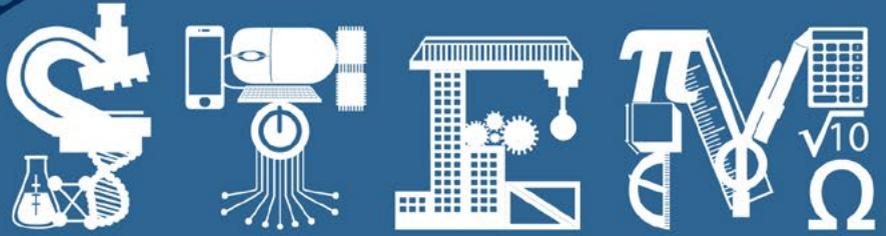


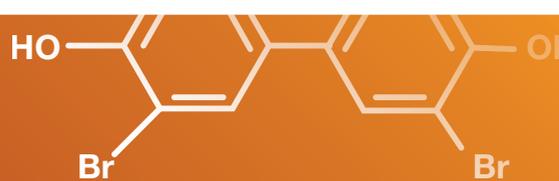
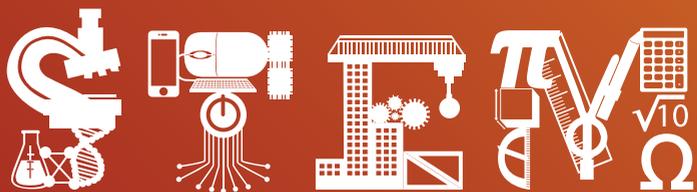
The Art & Science of Destinations™

# DESTINOLOGY™

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AMERICA'S DESTINATIONS LEAD THE WAY



## Science Technology Engineering Math

It's projected that employment in **Science, Technology, Engineering, and Math (STEM)** projects in the United States will grow almost twice as fast as employment in any other occupation between **2008 and 2018**.

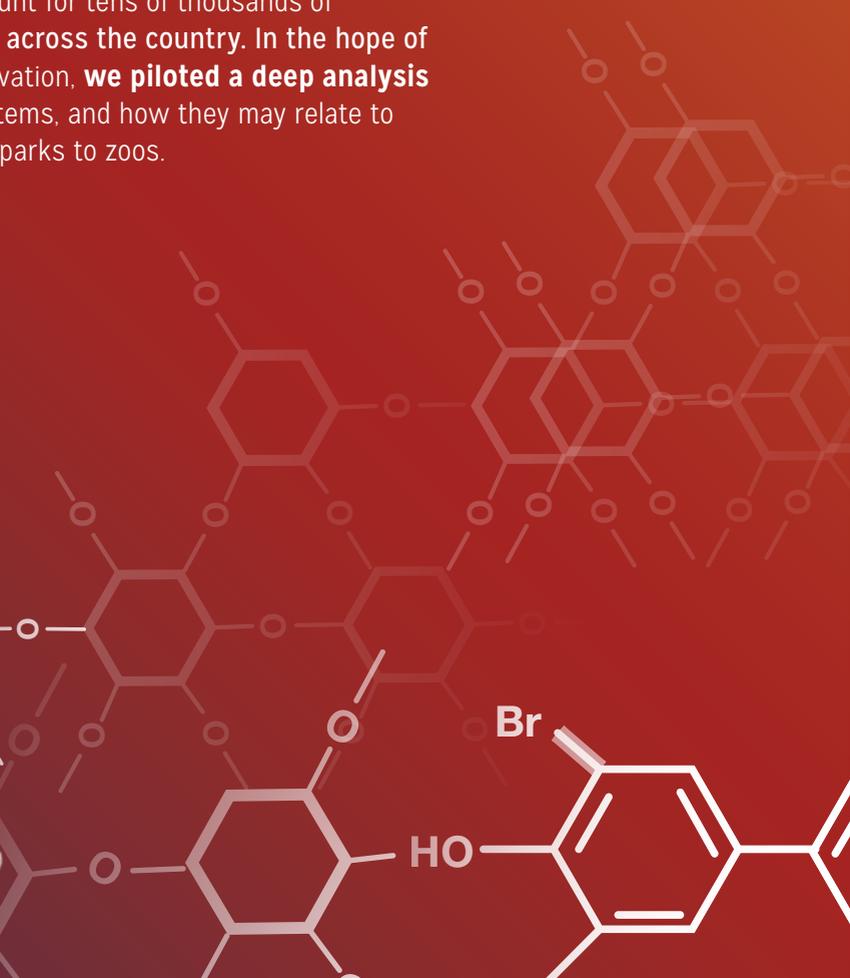
In fact, technology companies in the US are looking to fill a projected **650,000 jobs** by 2018, and **two-thirds of those hires are reported to be in STEM fields**. However, the US is falling behind many other nations in producing enough talent to fill the upcoming vacuum, both home and abroad. **American universities award only 30%** as many bachelor's degrees in science and engineering as Asian universities, and the Georgetown University Center on Education and the Workforce **ranks the US as 17th** on the number of science degrees it awards.

**So in a sea of available STEM talent from around the world...**

**How do we...**

Encourage STEM education in the US,  
Convince domestically-based firms to hire American STEM professionals, and  
Stay ahead in the international innovation and science race?

The answers to these questions are paramount for tens of thousands of educators, businesspeople, and politicians across the country. In the hope of alleviating a national epidemic of sleep deprivation, **we piloted a deep analysis** of the STEM job market, STEM education systems, and how they may relate to destinations from science centers to theme parks to zoos.



# WHERE STEM TALENT COMES FROM

## The opportunity for STEM employment is growing rapidly.

*The job-growth rate for STEM is 17% as opposed to non-STEM growth at 9.8%.*

India's technology sector is expected to grow six-fold over the course of the next seven years.

The South Korean government just pumped \$200B into a new green smart grid that will create at least 500,000 jobs, and

Britain is projecting an 80% increase in demand for biological science graduates and a 49% increase in demand for math and science graduates from now until 2017.

## So with all this great emerging job opportunity, where's the problem?

*The problem is that the US is falling behind in STEM productivity and innovation.*



In a study by the Information Technology and Innovation Foundation, the US ranked 6th out of 40 on innovation and competitiveness.

In 2009 for the first time in history, more than 50% of US patents were awarded to non-US companies.

In 1981, the US fielded 40% of all published research papers in the world - which shrank to 29% just four years ago.

During that same period, Europe went from producing a third of them to 36% and the Asia-Pacific nations made a huge jump from 13% in 1981 to a third of all published research in 2009.

China is the world's second-largest producer of research papers with 11% of the world's total, only second to the US.

US companies have a huge talent pool to source from, but it's just plain difficult to recruit international STEM talent. According to a recent Accenture study, 24% of executives in firms where R&D is critical said that STEM skills were located in other countries rather than where they're needed, and 21% of them said that the supply of the skilled talent they need is extremely small or non-existent locally. In fact, only 17% of executives felt they were even well-positioned to source talent worldwide.

The problem with sourcing international talent is that it takes a lot of time and money to find them; and once found, a firm has extra costs associated with relocation and work Visas. Even when they're found, they may not want to move, there may be governmental policies, employment, and immigration laws that forbid them to come work in the US (to incentivize them to stay in their home country and work), or their country's infrastructure simply makes them unobtainable.

**So American companies need STEM talent –**  
there's a lot of talent around the world but it's oftentimes just too hard to get – so where's all the American talent?

**Let's take a look at the talent factories.**

# A GAP IN INSPIRATION

It's not news that the US just isn't as good as other countries in educating its youth in STEM.

## **The World Economic forum ranks the US 48th**

*in the world in the quality of its math and science education.*

## **The National Assessment of Education Progress 2011 scores found that**

**28% of 4th graders,**

**37% of 8th graders, and**

**40% of high school seniors**

### **DIDN'T MEET THE BASIC STANDARDS OF SCIENCE KNOWLEDGE**

demonstrating that not only are a sizable amount not making the grade, but they're also scoring worse in science as they get older.

Even when we matched our advanced 8th graders with their international counterparts, we still only out-ranked Portugal, Greece, Turkey, and Mexico.

## **WHY AREN'T OUR CHILDREN LEARNING MATH AND SCIENCE?**

When it comes to money, STEM sells itself. On average, STEM bachelor's degree-holders earn 23% more and graduate-degree holders earn 12% more than their non-STEM counterparts.

### ***In fact, this premium is realized no matter what the degree level or field!***

Workers with associates degrees in STEM out-earn people with bachelor's degrees in other fields by 63%; almost 50% of STEM bachelor's degree holders out-earn PhDs in all other fields – in fact, they generally make half a million dollars more over the course of their lives than non-STEM degree holders. Even if you don't have a degree in STEM, but work in a STEM field, you'll tend to earn 30% more than non-STEM workers with a similar education. Over the last 30 years, STEM-related salaries have risen faster than all occupations except for healthcare and management. While STEM salaries have risen by 31%, non-STEM jobs have only risen 23%. So STEM workers and degree-holders make more money, and their jobs are more recession-proof than pretty much everyone else. The economy needs them, companies want them, our universities are great but elementary and high schools are uninspiring.

## **WHAT'S MISSING?**

America needs a concerted effort to make STEM fields exciting, fun, accessible, and attractive to younger generations. One of the primary vehicles for that innovation can be found in science centers, where these fields can be experienced by children in a multitude of great ways to make science, technology, engineering, and math relatable, interesting, and memorable.

The need is clear: more than half of America's economic growth over the last 50 years is attributable to improved productivity through innovation, and we simply cannot expand our economy without the needed human resources. If we can attract more young people to STEM fields at an early age and keep them engaged through graduation, we can feed corporate America the talent it needs to keep the US at the forefront of technological and scientific innovation.



Our universities are still top notch, but they're just not producing enough STEM graduates.  
As of 2008, only three of the top 20-ranked universities were outside of the US



When looking at the top 50, only 14 are outside of our borders.

But from 1985 until 2009, the share of STEM degrees at American Universities dropped,



Canada, Mexico, Germany, and other European countries graduate more STEM students as a share of all awarded degrees than America.

40% of all degrees awarded in China are in STEM;

China and India's STEM PhD degrees awarded are projected to grow by 68% between 2009 and 2015;

Brazil has seen a ten-fold increase in the number of STEM PhDs it has awarded in the last two years, looking to pass the US by 2016.

For that small percentage of US degrees awarded in STEM, a lot of them are to internationals who take those skills back to their home country after graduation. From 1977 to 2007, the number of Engineering PhDs awarded in the US to US students dropped from 56% to 29%; and in the physical sciences, they dropped from 76% to 43%. Overall STEM doctorates dropped from 75% to 50% of domestic recipients between 1985 and 2006. In 2007, the top five sources of international recipients in US STEM degrees were China and India with the lion's share, followed by South Korea, Taiwan, and Canada. Turkey, Thailand, Japan, Mexico, and Germany followed suit; and all five of the leading country recipients reported a decrease in definite intentions to stay in the US after graduation.



## WOMEN IN THE WORKPLACE

In light of these findings, it appears the US needs to find a ready talent pool to fill the STEM gap. If only there was some portion of the population that wasn't yet heavily involved in STEM - a hardworking, brilliant, dedicated segment that's just ripe for the picking to become the next scientists and engineers. What about women?

Women make up almost half of the total workforce, yet they only make up about a quarter of the STEM workforce; and that figure drops even further if you look at STEM degree-holding women working in a STEM job, which is only 20% of the STEM workforce. Where are the other 5% of degree holders taking their STEM degrees? Apparently to education and healthcare. Women STEM majors are actually twice as likely as men to take their degrees into education or healthcare.

There are an increasing percentage of women entering STEM fields overall, although there's a slow trickle-off of gender share in graduate and post-graduate studies. As of 2008, women earned 50% of STEM bachelor's degrees, 46% of master's degrees, and 41% of PhDs. In fact, STEM PhD degrees were up overall in 2008 by 1.9% from the year prior simply because of more women enrolling in STEM doctoral programs. What's happening though - what happened in their youth to inspire them towards, or drive them away from, these high-earning, cutting-edge fields?

***There must be a method, a destination,  
which can inspire lifelong  
STEM passion...***



# SCIENCE CENTERS ARE STEM INCUBATORS

The case for science centers goes well beyond inspiring America's future Creative Class, a segment of the population, identified by researcher Richard Florida, made up of 40 million scientists, engineers, educators, programmers, and more who control roughly 70% of America's discretionary income. It's also about the tremendous impact science centers can have on their cities.



This year we took a look at more than 120 US science centers, 503 cities, and more than 100 metrics that evaluate cities, from crime to corruption, green space to green scores. After running them through correlations and analyses, it's pretty clear - cities with great science centers are just plain better. Our research can't prove causality - it's a chicken and the egg problem.

We don't know if great cities help make great science centers, or if great science centers help make great cities. But we do understand the profile of what kind of urban environments are currently harboring successful science centers.

## HERE'S WHAT WE FOUND

According to *Fast Company's data*, cities with science centers typically rank higher on their intelligent economy, governance, mobility, and education

Cities which rank higher in these four categories have better ranked universities (*US News*),

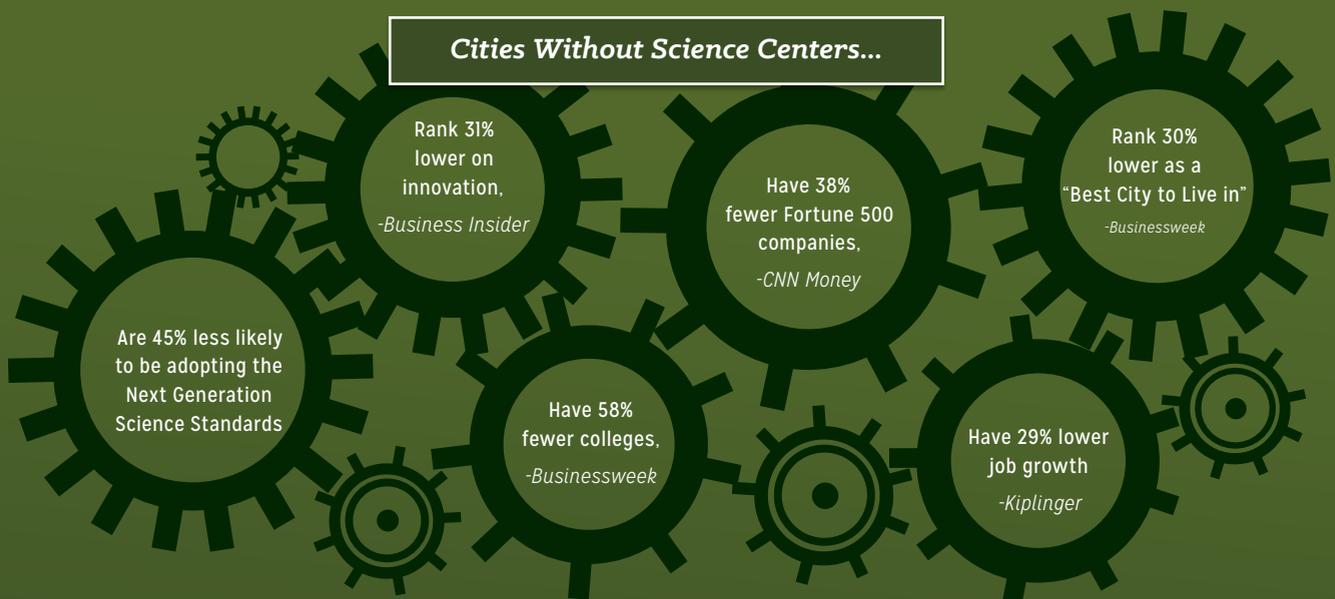
Are more attractive destination cities (*U-Haul International*),

And rank higher on *Mercer's Quality of Life*.



When you directly compare the scores of cities with science centers to those without, the differences are stark. Here are the top differences between these two types of cities:

### Cities Without Science Centers...



***We're not sure we can make the case any more clear.***

Countless reports show that our country is falling behind in technological leadership and innovation, causing our economy and our talent to deteriorate in a myriad of ways. We need to make STEM education incredible again - exciting, thrilling, attractive, and fun, and science centers serve as one of the best potential vehicles to accomplish that mission. By inspiring younger generations through these institutions, and drawing more young women into these fields, we get back on the leaderboard of the world's progress. And science centers aren't just catalysts for career inspiration:

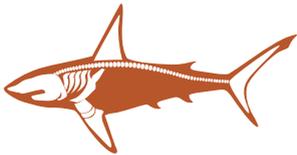
***They May Just Save Your City, Too.***

# STEM AT OTHER DESTINATIONS

Considering that STEM covers Science, Technology, Engineering, and Math, you simply can't go **60 seconds** in today's world without encountering something that requires STEM knowledge to understand it.

We frankly live in a world that can be neither understood nor innovated without brilliant STEM minds. And once those minds have deduced these complex principles, we need ways that clearly and simply explain phenomena to us so that we can grow too. As we've presented in this edition of Destinology, there are destination opportunities outside of the classroom - namely the science center - that can foster lifelong passion in STEM careers. But there are even more ways to drive passion.

*Theme parks, zoos, aquariums, and historic sites and museums are abundant with STEM principles:*



the biology of sharks and giraffes,



the engineering of roller coasters,



the science of history's greatest battles and discoveries.

By pulling these principles out of simply how the attraction functions, and turning it into an integrated and immersive learning experience, we can produce more unique, thrilling opportunities for our next generation of scientific leaders to be inspired by STEM.

The Animal Care Center at Busch Gardens Tampa allows visitors to see park veterinarians working in real time with the wide variety of animals at the park, performing surgeries, x-rays, regular treatments, nutrition, and more. The experience is flanked by extensive interpretation describing the roles veterinarians play and some of the procedures they're conducting, in addition to actual guest participation in non-critical routines.

Both SeaWorld Orlando and San Diego feature Wild Arctic, an adventure which takes guests on an exciting helicopter simulation in the Arctic to an immersive Base Station and Arctic animal encounter. Throughout the experience, guests learn about climatology, meteorology, biology, and how these scientists operate in the frigid North.

Lastly, Fort Ticonderoga in upstate New York is currently developing and implementing numerous scientific programs into their educational offerings to encourage STEM passion. The history of the iconic Fort is full of incredible science - from the evolution of weaponry, to cannon physics, and even to the science behind the structural strength of the Fort itself.

These are just three outstanding examples of how STEM passion is being promoted in some of America's most loved destinations and should stand as shining examples for other destinations to follow suit.



*Destinology* is a quarterly publication produced by PGAV Destinations, a world class consultancy, designer, and architect for zoos, museums, aquariums, theme parks and hospitality worldwide. To subscribe to *Destinology* and receive the latest Destination research and strategic innovations, contact [marie.shellenberg@pgav.com](mailto:marie.shellenberg@pgav.com).



## SPACE SHUTTLE ATLANTIS



Having just opened this summer, Space Shuttle Atlantis at the Kennedy Space Center Visitor Complex is the world's latest science center, themed attraction, and museum. Showcasing STEM learning in more than 60 never-before-seen interactives and hands-on demonstrations, Space Shuttle Atlantis gets visitors as close as possible to one of the world's greatest technological marvels. Visit what Smarter Travel calls one of the top ten hottest new museums in the world for 2013.