



## EES Robust Systems Engineering

Systems are failing.

We take for granted what goes on behind the scenes in medicine, banking, retail, automotive, and all sectors of the economy. A recent inquiry into the Toyota recall has found that actually the accelerator problem is not a mechanical failure but a software bug.<sup>i</sup>

Since the .com bust, the amount of new graduates with I.T. or mathematics degrees has dropped drastically. DARPA is even concerned that this is a threat to national security.<sup>ii</sup> DARPAS numbers have a decline as steep as 43%:

*A "significant national decline" in the number of U.S. college graduates with science, technology, engineering and mathematics degrees is "harming our national security," according to a recent report from the Department of Defense. According to DARPA, the Pentagon's research agency, the issue is of "national importance" and "affects our capacity to maintain a technological lead in critical skills and disciplines" on the international stage. The report (.pdf) cites a pronounced downward trend in computer science degrees and underlines the importance of them in an age of increased adoption of the Internet. There were 43 percent fewer graduates and 45 percent fewer CS degree enrollments in 2006-2007 than in 2003-2004, according to the Computer Research Association.<sup>iii</sup>*

This may partially explain the current "I.T. Crisis," but it is not the entire story. A combination of factors, economic, political, and social, have created an opportunity that the internet exists at all, but at the same time have restricted it's development in certain markets. How is it that South Korea is outperforming the United States in internet download speeds and costs?<sup>iv</sup>

## Manhattan project for banks

Joseph Menn, cyber security expert for the Financial Times, claims we need a new "Manhattan Project" for banking systems. In an article on wtop.com, he states:

*WASHINGTON - Ask your bank how safe it is to do business online and it may tell you it's more secure than traditional banking. But cyber security experts would disagree. "That's a lie," says Joseph Menn, who reports on cyber security for the Financial Times. "The banks are stuck because they've been telling people it's safe, and the fraud they're on the hook for has gone up four-fold in six months," Menn says. "The banks have been kidding people about all this because they save money when people bank online." Menn says the Internet was not designed with security in mind. He says it's fine for YouTube. "But anything financial, anything commercial, anything government needs to be on a different network. Technologically, we need a Manhattan Project," Menn says. "We can keep our current computers and chips, but we need different protocols, different ways for computers to talk to each other that do not rely on openness and trust."<sup>v</sup>*

Banking is a good example, because it is obviously a well funded industry that should be leading the technology development curve. Instead, massive data loss, theft, and other issues occur and are growing on a daily basis.



## **The Gap**

Companies like Intel, IBM, and others, have spent billions researching and designing very sophisticated processors and computer systems in general. Mostly, this equipment has been placed in the hands of the consumer (even if that consumer is a business). Exceptions are rare, such as mainframe environments such as IBM System Z<sup>vi</sup>, as there has been a trend even in large enterprise applications to client-server solutions vs. mainframes and robust systems administered by companies such as IBM.

While technology is exploding exponentially in terms of processing power and sophistication, computer education and understanding is declining, creating a 'knowledge gap' that is getting wider and wider. On a macro level, this gap can explain commonplace system meltdowns that are occurring more and more, comparing with 10, 20, or 30 years ago.

Instead of using the internet as a means of collecting information not available through traditional media such as TV, consumers have driven a trend to move TV to the internet and wireless devices.

## **Possible Trend toward serviced computing**

This problem may lead to a trend toward fully serviced computing, such as SAS on a consumer level, which is seen in cloud computing and web services. Users may have their power stricken from them, as they continue to damage their own systems and in the case of businesses, cause losses and general economic chaos.

For example, systems could be automatically backed up, for a fee, instead of relying on the user to backup their own data. Robust devices such as the Ironkey may grow faster in popularity vs. 'cool' devices such as the iPad.

As enterprise, consumer, and business systems begin to fail, without a shift to centralized, serviced computing, we may face an I.T. crisis.

## **Why should we notice?**

EES has found that the majority of client issues in our business are in fact I.T. related not trading related. In fact, if you examine most businesses, they are in fact I.T. businesses rather than their supposed business. For example, with the integration of electronic banking systems, banking is 95% I.T. and it could be argued that many businesses are in the same category: I.T. systems that run the businesses are increasingly more important than their core businesses. Wal-Mart, clearly not in the I.T. business, attributes its success to a computer system that tracks pricing, inventory, and customer demand on a large scale.

We are now forced to learn, adapt, and integrate; or suffer the fate of Enron, a billion dollar company run on an excel spreadsheet<sup>vii</sup>, or worse.



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- <sup>i</sup> <http://gizmodo.com/5467388/software-bug-causes-toyota-recall-of-almost-half-a-million-new-hybrid-cars>
- <sup>ii</sup> <http://www.smartplanet.com/business/blog/smart-takes/darpa-significant-decline-in-us-science-tech-degrees-harming-national-security/3412/>
- <sup>iii</sup> <http://www.smartplanet.com/business/blog/smart-takes/darpa-significant-decline-in-us-science-tech-degrees-harming-national-security/3412/>
- <sup>iv</sup> <http://www.cnn.com/2010/TECH/03/31/broadband.south.korea/?hpt=C2>
- <sup>v</sup> <http://wtop.com/?nid=111&sid=1894237>
- <sup>vi</sup> <http://www-03.ibm.com/systems/z/>
- <sup>vii</sup> [http://www.pwc.com/en\\_GX/gx/xbri/assets/pwc\\_complete.pdf](http://www.pwc.com/en_GX/gx/xbri/assets/pwc_complete.pdf)