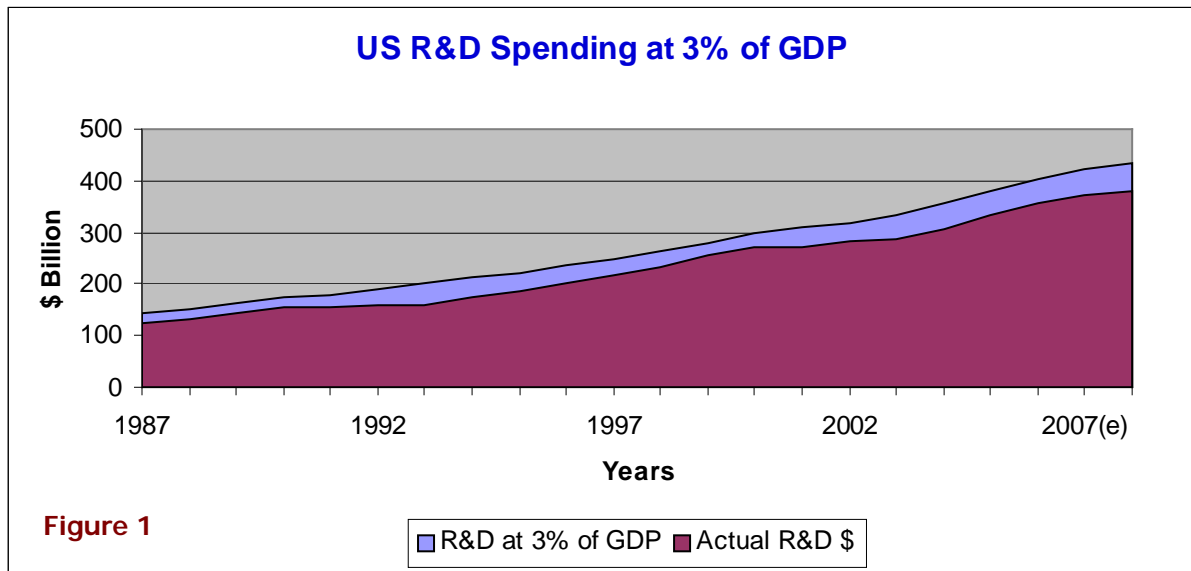


Funding R&D in the United States – the 3% Solution



Source: NSF, Science and Engineering Indicators, 2008

"I believe it is not in our American character to follow – but to lead. And it is time for us to lead once again. I am here today to set this goal: we will devote more than three percent of our GDP to research and development. We will not just meet, but we will exceed the level achieved at the height of the Space Race ... This represents the largest commitment to scientific research and innovation in American history."

President Obama on April 27, 2009 at the annual meeting of the National Academies.

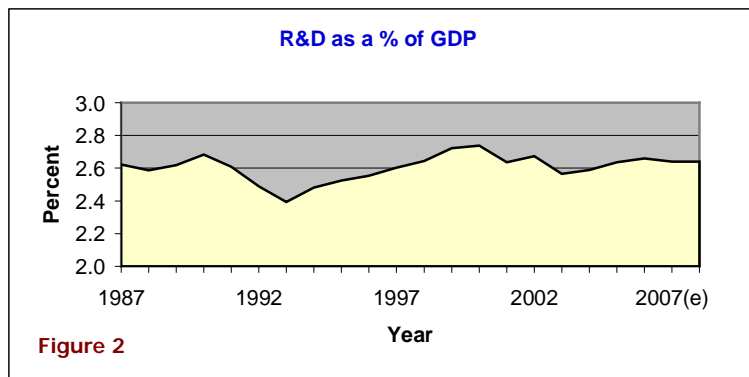
It's good to have stretch goals. They force us to look at the longer term and how we might get from where we are to some other, presumed to be better, place.

The problem with stretch goals is that they must be attainable in order to be credible. JFK put out perhaps one of the most remarkable stretch goals for the US when he declared in September 1962 that we would send a man to the moon and return him safely to Earth before the end of the decade. At the time no one seriously doubted that this was going to happen. The psyche of the times was that the US could do whatever it focused its energies and resources on. Contemplation of failure was simply not in the cards.

How much of a contrast is that to where we currently are? How much of a contrast is the current national mindset to that of the Sixties? Do we really consider Obama's setting of a national R&D stretch goal as being a credible commitment leading to significant, tangible efforts to realize that goal? Sadly, taking a jaundiced perspective on this latest goal is rational, knowing full well that there are other, more pressing issues to address. Without follow through and commitments to tangible action, stretch goals lack credibility.

For the sake of argument let's assume that there is a palpable level of excitement and buzz to Obama's R&D funding stretch goal. Let's commit ourselves to that path and see what it means in the real world. Obama stated that we will not just meet, but exceed the goal of committing 3% of our GDP to R&D. Properly digesting that commitment requires that we break it down a bit to see what it entails in terms of dollars. We also need to see where those dollars presently originate and where they are likely to come from in the future if we are to realize that targeted allocation.

The chart at the top of this article shows the twenty-year history of the US R&D enterprise's funding as a percent of total Gross Domestic Product. It contains the usual yin/yang of good news and bad. The positive is that the commitment to R&D has remained fairly consistent over time and grown with the overall economy. While we look at just the past twenty years in the chart, that is probably sufficient to tell the tale and frame the challenge that we face.



Source: NSF, Science and Engineering Indicators, 2008

Figure 2 shows the history of R&D spending as a % of GDP over the same time frame. This shows that the investment level tends to oscillate around 2.6%. In fact, going back over a 50-year record of R&D spending, the long run average is 2.6%. The highs in this figure took place in the mid-Sixties when they were in excess of 2.8% of GDP. The lows in the history of

R&D spending occurred in the mid-Seventies when the indicator hovered just above 2.1% for three years. When Obama declares that the objective is to get R&D spending to exceed 3% of GDP we are in fact talking about uncharted waters.

With that bit of history added to the mix, we direct your attention back to Figure 1. What we need to consider is what are the implications of devoting 3% of GDP to R&D, and where does this put us relative to our history. The light blue band maps the size of the challenge. This represents the gap between the 3% goal and the actual level of spending on R&D for the past twenty years. This widening gap sums to a total of over \$750 billion over the twenty years depicted, representing the level of spending that would have taken place had the nation managed to devote a 3% share of GDP to research and development.

That is a significant amount of resources. Which leads to the next question: where would this extra funding have come from had the prevailing sources of funding applied at the time? This is the point at which the plot thickens a bit. Unfortunately, the plot twist goes into a direction that reveals some issues that may not have been considered by President Obama.

One of the interesting facts about R&D is that while we hear so much about the Federal investment in R&D, the overwhelming majority of the work is funded by industry. In fact, the Federal share of total research has been declining almost monotonically for most of the past 50

years. Over the time span considered here, 1987 to 2007, the Federal government's share of research funding has declined from 46.4% in 1987 to an estimated 26.7% in 2007.

That is, however, only part of the story. Converting this from percentages to dollars reveals a problem that Obama might not have been thinking of when he set his 3% goal. In an economy that is currently running at about a \$14 trillion annual rate, there are some really enormous amounts of money that have to be found in order to reach the 3% objective. Compounding the problem is the decline in the Federal share of the total R&D pie. As a result, industry (the other major funder of R&D) is being asked to not only increase its funding for R&D, but it is also – *de facto* – being required to make up for the funding shortfall created by the decline in the Federal share of total R&D.

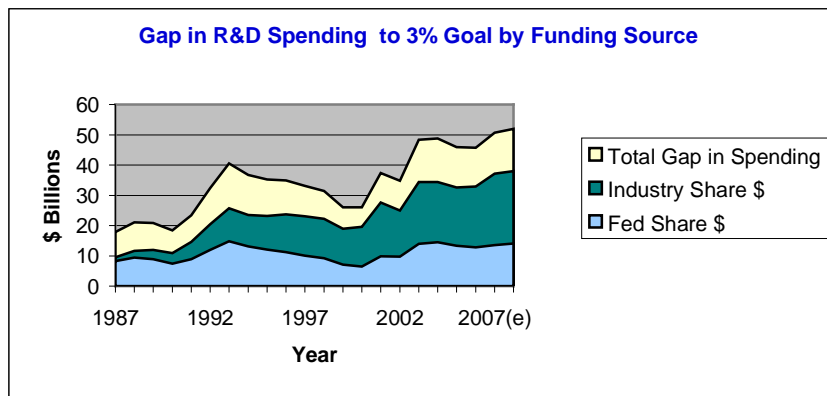


Figure 3

Source: NSF, Science and Engineering Indicators, 2008

Figure 3 depicts this problem. The yellow area shows the combined total gap of actual R&D spending to the 3% goal in billions of dollars. The green area represents the Industry share of the gap – in other words, what industry has to bring to the table in order to fill the gap.

The pale blue area is the Federal R&D investment, at the declining funding levels mentioned earlier, that will have to be made to reach 3%. Worth noting here is the fact that the Federal share of the total is dwarfed by the industry component. A quick read of the chart shows that industry is going to be asked to find another roughly \$38 billion a year – and this is a growing amount - to invest in R&D.

At recent investment levels, this amounts to about a 15% increase in R&D spending by American industry to achieve the 3% of GDP target – assuming that Federal spending manages to curb its decline and stabilize. That leaves us with the open question of what does setting the goal actually do for American R&D spending? If we are to begin moving toward this target in an economy that is uncertain at best, what needs to happen to get the ball rolling?

Some would argue that this is something that policy has already taken into account as we have a newly-restructured investment tax credit available as an incentive for corporate America to invest. However, the track record of the effectiveness of this measure as a stimulus to new investment has been repeatedly investigated and examined over the course of its history and found wanting. The analyses' conclusions range from indications that the existing structure of the R&E tax credit is slightly favorable to increasing investment, to a view that the credit is generally ineffective as an incentive for industry to ramp up its research spending. Overall, hardly a confidence-inspiring performance.

So how do we get to, and potentially surpass, the 3% of GDP goal? How do we get industry to increase its R&D spending by 15%? How do we ensure that the Federal government does its share by boosting its R&D spending?

The answer on the government side of the equation is, unfortunately, the same as it has been since the government and its various science related departments and agencies came into existence. It is a matter of politics and convincing the legislators who appropriate the share of the Federal government's budget that goes to R&D that they cannot afford to waver in their commitment to funding research. Just as Congress had to make a commitment to fund the Apollo program in the 1960s, we need Congress to again commit to funding scientific research and development.

But how can we get private enterprise to increase its R&D spending? That is a much more difficult and problematic issue. In effect, we are asking corporate America to ramp up its spending in what are presently very difficult fiscal times. One has to assume that companies across the nation engaged in R&D are doing so at a level that they see as necessary to ensure their market position, their global competitive position, and ultimately their survival. There are usually a backlog of unfunded projects that could be undertaken were the funding available. The key to ramping up the national R&D total becomes finding the funds to make these projects affordable.

How do we do that? Given that this is a national goal set by the government, and an administration that has not been reluctant to use the various fiscal arrows in its quiver, the solution this conundrum would fall into the government's lap. A simplistic solution, but a radical one, might be to restructure the existing R&E tax credit to where it is in sync with the national R&D goal. If the administration is looking to engender a 15% increase in private sector R&D spending (as our cursory analysis indicates), then perhaps we need to make the funding available to industry through a tax incentive that really is an incentive.

Rather than the current R&E Tax Credit that is nominally a 20% credit, but due to technical reasons is a 13% effective credit, let's put some muscle into the credit structure and offer a 100% tax credit for R&D spending up to 20% above the base period amount. This would define qualified research activities under the same set of rules currently used. Translated into real world corporate finance, this means that all of a firm's incremental R&D spending up to 20% above its base period would be directly charged against tax liabilities. Carry-forward rules would have to apply for those firms who are currently not profitable enough to use all of the potential credit. Bottom line, incremental R&D spending is supported and promoted.

Let's consider putting this on the books as a national science project in R&D and see where we are after five years of this policy. Let's see what the costs are and consider the benefits that have accrued during that time period. Let's do this as a real policy shift that will drive the economy toward meeting that 3% of GDP stretch goal. At least let's get the debate started about what it will take to meet that goal. At present, it's a target and nothing more. And worse yet, no one is really paying attention to what a critical goal this is for the nation's long term prosperity and security.