slower and more expensive and you still have the cost of the changeover and training at a later stage (plus possibly a lot of additional costs changing out the old equipment and re-configuring other parts of the system to work with the 'new' replacement. A short-term 'win' but an overall disaster.

Summary

To avoid this type of problem, everyone in the project group, especially team members, must be in a position to offer insight into technical debt, which the project manager can then choose to act, or not act, on. Aware teams bring up the subject of technical debt in planning meetings, and keep focused on it. Aware managers pose questions such as, "If this proposed shortcut is the right choice, what is there to gain, and what are the challenges and future implications?"

As with financial debt, there are times when going into debt can be beneficial, but only if you can pay back the accrued debt and interest at the right time! Unlike some other forms of project delay, technical debt can rarely be 'paid off' simply by throwing resources or money at the problem.



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