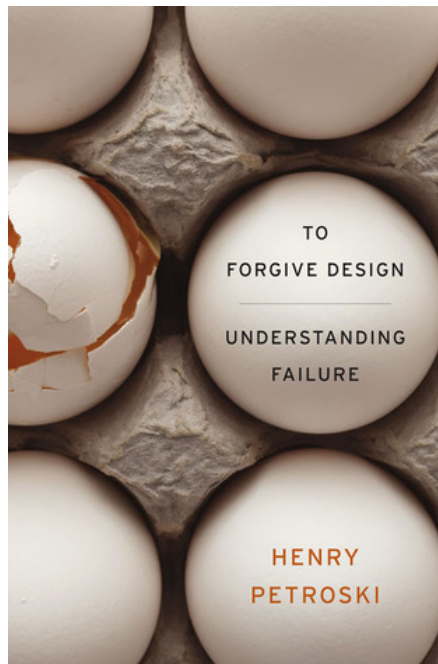




To Forgive Design: Understanding Failure

Henry Petroski

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When planes crash, bridges collapse, and automobile gas tanks explode, we are quick to blame poor design. But Henry Petroski says we must look beyond design for causes and corrections. Known for his masterly explanations of engineering successes and failures, Petroski here takes his analysis a step further, to consider the larger context in which accidents occur.

In ***To Forgive Design*** he surveys some of the most infamous failures of our time, from the 2007 Minneapolis bridge collapse and the toppling of a massive Shanghai apartment building in 2009 to Boston's prolonged Big Dig and the 2010 Gulf oil spill. These avoidable disasters reveal the interdependency of people and machines within systems whose complex behavior was undreamt of by their designers, until it was too late. Petroski shows that even the simplest technology is embedded in cultural and socioeconomic constraints, complications, and contradictions.

Failure to imagine the possibility of failure is the most profound mistake engineers can make. Software developers realized this early on and looked outside their young field, to structural engineering, as they sought a historical perspective to help them identify their own potential mistakes. By explaining the interconnectedness of technology and culture and the dangers that can emerge from complexity, Petroski demonstrates that we would all do well to follow their lead.

To Forgive Design: Understanding Failure Details

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dejah_thoris says

It took me forever to slog through this because I made the mistake of reading the rest of the author's work first. If you're going to read one book by Petroski, read this one. It has the most current examples and the same philosophy. It's a little heavy-handed at times and the memoir sections can seem unnecessary but it hits the high points in his field.

Rick Edwards says

Petroski tells the stories of a number of engineering failures and what was learned from them. He does an excellent job, and makes a strong case for engineering training to include a better historical perspective. There appears to be a tendency for engineers to forget the lessons of past failures, and to build on recent successes without fulling understanding the rationale for them. Ergo, important considerations may be overlooked.

Nelson Zagalo says

Este livro trata um tema crítico da atividade humana, “a falha”, o estudo e análise do modo como falhamos na realização das nossas ações. O livro foca-se sobre a engenharia, nomeadamente civil e mecânica, mas o ponto ilustrado serve qualquer outra engenharia, serve o design, serve toda a atividade criativa, acabando por servir toda a atividade humana. Mais serviria se o autor se tivesse conseguido focar nessa essência como promete o título, não o conseguindo perde o livro e perdemos nós.

Esta questão da falha tornou-se um tópico central dos estudos sobre criatividade na última década, contando com um livro dedicado ao tema por Sarah Lewis, “The Rise: Creativity, the Gift of Failure, and the Search for Mastery” (2014), foi também amplamente discutido por Catmull no “Creativity Inc.” (2014), sendo tópico de imensos artigos e até motivo de uma exposição artística, “Permission to Fail” , que termina este mês nos EUA.

A vantagem de Petroski é que não se interessou pelo tema agora, antes já tinha publicado “To Engineer Is Human: The Role of Failure in Successful Design” em 1985. O autor refere o facto do livro ter mantido procura a razão pela qual resolveu escrever este novo. Não tendo lido o livro de 1985, acredito, pela resenha do mesmo, que avançou pouco, nomeadamente naquilo que o título prometia, a formulação de conhecimento. Alguns dos exemplos que aparecem na resenha do livro anterior servem mais uma vez a discussão aqui, tendo-se acrescentado exemplos relevantes como a queda das Torres Gémeas em 2001, o acidente do poço de petróleo aberto durante meses debaixo do mar pela BP em 2010, ou entrando um pouco no design industrial o problema do iPhone 4 com a receção.

Podemos dizer que “To Forgive Design: Understanding Failure” falha, o que acaba por ser irónico. Mas ao manter-se quase todo o tempo colado à descrição dos acidentes, é verdade que Petroski vai à essência da falha de cada acidente reportado, mas isso não chega para um livro, menos ainda para um livro que pretende elencar a essência do conceito. Não basta dar exemplos, dissecá-los, dar mais exemplos, mais detalhados,

mais suportados, mais focados. Quando se constrói conhecimento, é necessário olhar para o todo e retirar daí conclusões, sintetizar ideias, focar mas também criticar, sustentar a descrição mas também sustentar o conceito, e isso pouco acontece aqui.

Diga-se que este problema tinha surgido exatamente da mesma forma em “The Rise”. Nessa altura referi que era um problema de conhecimento tácito, ou seja o ato de falhar precisa de ser experimentado, tornando complicado o problema de expressar o mesmo por palavras. Contudo depois de ter lido mais este livro sobre o tópico, julgo que o problema é mais evidenciado pelo parágrafo com que abri o texto, o facto da falha estar presente em toda a ação humana, tornando difícil a sua conceptualização sem entrar por discussões abstracts e filosóficas que acabam por acrescentar pouco. No fundo o modo como Petroski e Lewis fazem o seu trabalho, despejando descrições de dezenas de casos, acaba por ser a única forma de chegar à sua essência, o problema é que para isso precisávamos de ter livros sobre falhas em cada domínio.

E era isso mesmo que pensava ao ler este livro. Porque razão fazemos tantos livros sobre Casos de Sucesso, quando o modo como as pessoas aprendem efetivamente é a partir dos casos de falhanço? Existe aqui um certo paradoxo que é querermos emular os melhores, os que não falharam, sem compreender onde estão os problemas que provavelmente se vão atravessar na nossa frente, e que só poderemos conhecer a partir dos exemplos de quem os enfrentou.

Ler com links em: <http://virtual-illusion.blogspot.pt/2...>

Margaret Sankey says

Reading this made me appreciate that things don't fail more often than they do. A bridge, or space shuttle, or parking garage or de-icing boot on an airplane is a complex system--it may have been built with redundant safety tolerances, but one shoddy material, or one sub-contractor who didn't pour the concrete properly, or an addition that added different stresses, or an increase in use, or an environmental factor (heat/cold/salt water corrosion), or a new way of using it, or some repairs made with a new material....and it breaks. Petroski examines how engineers learn from the process of breaks--designing things that avoid fatalities and damage through managed failures, testing and designing safety tolerances, attempting to have designs carried out in transparent and safe construction practices, the national characters of British, Canadian and American Engineering codes of ethics, and the studies made of catastrophic failures like the I-35 bridge collapse in Minneapolis.

Thomas Warger says

[Brilliant concept in the book-cover illustration, too: egg shells need to be st

Stella says

I like it because it is a non-fiction book. I appreciate the thorough explanations about metal fatigue, testing strength of building materials, and intended planned failure. That was something I never thought of. For instance, crackers, stamps and chocolate bars, are perforated to break easily when a certain force is applied. I had not previously thought of this concept. A sprinkling system in case of fire has a thermo-sensitive device

that breaks when the air around it reaches the design activation temperature of the individual sprinkler. Then the water starts flowing. That is the intended design failure of the design. "Sometimes a component must fail in order for the larger system to succeed."

I don't particularly LIKE the narrator but I don't hate him either. He is a bit annoying.

I noticed in Henry's last book, *To Engineer is Human*, that there is a sort of rivalry between physicists and engineers. I have actually seen something similar when my old Science Methods teacher at the U had some disdain for applied science. "This does not indicate that the university's proud physicists have any less of a sense universality of purpose or of superiority over their engineer colleagues than physicists everywhere." This line from the book says it all!

Reading about the horrible Challenger and Columbus failures, the bridge disasters etc. was fascinating. Getting to the root of the problem, understanding how to fix it for next time, that's so important. It requires real investment of time as well as open minds. There are so many variables around a plan crash, a bridge collapse, a chemical spill, one must be open to learning from it and not decide what happened before investigating.

One of my favorite premises from the book is about the Titanic. The Titanic was the most spectacular, the best ship of its time. If it had not hit an iceberg, how many other ships would have been made to the same specifications before another hit an iceberg or a dock or another ship and exposed the weak area in the design?

Awesome book. I will be reading more by this author.

Qwerty88 says

Read *_To Engineer is Human_* and *_The Evolution of Useful Things_* and you'll have captured the main points in a more cohesive presentation.

I really wish that he had done more with the idea of the human factors which cause failure which he hasn't really covered before - the people who bypass systems which are perceived as too constraining, the employees who don't want to cause waves, the toxic workplaces that lead to accepting too much risk without realizing it, etc.

Carol says

I got this from the library with the intent of gleaning a few tidbits for a class assignment. I ended up reading the whole thing and not using any tidbits. The book gives good historical accounts of several engineering catastrophes and their human interfaces while highlighting the value of failure.

Alan Cunningham says

This was a great book for this time in my life. The author makes each paragraph into a little story of its own, which means he writes more than I would care to, but his prose still flows. I have enjoyed two of his other books, for much the same reasons. He gets the inside scoop and detailed accounts on long dead tales that bring history alive.

Clif Hostetler says

This book is a combination memoir and history of design failures. From the patterns developed by the relationship between failures and the striving for economical design, the author draws conclusions regarding the dangers that can emerge from complexity and the subsequent passage of old designs on to new generations of designers who have forgotten old lessons.

Unexpected and unintended failures are obviously bad, but once they occur the lessons learned are very valuable. The whole process of understanding why the failure occurred as well as why the cause was missed in the design process are necessary for progress to be made.

Sometimes the design is adequate but the construction process or the manufacturing of the material failed to meet the design intent. Other times improper maintenance and corrosive environments are at fault for causing failure. Thus there are many tiers of responsibility and communication that need to perform smoothly if public safety is to be maintained.

Some of the more notable examples of failure that are discussed in the book include the 2007 Minneapolis bridge collapse, the 2009 Boston prolonged Big Dig, the 2010 Gulf oil spill, the 1912 sinking of the ship RMS Titanic, the 1940 Tacoma Narrows bridge collapse, and the 1986 Challenger and 2003 Columbia space shuttle accidents.

Joe says

The case studies presented have been discussed elsewhere in comparable detail with similar conclusions. Aside from the author's tales of his own past, there was little in the way of original insight.

Kelsey Grissom says

While this book was written more for engineers, I (who am NOT an engineer) still found it thought-provoking, entertaining, and informative. Petroski is particularly good at interdisciplinary thinking, which makes this book useful for anyone who is willing to slog through the little bits of insider-writing about Engineering campuses and practices in order to mine the gold about what failure could (and should) teach us.

John Kowalczyk says

Petroski starts out strong with numerous descriptions in rapid succession of structural concrete related failures, highlighting the underlying non-obvious causes. It was a pleasant and confidence building beginning. And overall, I was impressed. The author emphasizes throughout the book, the importance of proper planning and analysis and shows respect for the complexity inherent in sophisticated engineering designs, refuting oversimplified 1:1 causality. But for some reason, I felt it was lacking. The book is good and well worth a serious read, but some tangential narratives of engineering history and such felt unimportant and detracted from the overall quality of the book. I still recommend it, but would also

recommend skipping the portions that were extraneous to the case studies that I found much more interesting.

John Pedersen says

This is an engaging, although lengthy, read. I admit I resorted to skimming through much of the book since I got it from the library and only have so much time. However, the central premise of the book is clearly true - studying failure should be a never-ending activity for engineers (and those involved in management of engineering projects).

A few lines present the premise very clearly. One might as well just be the summary of the lesson we should take from the book - "It is imperative that the realistic prospect of failure be kept in the forefront of every engineer's mind." Another, in reflecting on the hundreds of years of books on what we today call engineering or design, captures the historical view as well "One thing that especially impressed me was that, seeming no matter when a book on design was published, it discussed either explicitly or implicitly the persistent problem of failure and how to avoid it."

This book probably could have been shorter, and focuses mostly on bridges, but nevertheless, it is a valuable commentary on engineering and is relevant to every branch of engineering.

David says

Petroski writes almost an ode to failure: why it happens, why it must be studied and why we must always welcome it. It is through failure that things are learned and designs improve. Petroski looks at failure in a very broad sense: not just failure of design or technology but of all of the human decisions that come into play when massive projects - like bridges or shuttles - are put together. Petroski hopes that modern colleges of engineering and modern engineers study failure and plan for failure so that new things can be learned and designs strengthened over time.
