LOST OPPORTUNITIES
THE COST OF IGNORING COMMERCIAL INNOVATION
Executive Summary

If government information technology (IT) spending continues to grow at its current pace, the United States will distribute over $500 billion dollars to government contractors between now and 2023. In significant part, this money will likely be spent building IT solutions that already exist in the commercial marketplace—a problem that lacks media coverage commensurate with its size and importance.

We were warned about the current state of affairs over 20 years ago. In 1994, then Senator William Cohen wrote *Computer Chaos, Billions Wasted Buying Federal Computer Systems*. In that investigative report, Cohen identified a useful analytic perspective to measure government IT spending, calculating the government’s IT spend as a percentage of total United States discretionary funding. Cohen noted that the government was spending more than $25B on IT annually. This represented about 5 percent of its total federal discretionary funding, but Cohen found that neither the public nor the government had realized the benefits of the $200B spent in the previous decade. For Cohen, 5 percent was already too much as compared to the value American taxpayers received, in part, because the government was wasting money on building systems from scratch rather than purchasing products from the commercial marketplace.

Cohen’s warning has gone unheeded. Since *Computer Chaos* was written, the government has spent about $1.6T on information technology against a discretionary budget of about $25T—or about 6.4 percent of funding. In other words, the percent spent on IT has climbed since the Cohen report and the passage of the Federal Acquisition Streamlining Act (FASA) that same year—an Act designed to reduce unnecessary spending, by requiring the government to buy commercial products, whenever possible.

In recent years, how much of the government’s IT spend has been wasted? Studies show the average enterprise-spend for IT, across all commercial industry sectors, is about 3.3 percent of revenues. If the government IT spending matched the industry average as a percentage of revenues, the government would have saved about $717B since 1994. If the government had been able to keep its spending at Cohen’s rate of 5 percent (the same rate already bemoaned at the time as wasteful), it would have saved about $345B in the twenty-five years since Computer Chaos was written, and FASA was enacted.

Although the exact amount of waste may be subject to debate, there is every reason to implement IT acquisition best practices well-known by digital leaders, which are obvious on their face and mandated by laws like FASA. Specifically, the government should never incur the cost, time and risk to build a custom IT system—reinventing the wheel, when a proven commercial product is already available that meets or exceeds requirements at the same or lower cost.
Introduction

The federal deficit for fiscal year 2019 is a fraction under a trillion dollars and the deficit for 2020 is predicted to be 1.1 trillion. The aggregated national debt from years of government spending currently sits north of 22 trillion dollars. No one category of spending is the single culprit of this financial dilemma, but there has been a specific component of the federal budget that has accounted for waste in an extraordinary way, with some of it being patently illegal and much of it being defiant of the intent of the Federal Acquisition Streamlining Act of 1994 (FASA).

In the twenty-five years since FASA required the government to purchase readily available commercial information technology (IT) products instead of developing unique custom solutions, the Federal government has likely wasted at least $345B on IT—a cost equal to about $2,737 per every American household.

There are numerous reasons why the government should not be in the business of developing products that already exist—especially in IT. The failure rate of government-built IT solutions is high, forcing taxpayers to foot bigger bills for worse outcomes. In developing its own bespoke solutions, the government also misses out on commercial marketplace innovation. For all these reasons, there is broad agreement among policymakers that the government should buy commercial products whenever possible. Yet, a recent estimate of government spending between 2018 and 2023 estimates new commercial software will only account for 11% of $664 billion in total IT expenditures.

The unfortunate way the government unnecessarily wastes money on IT has been previously noted in hundreds of official reports, but it’s time to focus attention on the wide-ranging economic consequences of not fully adopting commercial IT and the resulting unnecessary cost to American taxpayers.

“It should be rare for the government to purchase anything but commercially available hardware and software...unless agencies radically alter their dependence on uniquely developed non-commercial computer systems...[FASA] may not have a significant effect...”

SENATOR WILLIAM S. COHEN (1994)
The Worst Kept Secret: Most IT Development Projects Fail

One of the largest economic consequences of not adopting commercial IT is that taxpayers are forced to pay for the development of IT projects that fail most of the time. Software development is exceedingly difficult, and not just for the government. In a still referenced research project from the mid-90’s, the Standish Group, a UK consulting firm, analyzed 8,380 application development projects across 365 organizations to determine the following results.9

- 31.1 percent of all custom software projects were canceled
- 52.7 percent cost 189% of original cost estimates
- On average, for every 100 projects that start, there are 94 restarts

In fact, the study showed only 9 percent of all projects for large organizations were completed on-time and on budget. The picture has not improved since the landmark mid-90’s study. In 2016, a research project showed 55 percent of the IT professionals surveyed reported they had a project failure in 2015.10 In 2009, an even bleaker report indicated that it was probable that 68 percent of IT projects would ultimately fail.11 When the government decides to build what it could otherwise purchase, it is asking tax payers to assume the risk that the money will be totally wasted as much as 68 percent of the time. Even if the project eventually works, it is likely that it will miss its deadlines and budget goals 91 percent of the time.

Congressional oversight, and media reports, periodically expose IT scandals such as the Expeditionary Combat Support System (ECSS) that cost taxpayers over $1 billion and delivered no “significant military capability.” But the after-action explanations always focus on why the individual system failed instead of whether the government could have reduced the risk to taxpayers by procuring a commercial product in the first place. Buying commercial is infinitely superior to trying to develop solutions from scratch, whether you are the government or a commercial enterprise. The depth and impact of commercial solutions has exploded but government hasn’t noticed.

[O]nly 9 percent of all projects for large organizations were completed on time and on budget.
In the business of information technology (IT), the bedrock principal of Moore’s Law is a testament for the consistent delivery of technical innovation produced by commercial industry. Just as promised by Intel technologist Gordon Moore in 1965, the density of transistors on circuit boards has doubled about every two years, bringing enormous commercial innovation directly to ordinary consumers, at astonishingly low prices. Because of Moore’s Law, a single teenager’s iPhone has more capacity than all of the computers used by NASA to land a man on the moon--combined. But despite this and other similar transformative innovations such as commercial cloud computing and new software architectures, much of our government’s approach to information technology harkens back to the early days of NASA, when systems were built from scratch by government contractors.

The Global Information Technology Industry: $5 Trillion

While this may have made sense given the unique needs of the moonshot, or similarly unique government requirements, when misapplied, the absurdity of this approach has been decried before. The digital revolution was still young in 1994 when Senator William Cohen wrote “Computer Chaos: Billions Wasted Buying Federal Computer Systems.” Cohen claimed the government had already wasted much of the $200B it spent on IT systems, in the decade between 1984 and 1994. In the twenty-five years since Cohen wrote Computer Chaos, it is easy to envision
how the government has wasted another $345B dollars or a little less than a quarter of the $1.6T it spent on IT for the period—either through poorly functioning investments or through the excess costs incurred by not investing more wisely in readily available commercial technologies.

It was not supposed to be this way. After the Congressionally mandated Section 800 Panel of 1993, and with media reports of $640 toilet seats being custom built, Congress passed the Federal Acquisition Streamlining Act of 1994 (FASA). FASA was designed to inject commercial products into the government and invite commercial suppliers to participate in the Federal market—both for cost savings and for innovation. To accomplish this, FASA created a safe zone for regular consumer goods and services by designating them “commercial items,” and by mandating that they be given a preference over custom manufacturing and development.

But old habits die hard. FASA did not kill the steady drumbeat of customized IT project which has led to an unacceptable economic loss for American tax-payers.

[Sch]In the decade between 1984 and 1994 . . . it is easy to envision how the government has wasted another $345B dollars or a little less than a quarter of the $1.6T it spent on IT for the period
FASA Has Been Ignored for Federal IT

The government was correct to believe that quick adoption of commercial technologies would return immediate benefits. In the current massively connected digital world, we have entered a new era of automation that some are calling the 3rd industrial revolution.\textsuperscript{19} As we speed through the first quarter of the 21st century, commercial IT products are so profoundly pervasive and ubiquitous, it’s hard to keep track of them. Gartner, Inc., which provides market analysis of the commercial IT industry, issues 111 “Magic Quadrant” reports—each depicting a defined product category with multiple competitors.\textsuperscript{20} Likewise Forrester, another IT market analyst, produces 216 “Wave” reports.\textsuperscript{21} Just covering the voluminous possibilities of commercial IT solutions has become an industry unto itself. The point is there are literally thousands of commercial IT solutions relevant for the government.

Unfortunately, the best laid plans for FASA with respect to commercial information technology did not completely materialize. A simple review of the government’s annual expense to keep old bespoke systems operating, combined with the economic loss associated with poor performing, non-agile systems, and the fact that the world’s most innovative IT companies only do a small fraction of their business with the government, shows that FASA has not provided taxpayers with the hoped-for benefits or cost savings.

The editor of Federal Computer Week recently assembled IT leaders from across the government to discuss the lack of IT innovation. Tellingly they mentioned the struggle to enforce a preference for commercial products, as FASA requires, over bespoke systems:

“Few mission owners are willing to adapt their approaches to the ‘70 percent’ solution that a COTS [commercial off-the-shelf] product can offer, and they instead hold out for a custom solution... you’ve got to break that mentality, which is hand-to-hand combat.”\textsuperscript{22}
On-Going Waste and Economic Loss

The conservative $345B dollar estimated loss to taxpayers, for the continuation of development of customized systems, can be found in several categories of waste, including: Operations & Maintenance, Poorly Managed or Abandoned Custom Development Projects, Inability to Attract Innovation, Waste, Fraud and Abuse, and the Opportunity Costs of Poorly Performing Operational Systems. The discussion below shows the negative consequences of the failure to adopt commercial solutions in each category.

IT Operations & Maintenance Waste Is Enormous

In 2016, GAO released an eye-opening account of the money that was used to hold together the government’s legacy IT—the vast majority of it custom built. Between 2010 and 2017, at least $440B was spent on operations and maintenance (O&M) for existing systems.\textsuperscript{23} In 2015 alone, $61.2B was spent on O&M, while only $19.2B was spent on development, modernization, and enhancement (DM&E).\textsuperscript{24}

Figure 2. The portion of spending allocated to operating and maintaining legacy systems is growing over 1\% per year, and already accounts for over 77\% of the U.S. IT budget. This is starving the ability of the federal government to invest in innovation. If commercial products were used, maintenance costs could be controlled, freeing up funds to invest in modernization and innovation.
In the same report, GAO listed seven specific systems with ages that ranged from 31 years old to 56 years old and pointed out that some were written in archaic languages like assembly or COBOL. Of the roughly 7,000 budget requests for IT in 2015, 5,233 or 74 percent, were for maintaining old bespoke systems. Of course, if these were standard commercial systems, the costs of maintenance would have been borne by the provider and amortized across a large customer base.

Furthermore, GAO reported the O&M trend had gotten worse across the seven years scrutinized. In 2010, the government was spending only 68 percent of its IT budget on O&M. By 2017, it was spending 77 percent of its budget on O&M. This dismal trend meant that there was $7.3B less money available for new IT in 2017 than there had been in 2010. To be clear, we are talking about $61B to keep archaic customized systems alive —more than $185 for every man, woman and child in the United States, per year. And not one increment of innovation, new functionality, or cost savings would be derived from the $61B spent on something perversely labeled “IT investments.” If this trendline continues, eventually 100 percent will be spent on maintaining legacy systems—which is obviously untenable.

Among the oldest systems held together through O&M spending include:

- The IRS’s authoritative individual taxpayers accounts, written in COBOL operating on a mainframe (56 years old);
- The IRS’ authoritative business master file, written in COBOL, operating on a mainframe (56 years old);
- The VA’s timekeeping and attendance system, written in COBOL, operating on a mainframe (53 years old);
- The VA’s veteran’s benefits eligibility system, a suite of applications, written in COBOL, operating on a mainframe (51 years old);
- Social Security’s retirement eligibility system, comprising 162 subsystems, some of which are written in COBOL (31 years old)

Gartner’s 2017 CIO survey revealed that top performing organizations were spending 34 percent of their IT budgets on digital innovation, rather than holding together legacy systems. If the government’s O&M spending were more in-line with the top performers in industry, it would have approximately ten percent more to spend on new digital commercial innovation, or roughly $44B of the $440B spent on O&M between 2010 and 2017, alone. Imagine what those savings might look like across twenty-five years, instead of just seven. And, this does not include ancillary benefits, such as reduced fraud and backlogs.

This extra spending on O&M in recent years aligns well with the increase of IT
spending in proportion to the government’s discretionary funding. On average, the increase in IT spend as a proportion of discretionary funding increased by an entire percentage point from about 6 percent prior to 2011, to about 7 percent ever since. Likewise the actual IT budget has gone from $71B in 2011 to $92B in 2019. As bespoke systems get older, they increasingly become more expensive to maintain and they will continue to eat into funding that could be spent on new commercial solutions.

The majority of the government’s old information systems should have been retired and replaced with commercial applications, maintained by commercial software licensors and routinely upgraded with innovation, as the commercial suppliers systematically inject research and development innovations into their installed base of products. Continued renewal and innovation is the historic commercial software licensing business model. The commercial software company invests in research and development, and the users get the results for an annual maintenance fee. Unfortunately, this classic commercial model bears little resemblance to the reality of our government’s IT estate.

Maintaining the United States’ old custom code is where approximately 77 percent of the government’s annual IT budget is currently spent. This is a diseconomy of scale and the complete opposite of what was to be garnered by FASA. It’s absurdly expensive and virtually guarantees locking out innovation and the economical adoption of commercial technologies. Further, it perpetuates a cycle of irrationality. When the vast majority of the government’s IT budget is used to prop up old junk systems, there’s little money left for economical and efficient innovation. Furthermore, the older systems are often the prime targets of cyber-security threats, precisely because many do not have modern commercial cyber-security defenses.

The problem of old systems is not new. All of this was noted, twenty-five years ago, in Cohen’s Computer Chaos:

The federal government continues to operate old, obsolete computer systems while it has wasted billions of dollars on computer modernization efforts...Outdated IRS computer systems have contributed to a $70B backlog in uncollected taxes and unreliable financial reports....the DoD operates 161 different “major” accounting systems on archaic computer systems, making it difficult, if not impossible, to audit defense expenditures, and forces DoD to rely on contractors to identify government overpayments...  

We are losing a fortune by spending on these old antiquated bespoke systems, many of which should never have been built from scratch in the first place.

In a 2015 report, GAO listed a litany of failed IT projects:

- DoD’s Expeditionary Combat Support System, canceled in 2012, after spending more than $1B and failing to deploy within 5 years;
- DHS’s Secure Border Initiative Network Program, canceled in 2011, after $1B obligated, because it did not meet viability standards;
- VA’s Financial and Logistics Integrated Technology Enterprise Program, terminated in 2011, estimated cost $609M;
- NOAA’s National Polar-orbiting Operational Environment Satellite Systems, terminated in 2010, after 16 years and almost $5B.

Id. At FN 32.
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Remember: one of the key drivers of FASA was to bring this wasteful systems development to an end.

Poorly Managed; Late or Abandoned Custom IT Projects

Between 2009 and 2014, the GAO made over 700 recommendations for the improvement of managing agencies IT investments. By 2015, GAO was so concerned with the government’s inability to effectively improve operational IT, it added IT acquisitions and operations to their “high-risk” series of reports delivered annually to Congress. In the graphic below, GAO shows that after an investigation in 2015, about 21 percent of all the IT investments tracked that year were in some form of trouble. Likewise, in hearings supporting the recent Federal Information Technology Acquisition Reform Act (FITARA), it was reported that between 2003 and 2013, at least $9.2B worth of IT custom development projects had to be abandoned, because the systems to be developed simply would not work.

Overall Performance Ratings of Major Investments on the IT Dashboard as of May 2015

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<tr>
<td>Needs Significant attention</td>
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</tbody>
</table>

Source: Office of the Management and Budget’s IT Dashboard | GAO-15-675T

FIGURE 3. According to GAO, 21% of IT project investments in a recent year either needed attention or needed significant attention. This amounted to $8.7 billion. There is no reason to believe that these percentages have improved significantly.

The Government’s Inability to Attract Commercial Innovation Leaves Over $300B in Research and Development on the Table Every Year

In the $1.6T the government has spent on IT since FASA, its failure to fully exploit commercial systems has effectively left a massive amount of commercial investment on the sidelines. In 2017, commercial technology companies spent $341B on research and development, while DoD spent $75B. In recent years, commercial companies are outspending DoD by 450 percent on innovation and development.

In the runup to FASA, there was much consternation over an awareness that DoD was no longer the world’s top investor in research and development and the force
behind technology breakthroughs. Even by 1994, it was clear that private industry, backed by the sales of a gigantic market of ordinary consumers, had much more money to spend on improving products and creating novel solutions than the government. In 1996 alone, businesses and consumers spent over $200B just on personal computers. According to Forrester Research, there are now over two billion personal computers in use around the world.

DOD and Private Research Sector Research and Development Spending

![Graph showing DOD and Private Research Sector Research and Development Spending](chart.png)

**FIGURE 4.** Decades ago, DoD R&D investments were arguably on par with those of the U.S. private sector’s. Digital technologies have become mainstream and grown exponentially, driven by consumers and enterprises. As a result, private sector R&D now vastly dwarfs the DoD.

In that regard, Congress knew that for FASA to work, it would be necessary to make sure that commercial companies would be actually willing to engage with the government. To that end, the 2nd ingredient of FASA, the glue to the whole approach, was the removal of onerous regulations that would typically be forced upon any contractor attempting to sell goods or services to the government. The spirit of FASA was to ensure that the government could contract with commercial companies on normal commercial terms—and the law explicitly removed some of the most onerous of all contracting clauses, including the mother of all onerous clauses known as TINA, the Truth in Negotiations Act, which required contractors to reveal their internal costs and pricing information.

But the government’s penchant for regulation is hard to suppress. Even though FASA clearly stripped out the most burdensome regulations for commercial companies, regulatory creep forced its way back into contracting. With respect to regulation creep, the Congressionally mandated 809 Panel reported in 2018:

[B]etween 2003 and 2013, at least $9.2B worth of IT custom development projects had to be abandoned, because the systems to be developed simply would not work.
Since FASA was implemented, the number of DoD-related commercial buying provisions and clauses has increased by 188 percent, and the number of commercial clauses that may be flowed down has increased five-fold. In 1995, the FAR and DFARS contained a combined total of 57 government clauses applicable to commercial items. Today there are 165 clauses, with 122 originating in statute, 20 originating in executive orders, and 23 originating in agency-level policy.\textsuperscript{44}

In fact, despite the hopes of FASA, the government still consistently relies upon a community of incumbent government-unique contractors for most of its IT spend and repels the world’s most innovative companies. The Center for Strategic & International Studies (CSIS) produced a report in 2018, showing how hard it was for new market entrants to survive the government contracting market. CSIS studied contractor data in the Federal Procurement Database System (FPDS) starting in 2001 and reached the following conclusion:

The survival rates show that around 40 percent of new entrants exit the market for federal contracts after three years, around 60 percent after five years, and only about one-fifth of new entrants remain in the federal contracting arena after 10 years.\textsuperscript{45}

It is hard for all small business to survive. It’s a well-known fact that many fail in the first few years of existence. But the government’s extreme requirement for government-unique contracting terms and conditions only compounds the problem. The inability to attract and maintain new market entrants and innovators is a total reversal of the aspirations of FASA.

\textbf{Waste, Fraud and Abuse Goes Undetected in Old Non-Commercial Systems}

In fiscal year 2017,\textsuperscript{46} agencies reported $8.8B to the Office of Management and Budget (OMB) in confirmed fraud.\textsuperscript{47} A review of “high-priority” programs, across nine different agencies, where at least $100M in losses were reported reveals a common denominator—processes where modern commercial risk assurance verifications of data can and should occur—they don’t. For instance, on USDA’s Supplemental Nutrition Assistance Program (SNAP), there were confirmed overpayments in fiscal 2017 of $3.3B. The primary reasons given for overpayments was poorly captured or fraudulent data.\textsuperscript{48}
FIGURE 5. Data stewardship and data quality initiatives have long been a focus of private enterprise. In just one program, the Supplemental Nutrition Assistance Program, over 3 billion dollars of waste through overpayments was identified. This could be vastly reduced through use of commercially available software and services, such as online income verification.

Commercial applications that can prevent this type of inaccurate or fraudulent data have been available for years. Every major retailer in America can do an on-line income verification in seconds, prior to issuing a credit card. Income verification is key, because it is the number one predictor of whether the applicant has the capacity to repay a loan. False statement of income is the number one predictor of fraud. Old bespoke systems, sitting on customized applications, cannot effectively link to 3rd party income-verification, address verification, social security verification, or do-not-fly list applications. These old non-commercial systems are stranded, as if on a desert island.

The reluctance to bring in commercial applications has created an enormous opportunity cost in fraud, waste, and abuse alone. Note the improper payments reported to OMB are only the wrongful payments that have been detected. Because the government is so deficient in modern commercial data collection, it’s also devoid of the analytics typically used to determine patterns of fraud or spot early negative trends.49 It is likely the $8.8B in inappropriate payments detected in 2017 is a superficial glimpse into more profound losses.

Unrealized Benefits and Opportunity Costs of Not Adopting Commercial Technology

When all goes well, IT deployments can offer an excellent return: many impactful benefits at a comparatively low total cost, or at least a fair return where the benefits are commensurate with and exceed the costs.

On the other hand, every time the government risks developing a customized IT project, it risks creating an economic loss that goes well beyond the time and money spent on development. This particular category of loss is potentially huge
and devastating. Like the old proverb about the iceberg, the vast majority of the economic losses of subpar IT are hidden.

The case of Healthcare.gov is well known, but the underlying loss associated with its disastrous development has never been fully appreciated. How many hours of productivity were lost while Americans spent hours trying to logon and complete applications? How many Americans gave up and therefore never purchased the insurance coverage that insurance companies required in order to maintain their stated premiums? Perhaps most importantly, the very legitimacy of the Administration was called into doubt for a simple failure to deploy a working IT solution, to support a signature piece of legislation which was the will of Congress. Increasingly, as we race into the digital age, many forms of legislation will need an operational IT component. When government IT fails to deliver to constituents, the government risks losing legitimacy.

**FIGURE 6.** Some federal IT software and services may be unnecessary, but most exist to provide services to civilian or military personnel or to ordinary citizens. When these systems are down for maintenance, down due to software bugs, or down due to cyberattack, enormous costs can be incurred. These costs are not captured by IT budget analysis, but costs incurred by users or beneficiaries due to unavailable, inaccurate, or delayed services. A wide range of systems, such as background firearms checks or Veterans Affairs scheduling, can have life-impacting consequences; some, such as air defense, can have enormous national security consequences.

Recently the U.S. Digital Service identified issues with a Veteran’s Affairs eligibility tool, namely that it was likely to generate errors, have performance issues, or even crash. Poor user design and response time issues could increase patient appointments by five to ten minutes. A few minutes may not seem like a big issue, but the report indicated that it could have the effect of depriving up to 75,000 veterans from receiving health care each day. That potential loss is not measured in the cost of the information system, but rather the cascading effect of inefficiencies, like the
fender-bender that ripples through rush hour traffic and causes everyone to be late. In the case of an extra few minutes unnecessarily spent with patients due to poor IT, would the VA eventually need to bring on-board more doctors, require more facilities, and more equipment to handle the backlog? As if these extra costs were not enough, how do you calculate the loss of a life or human suffering potentially caused by a delayed diagnosis?

Furthermore, where the government spends its investment dollars has a huge effect on the American economy. When the government builds unique systems, it deprives commercial firms of the income that would be pumped back into commercial research and development. A bespoke system that can only be sold one time, to one customer, represents a very limited investment. It’s really the difference between building a bridge used by a handful of people, versus an interstate highway. If the government were the largest consumer of commercial IT applications, it would greatly enhance the competitive posture of American technology companies and its investments would become part of the pool of funding that drives innovation for the benefit of all of us. It would also be a competitive benefit for America, as we consider the impact of China’s direct investment in Chinese technology companies like Huawei.
Conclusion

Despite these profound losses to American taxpayers, IT funding continues to flow from Congress at a rapid pace—much of it destined for the operations and maintenance of antiquated legacy systems or slated for custom IT development. Deltek’s recent “Addressable Government IT Market” survey for the six-year period, between 2018-2023, forecasts $664B in net new IT dollars to be spent government-wide.\textsuperscript{52} To be clear, this is 66.4 percent of a trillion dollars to be spent over six years—almost two times the market valuation of Exxon Mobil—and only a couple of years of spending less than the money required to buy Google or Microsoft, in their entirety.\textsuperscript{53} Of this enormous six-year figure, only $78B, a mere 11 percent, is predicted to be spent on new commercial software.\textsuperscript{54} Meanwhile, $191B, the lion’s share, is destined to go to an entrenched system integrator community, to be spent on IT professional services, where most of it will fund the maintenance of a patchwork of ancient bespoke non-commercial systems.\textsuperscript{55}

Every citizen and legislator should be alarmed at the wasteful, profligate spending endemic to federal IT. If this spending represented actual investments in capabilities and services to improve national defense, improve services to citizens and civilian and military employees, reduce fraud, improve health and welfare, and the like, we would all applaud it. After all, several other countries have services that we can only envy.\textsuperscript{56} Instead, a variety of enormous costs are being incurred to accomplish little, even though best practices in information technology management and software and service procurement are widely known and time-tested.

And, of course, FASA, the Act that requires the government to buy commercial products over building government-unique solutions, is still the law.
Appendix

IT Spending v Discretionary Spending

Although we stated that the loss to American taxpayers for wasteful IT spending is $345B, the actual amount of loss cannot be definitively proven, because the government does not track the performance of its IT investments at a level of detail that allows for a precise governmentwide economic analysis. In fact, we know the true numbers of actual IT spend are significantly higher than the official reported numbers, because the classified portion of the budget is not reported.

It is widely believed that an industry average (across all sectors) for IT spend is about 3.3 percent of revenue. The total federal IT budget for the last twenty-five years is about $1.6T. In the same period the government had about $25T in discretionary funding. Stated as a percentage, the government spent about 6.4 percent of all its discretionary funding on IT, since 1994, and about 7 percent since 2013. If the government had been able to shave 1.4 percent off this spend, over this time frame, spending only 5 percent of discretionary funding instead of 6.4 percent, it could have saved $345B.

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<td>6.50%</td>
</tr>
<tr>
<td>2003</td>
<td>$50</td>
<td>$849</td>
<td>5.89%</td>
</tr>
<tr>
<td>2002</td>
<td>$46</td>
<td>$734</td>
<td>6.27%</td>
</tr>
<tr>
<td>2001</td>
<td>$43</td>
<td>$663</td>
<td>6.49%</td>
</tr>
<tr>
<td>2000</td>
<td>$40</td>
<td>$584</td>
<td>6.85%</td>
</tr>
<tr>
<td>1999</td>
<td>$37</td>
<td>$581</td>
<td>6.37%</td>
</tr>
<tr>
<td>1998</td>
<td>$34</td>
<td>$529</td>
<td>6.43%</td>
</tr>
<tr>
<td>1997</td>
<td>$32</td>
<td>$511</td>
<td>6.26%</td>
</tr>
<tr>
<td>1996</td>
<td>$29</td>
<td>$500</td>
<td>5.80%</td>
</tr>
<tr>
<td>1995</td>
<td>$27</td>
<td>$510</td>
<td>5.29%</td>
</tr>
<tr>
<td>1994</td>
<td>$25</td>
<td>$512</td>
<td>4.88%</td>
</tr>
<tr>
<td>Total Spend</td>
<td>$1,586</td>
<td>$24,820</td>
<td>6.40%</td>
</tr>
</tbody>
</table>

AMOUNTS IN BILLIONS

Discretionary Spending—Potential Percentage of Waste

<table>
<thead>
<tr>
<th>Target Spend Percentage</th>
<th>Target IT Spend</th>
<th>Actual IT Spend</th>
<th>Potential Wasteful Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5% of Discretionary Budget</td>
<td>$868.70</td>
<td>$1,586</td>
<td>$716.90</td>
</tr>
<tr>
<td>4% of Discretionary Budget</td>
<td>$992.80</td>
<td>$1,586</td>
<td>$592.80</td>
</tr>
<tr>
<td>4.5% of Discretionary Budget</td>
<td>$1,116.90</td>
<td>$1,586</td>
<td>$468.70</td>
</tr>
<tr>
<td>5% of Discretionary Budget</td>
<td>$1,241.00</td>
<td>$1,586</td>
<td>$344.60</td>
</tr>
<tr>
<td>5.5% of Discretionary Budget</td>
<td>$1,365.10</td>
<td>$1,586</td>
<td>$220.50</td>
</tr>
</tbody>
</table>

AMOUNTS IN BILLIONS
LOST OPPORTUNITIES

Endnotes

1 See supra Appendix p.16 for complete IT budget table 1994-2019.
3 The budget deficit for 2019 is $980B. See https://www.thebalance.com/current-u-s-federal-budget-deficit-3305783.
4 Id.
5 For a complete calculation of government debt, see https://www.usgovernmentdebt.us/.
6 It is impossible to precisely calculate the monumental loss of wasteful IT spending. $345B is an estimate based on the fact that for twenty-five years between 1994-2019, the government spent approximately $1.6T on IT against a discretionary budget of roughly $25T. See supra Appendix at p. 16 for complete spending table. The twenty-five-year ratio of IT spend to discretionary budget is approximately 6.4%. Deloitte reports that across all industry, the average IT budget against revenue is about 3%. See Deloitte’s Insights, CIO Insider for November 2017, available at https://www2.deloitte.com/content/dam/insights/us/articles/4349_CIO-Insider_Tech-budgets/DT_CIO-Insider_Tech- budgets.pdf at 2. Similarly, CIO magazine found that companies with revenues over $2B spent about 3.2% of revenue on IT. See https://blog.techvera.com/company-it-spend.
7 There were 126 million households in American in 2017. See https://www.statista.com/statistics/183635/number-of-households-in-the-us/.
8 GAO has written no less than 800 reports on the need to improve IT spending efficiency between 2010-2016. See Federal Agencies Need to Address Aging Legacy Systems, GAO-16-696T May 2016 at 4.
9 For the complete Standish Report on project failure, see Chaos available at https://www. projectsmart.co.uk/white-papers/chaos-report. pdf.
11 See Study 68 Percent of IT Projects Fail available at https://www.zdnet.com/article/study-68- percent-of-it-projects-fail/
14 Id. at i.
18 The primary framework of FASA was threefold: 1) the creation and definition of "commercial items" where qualifying products and services would be treated entirely differently than things built to government specification, requiring cost-type contracts, 2) the advent of a "micro-purchase" zone of procurement where items that could be purchased without competition, set at $2,500 (now $25,000), and 3) a simplified zone of procurement where simplified and less competitive rules could be utilized for purchases between $2,500 and $100,000 (now $250,000).
21 For a comprehensive look at all Forrester reports, See https://www.forrester.com/search?N=1000 1=5000&range=504005&sort=3&searchRefine ment reports.
24 Id. at 10.
25 Id at 15.
26 Id at 6.
27 Id. at 9. In 2013, GAO reported that the worst offenders were NASA spending 98% of its IT budget on O&M and the Department of Interior which spent 95% of its IT budget on O&M. See Agencies Need to Strengthen Oversight of Multibillion Dollar Investments in Operations and Maintenance, GAO-14-66 at 4.
28 Id.
29 It is estimated that the current population of the United States is about 327,000,000; $618B/$327,000,000 = $186.54.
31 See supra Appendix at p. 16.
32 A normal fees vary, 20% is an industry average.
33 See infra note 24.
34 Computer Chaos at ii.
38 See Data Centers and the Cloud, Part II: The Federal Government Take on Optimizing New Information Technologies Opportunities to Save Taxpayers Money: Hearing Before the Subcomm. on Government Operations of the Comm. on Oversight and Government Reform House of Representatives, 103 Cong. 2-13) at 2.
39 See supra Appendix at p. 16.
42 For a look at worldwide computer sales, See http://www.worldometers.info/computers/.
43 TINA stands for the Truth in Negotiations Act which was developed for "cost type" contracts. Cost contracts are used to build items like the Space Shuttle, where the risks associated with developing solutions from scratch are unknowable in advance. The only way to be sure to engage a contractor would be to guarantee a specific profit. Cost contracts require that a contractor maintain a government approved accounting system to accurately measure its costs.
44 See Report of the Advisory Panel on Streamlining
See New Entrants and Small Business Graduation in the Market for Federal Contracts, Center for Strategic & International Studies, November 2018, at XI.

46 In 2017, OMB directed agencies to report confirmed fraud to its website called Paymentaccuracy.gov. See www.paymentaccuracy.gov.


49 To avoid possible fraud, retailers and credit care companies are deploying modern data analytics in the extreme. See https://creditcards.usnews.com/articles/how-credit-card-companies-spot-fraud-before-you-do.


52 See Deltek’s Federal Information Technology Market, 2018-2023, June 2018 at page 65.

53 As of April 8, 2019, the market caps for Exxon Mobil $351B, Alphabet (Google Parent) $838B, Microsoft $919B, according to Yahoo Finance, available at https://finance.yahoo.com/.

54 See Deltek infra at 72.

55 Id. at 75.

56 For example, the DubaiNow mobile application helps citizens of the Emirate access 50 government services. It helps manage bills, track visas, renew trade licenses, register cars, pay traffic fines, plan travel, inquire as to court status, find the location of the court hearings, register business names for new businesses, renew driver’s licenses, register vehicles, pay fines, and many other services. For a complete summary of benefits, See https://dubainow.dubai.ae/en/Pages/default.aspx. Likewise, Singapore will have virtually all government transactions (except for a few, such as physical passport pickup) completely digitalized by 2023, payable by cashless mobile app and via e-signing of documents. See https://www.straitstimes.com/tech/almost-all-govt-services-to-go-digital-by-2023.

57 Deloitte’s Insights, CIO Insider for November 2017, reports that the average IT budget as a percentage of revenue for all industry sectors averages 3.28%. See https://www2.deloitte.com/content/dam/insights/us/articles/4349_CIO-Insider_Tech-budgets/DL_CIO-Insider_Tech-budgets.pdf at 2. Similarly, CIO magazine found that companies with revenues over $2B spent about 3.2% of revenue on IT. See https://blog.techvera.com/company-it-spend.

58 IT budget detail was found in the Analytic Perspectives for each year’s budget as published by United States Government Publishing Office (GPO) available at https://www.govinfo.gov/app/collection/budget. Prior to 2003, OMB did not publish a budget line item for IT. The budget numbers between 1995 and 2002 are estimates based on the known baseline budget of $258 in 1994, as reported by Senator William Cohen and the known budget of $508 in 2003. Estimates were generated by assuming a fixed compound annual growth rate of 1.08. Discretionary budget detail for the years between 1994-2019 are published in Table 5.6—Budget Authority For Discretionary: 1976 – 2024 available at https://www.whitehouse.gov/omb/historical-tables.
Acknowledgements

Many thanks to Michael Garland, the author of *A Brief History of IT Acquisition Reform*, and founder of Garland LLC, for the original research that supports this paper. Additional thanks to Joe Weinman, the author of *Cloudonomics* and *Digital Disciplines.*
The Alliance for Digital Innovation is a not-for-profit coalition of cloud-forward disruptive companies dedicated to driving commercial innovation into government. Our goal is to support the transition to a modern digital government using proven technologies in service to the American people.

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- VERITAS
- Novetta
- Slalom
- Zscaler