

# Failure to Modernize... The Real Cost



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# A Perfect Storm?

By Jim Buck

December 2008

**A** “Perfect Storm” is IBM’s term for the poor condition of Information Technology’s (IT) current college enrollment. This fall beings my seventh year teaching IBM i classes at Gateway Technical College and was marked with the college mailing “Voluntary” layoff letters to the entire Information Technology faculty. This was due to steadily declining student enrollment in all of the IT programs since 2002.

As president of the WMCPA ([www.wmcpa.org](http://www.wmcpa.org)), I interact with many IT professionals both in Wisconsin and Illinois. Often asked how classes are going, I always answer “Great... except for the lack of students.” The person asking the question inevitably replies something akin to “What? I figured your classes would be full!” Many times, potential employers ask if I have any outstanding recent graduates I would recommend for an entry-level PPC position. My



## College IT Enrollment Trends

Gateway Technical College is a member of the Wisconsin Technical College System (WTCS); which includes 16 colleges and 47 campuses. Many graduates of this system continue their education and complete four year degrees. The table below displays the Information Technology enrollment and graduation figures for all WTCS colleges. Enrollment in IT programs has decreased 57% in the last 5 years with graduation at only 27% of the rate in 2002.

Wisconsin Technical College System							
	2002	2003	2004	2005	2006	2007	%
Enrollment	9165	7635	6309	5160	4048	3915	42.72%
Graduation	1089	1088	995	816	640	289	26.54%

# Agenda

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- Employment Trends
- IT Future Growth
- I.T. Retirements
- College Today
- Skills Gap
- Students Today
- How To Fail
- What You Can Do



# Failure To Modernize Employment Trends

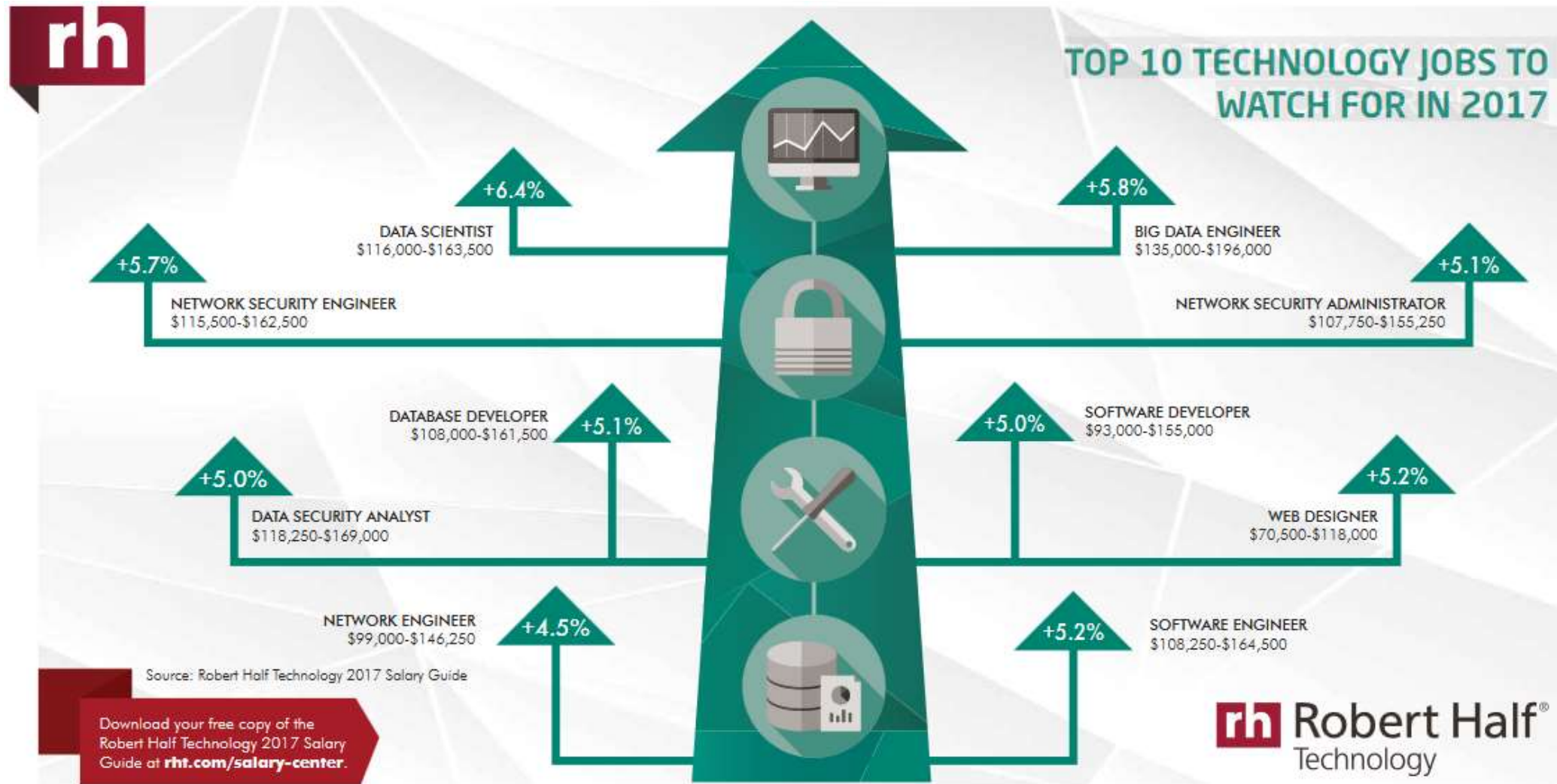


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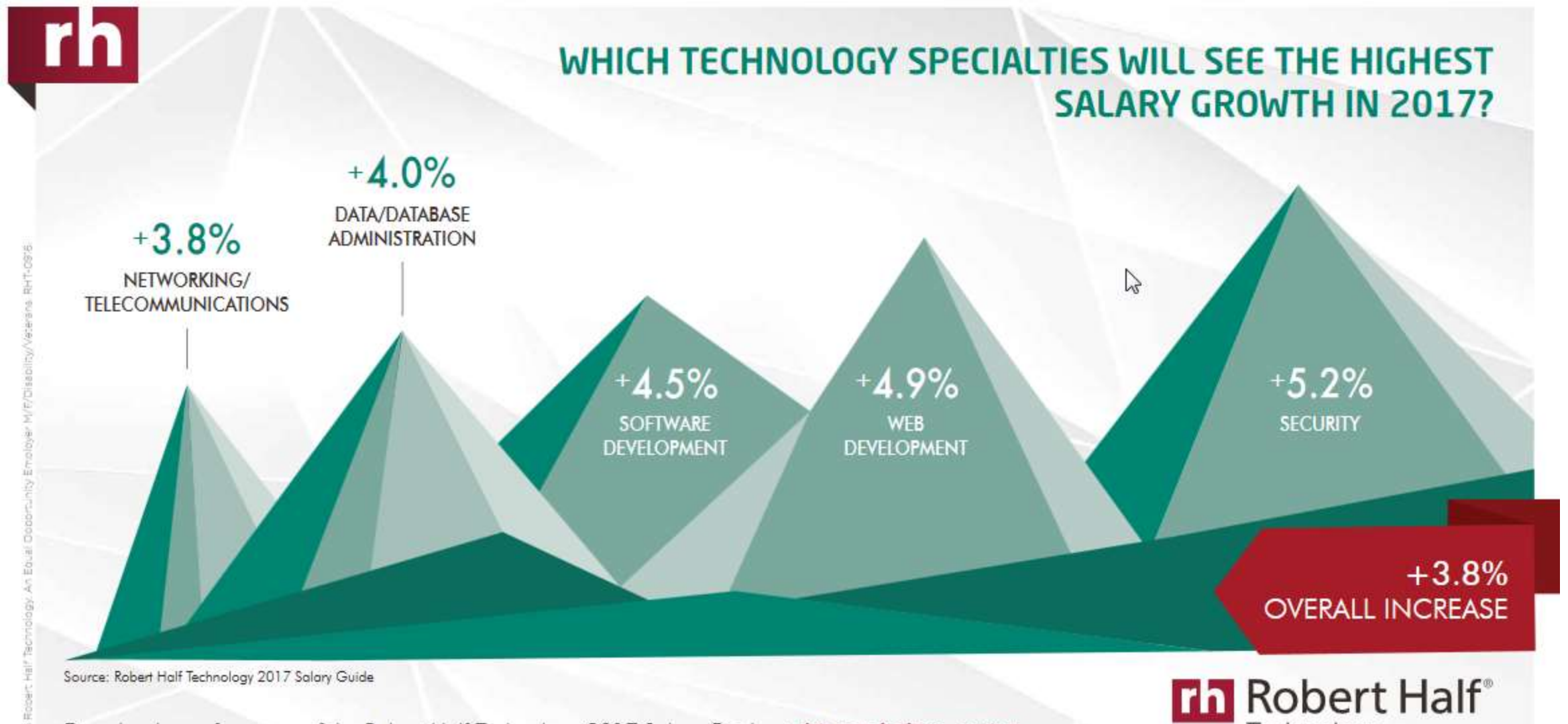
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# TOP 10 TECHNOLOGY JOBS TO WATCH FOR IN 2017



# TECHNOLOGY SPECIALTIES HIGHEST SALARY GROWTH IN 2017?





# 4 TRENDS AFFECTING HIRING AND PAY FOR TECHNOLOGY JOBS



## 4 TRENDS AFFECTING HIRING AND PAY FOR TECHNOLOGY JOBS

### 1. Timing is everything

Top candidates often receive multiple offers, so organizations need to move quickly. When faced with a lengthy hiring process, 39% of candidates lose interest and pursue other roles.



### 2. Skilled talent is in short supply

The unemployment rates for specialized positions are typically lower than the national rate. These professionals are difficult to hire given the high demand and short supply.



### 3. Education is essential

Employers consider college a must for most professional roles. More than 95% of jobs created during the recovery have gone to those with some college education.

### 4. Temporary is becoming permanent

Rather than let a job sit vacant, firms are bringing in temporary professionals. This gives them more time to recruit or determine if the temporary worker is the right fit for a full-time role.

#### Sources:

- 1. Robert Half survey of more than 1,000 working professionals
- 2. U.S. Department of Labor's Bureau of Labor Statistics
- 3. "America's Divided Recovery: College Have and Have-Nots," Georgetown University Center on Education and the Workforce

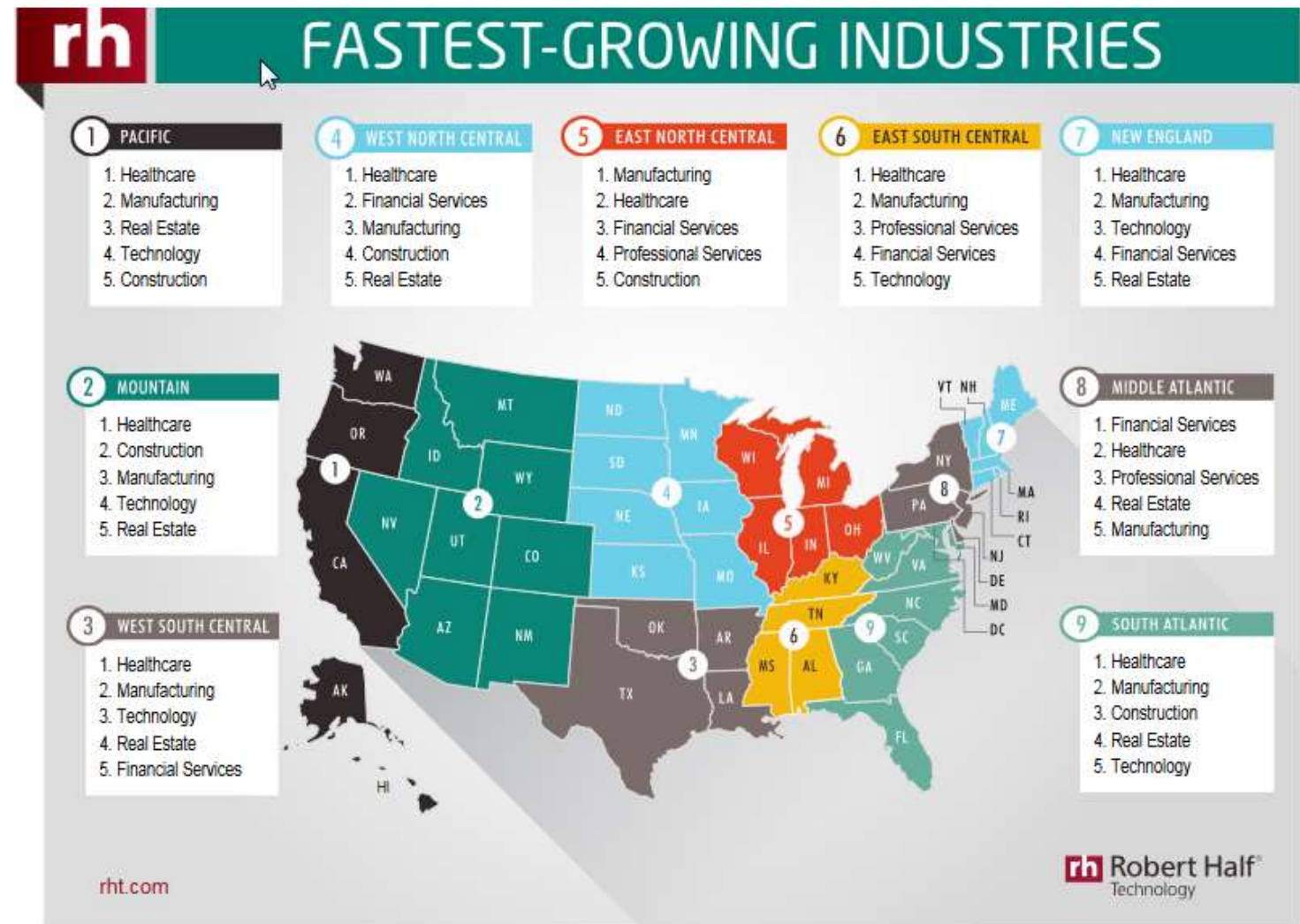
Download your free copy of the Robert Half Technology 2017 Salary Guide at [rht.com/salary-center](http://rht.com/salary-center).



# FASTEST GROWING INDUSTRIES

Top National Growth Industries are heavy users of Information Technology

- #1 Healthcare
- #2 Manufacturing
- #3 Technology
- #4 Financial Services

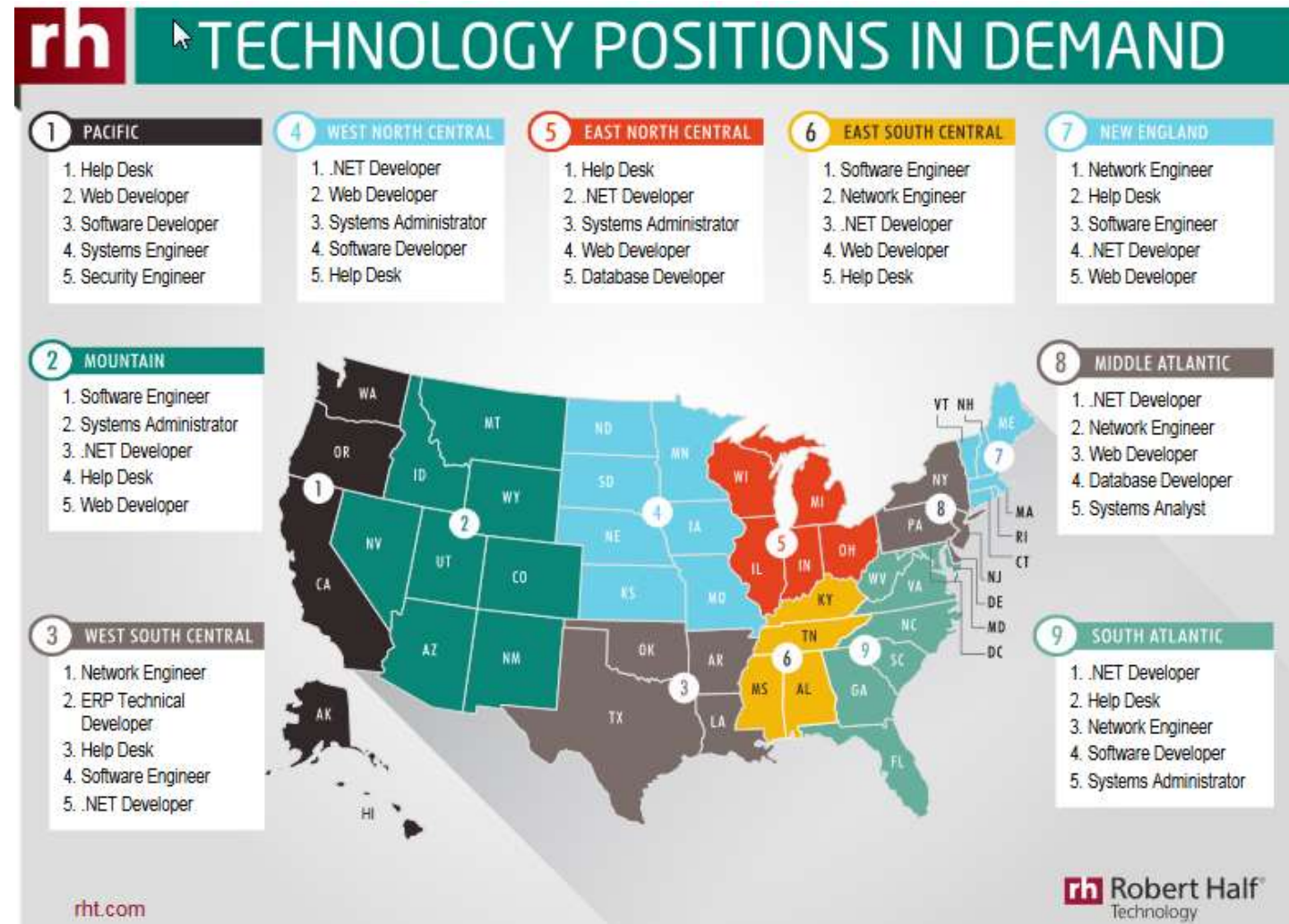




# TECHNOLOGY POSITIONS IN DEMAND

## Top IT Positions

- Developers (web, software and mobile applications)
- Business intelligence analysts
- Database administrators
- Help desk and desktop support professionals
- Systems engineers and systems administrators



# NATIONAL SALARY RANGES

APPLICATIONS DEVELOPMENT (A)	2016	2017	
Manager	\$105,750 - \$160,500	\$107,750 - \$167,250	3.3%
Project Manager	\$ 95,250 - \$146,500	\$ 97,250 - \$151,750	3.0%
Systems Analyst	\$ 81,750 - \$121,000	\$ 84,500 - \$125,000	3.3%
Applications Architect	\$121,250 - \$171,750	\$124,500 - \$178,750	3.5%
Business Systems Analyst	\$ 84,000 - \$122,000	\$ 86,250 - \$127,000	3.5%
CRM Business Analyst	\$ 87,500 - \$126,000	\$ 89,500 - \$132,250	3.9%
CRM Technical Developer	\$ 98,500 - \$137,750	\$100,000 - \$146,000	4.1%
Developer/Programmer Analyst	\$ 80,000 - \$137,000	\$ 83,000 - \$143,250	4.3%
ERP Business Analyst	\$ 92,500 - \$132,000	\$ 95,000 - \$137,750	3.7%
ERP Technical/Functional Analyst	\$ 98,000 - \$140,750	\$100,000 - \$146,250	3.1%
ERP Technical Developer	\$100,750 - \$148,500	\$102,750 - \$154,250	3.1%
Lead Applications Developer	\$110,750 - \$160,750	\$115,000 - \$167,000	3.9%
Mobile Applications Developer	\$115,250 - \$175,750	\$118,750 - \$182,250	3.4%
Technical Writer	\$ 55,500 - \$ 87,250	\$ 56,500 - \$ 89,250	2.1%

**Add the percentage below, based on national averages, to IT salaries for the following skills:**

- AJAX (Asynchronous JavaScript and XML) development skills 5%
- Business Objects skills 5%
- C# development skills 7%
- C++ development skills 4%
- Hyperion skills 5%
- Java development skills 8%
- Java EE/J2EE development skills 8%
- LAMP (Linux, Apache, MySQL and Perl/PHP/Python) skills 7%
- .NET development skills 7%
- PHP development skills 7%
- SAP development skills 5%
- SharePoint skills 8%



Using labor market data to connect  
and inform people, education, and business.

A photograph showing the backs of two young women sitting on a stone ledge outdoors, looking towards a campus with trees and a building.

HIGHER

A photograph of a dark, cloudy sky with a small, dark silhouette of a structure or object in the foreground.

ECONOMIC

A photograph of two people wearing blue protective suits and respirators, working in a laboratory or industrial setting.

WORKFORCE

A photograph of a woman and a man in a professional office setting, looking at a laptop screen. A small circular icon with a white speech bubble is overlaid in the bottom right corner.

ENTERPRISE

# Breaking Down the Labor Market Supply & Demand Software Developers

## WAGES & JOBS TRENDS

Occupation Summary for Software Developers, Applications



792,329

Jobs (2016) ?

+3.7%

⊕ % Change (2016-2017)

\$47.68/hr

⊕ Median Hourly Earnings ?

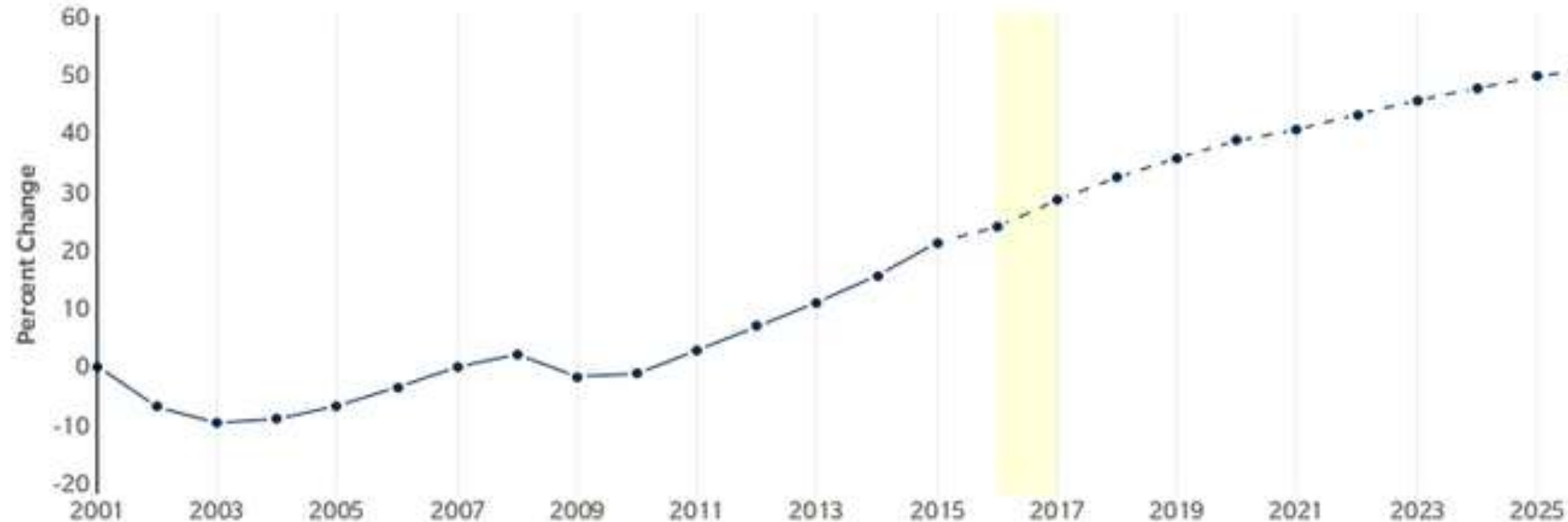
Job totals for software developers have swelled to nearly 800k and show no sign of slowing over the next ten years. Median wages are strong at \$47.68/hr and leave plenty of room for growth with a 90th percentile wage of \$70/hr.



# Breaking Down the Labor Market Supply & Demand Software Developers

## Regional Trends

[Jump to Regional Comparison by Occupation](#)



Region	2016 Jobs	2017 Jobs	Change	% Change
United States	792,329	821,693	29,364	3.7%

# Breaking Down the Labor Market Supply & Demand Software Developers

In an average month:

- 115,058 unique job postings for Software Developers
- 33,579 actually hired.
- Approximately 1 hire for every 3 unique job postings.

## JOB POSTING ANALYTICS

Job Postings Overview

[Jump to Job Posting Analytics](#)

1.61M

Unique Postings (Jan 2016 - Feb 2017) ⓘ  
9.68M Total Postings

6:1

Posting Intensity (Jan 2016 - Feb 2017) ⓘ  
  
Regional Average: 7:1

Job Postings vs. Hires

115,058

Avg. Monthly Postings (Jan 2016 - Feb 2017) ⓘ

33,579

Avg. Monthly Hires (Jan 2016 - Feb 2017) ⓘ



# Failure To Modernize IT Future Growth?



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# US Dept. of Labor - Bureau of Labor Statistics

- Information Security Analysts - 37%
  - Much faster than average
- Computer Systems Analysts - 25%
  - Much faster than average
- Software Developers - 22%
  - Much faster than average
- Database Administrators - 15%
  - Faster than average

Occupation	2012 Median Pay	Entry-Level Education	Work Experience in a Related Occupation	On-the-job Training	Number of Jobs, 2012	Job Outlook, 2012-22	Employment Change, 2012-22
Computer Programmers	\$74,280 per year \$35.73 per hour	Bachelor's degree	None	None	127,600	25% (Much faster than average)	127,600
Computer Systems Analysts	\$75,600 per year \$36.31 per hour	Bachelor's degree	None	None	118,700	15% (Faster than average)	17,900
Information Security Analysts	\$86,170 per year \$41.43 per hour	Bachelor's degree	None	None	118,700	15% (Faster than average)	17,900
Database Administrators	\$77,080 per year \$37.06 per hour	Bachelor's degree	Less than 5 years	None	118,700	15% (Faster than average)	17,900
Web Developers	\$62,560 per year \$30.05 per hour	Associate's degree	None	None	118,700	15% (Faster than average)	17,900
Software Developers	\$93,350 per year \$44.88 per hour	Bachelor's degree	None	None	1,018,000	22% (Much faster than average)	222,600

# I.T. Services Growing

- IT Employment expected to grow
- Average annual rate of 6.1%



The screenshot shows the Bureau of Labor Statistics website with the 'Beyond the Numbers' section. The article is titled 'Careers in the growing field of information technology services' by Lauren Csorny, dated April 2013. The article discusses the growth of the IT services industry, noting that it was not significantly affected by the 2007-2009 recession and has since regained momentum. It highlights the high demand for IT services and the resulting fast-growing and high-paying jobs. A sidebar on the right lists related articles, including 'Computer and Information Technology Occupations' and 'Employment Trends and Training in Information Technology'.

UNITED STATES DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS

Home Subjects Data Tools Publications Economic Releases Students Beta

BEYOND THE NUMBERS

HOME BROWSE ARCHIVE ABOUT SEARCH

April 2013 | Vol. 2 / No. 9  
EMPLOYMENT & UNEMPLOYMENT

### Careers in the growing field of information technology services

By Lauren Csorny

Computers and information technology (IT) touch nearly every aspect of modern life. Information technology can help with such diverse tasks as driving motor vehicles and diagnosing diseases. IT enables seamless integration and communication between businesses anywhere in the world. To keep IT systems running, a large workforce is needed to maintain networks, create new software, and ensure information security. In addition, the proliferation of smart phones has given rise to a new "app economy," in which new employment opportunities are available for workers who create the programs that run on mobile devices.<sup>1</sup> Unlike many other sectors of the economy, employment in the computer systems design and related services industry (commonly known as IT services) was not significantly affected by the recession of 2007–2009. The industry lost about 1 percent of its employment in 2009 but regained momentum in 2010, when it surpassed the employment numbers from 2008.<sup>2</sup> The high demand for the services provided by this industry has created a large number of fast-growing and high-paying IT jobs.

**What does the IT industry do?**

Establishments in computer systems design and related services provide IT expertise for consumers and firms, often consulting with businesses to help them upgrade their computer systems, networks, or software.<sup>3</sup> The industry is the largest of any computer-related industry, employing more than 1.5 million people in 2011.

Computer systems design and related services can be broken down into four subindustries: custom computer programming services, computer systems design services, computer facilities management services, and other computer related services. (See chart 1.) The first two are the largest, and account for almost 90 percent of all IT services employment. **Custom computer programming services** (NAICS 541511) includes establishments that write, test, and modify software for a particular client. This software includes computer programs, webpage design, and database design. Computer programming services also provide support to clients after the newly designed software is implemented.<sup>4</sup>

Download PDF Version

**RELATED ARTICLES**

- "Computer and Information Technology Occupations," *Occupational Outlook Handbook*.
- "Employment Trends and Training in Information Technology," *Occupational Outlook Quarterly*, Spring 2009.
- "After the Dot-Com Bubble: Silicon Valley High-Tech Employment and Wages in 2001 and 2008."



# 2017 H-1B Visa Job Categories

## Top 6 Jobs are IT Positions!

### 2017 H1B Visa Report: Top H1B Visa Occupation

1 - 50 | [51 - 100](#) | [101 - 150](#) | [151 - 200](#) | [search all](#)

Other Reports: [All](#) | [Occupation](#) | [Visa Status](#) | [Job Title](#) | [Industry](#) | [Work City](#) | [Work State](#)

Rank	Occupation	Number of LCA *	Average Salary
1	<a href="#">Software Developers, Applications</a>	121,227	\$95,988
2	<a href="#">Computer Systems Analysts</a>	98,750	\$81,394
3	<a href="#">Computer Programmers</a>	81,814	\$69,478
4	<a href="#">Computer Occupations, All Other</a>	53,875	\$80,892
5	<a href="#">Software Developers, Systems Software</a>	21,851	\$111,170
6	<a href="#">Computer Systems Analyst</a>	16,835	\$78,813
7	<a href="#">Management Analysts</a>	15,009	\$92,937
8	<a href="#">Accountants And Auditors</a>	11,204	\$67,426
9	<a href="#">Network And Computer Systems Administrators</a>	11,152	\$76,233
10	<a href="#">Mechanical Engineers</a>	9,616	\$80,632

# 2017 H-1B Visa Sponsors

## 2017 H1B Visa Reports: Top 100 H1B Visa Sponsors

Rank: [1 - 25](#) | [26 - 50](#) | [51 - 75](#) | [76-100](#) | [search all](#)

SubReports: [Visa Status](#) | [Job Title](#) | [Occupation](#) | [Industry](#) | [Work City](#) | [Work State](#)

Rank	H1B Visa Sponsor	Number of LCA *	Average Salary
1	<a href="#">Infosys</a>	<a href="#">25,405</a>	\$81,705
2	<a href="#">Capgemini</a>	<a href="#">17,479</a>	\$93,213
3	<a href="#">Tata Consultancy Services</a>	<a href="#">13,134</a>	\$76,099
4	<a href="#">IBM</a>	<a href="#">12,381</a>	\$87,378
5	<a href="#">Wipro</a>	<a href="#">10,607</a>	\$72,720
6	<a href="#">Accenture</a>	<a href="#">9,479</a>	\$81,585
7	<a href="#">Tech Mahindra (Americas)</a>	<a href="#">8,615</a>	\$75,879
8	<a href="#">Deloitte Consulting</a>	<a href="#">7,645</a>	\$122,667
9	<a href="#">Cognizant Technology Solutions</a>	<a href="#">5,370</a>	\$74,628
10	<a href="#">Microsoft</a>	<a href="#">5,029</a>	\$129,610
11	<a href="#">Hcl America</a>	<a href="#">4,930</a>	\$84,040
12	<a href="#">Google</a>	<a href="#">4,897</a>	\$129,997
13	<a href="#">Ernst &amp; Young</a>	<a href="#">4,625</a>	\$98,722
14	<a href="#">Ust Global</a>	<a href="#">3,170</a>	\$69,819
15	<a href="#">Larsen &amp; Toubro Infotech</a>	<a href="#">3,092</a>	\$76,755

# Failure To Modernize I.T. Retirements



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# Retirement Leads to IT Job Opportunities

- In the US...
  - 10K people turn 65 every day
  - Trend will continue through 2030



# Retirees Help Create 55 Million Jobs

- Baby boomers retiring
- 31M jobs will open up
- 24M more by 2020



# IT Starts to Prepare for a Workforce Exodus

## ○IT veteran workers

- Still relied upon
- Help run critical systems
- On somewhat dated technology



[www.cio.com/article/2383118/careers-staffing/  
with-worker-retirements-looming--it-starts-to-prepare-for-a-workforce-exodus.html](http://www.cio.com/article/2383118/careers-staffing/with-worker-retirements-looming--it-starts-to-prepare-for-a-workforce-exodus.html)



# Failure To Modernize Colleges Today



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# Colleges Have Changed

- BIG business now!
- It's the bottom line
- It's "Butts in the seat!"
- Receive funding based on enrollment & grants
- Constantly trying to maximize revenues





# An Instructor Teaches What Sells...

- Instructors paid by the number of students





# An Instructor Teaches What Sells...

- Instructors paid by the number of students
- A low number of students
  - Class is cancelled
  - Instructor receives a lower percentage of his workload





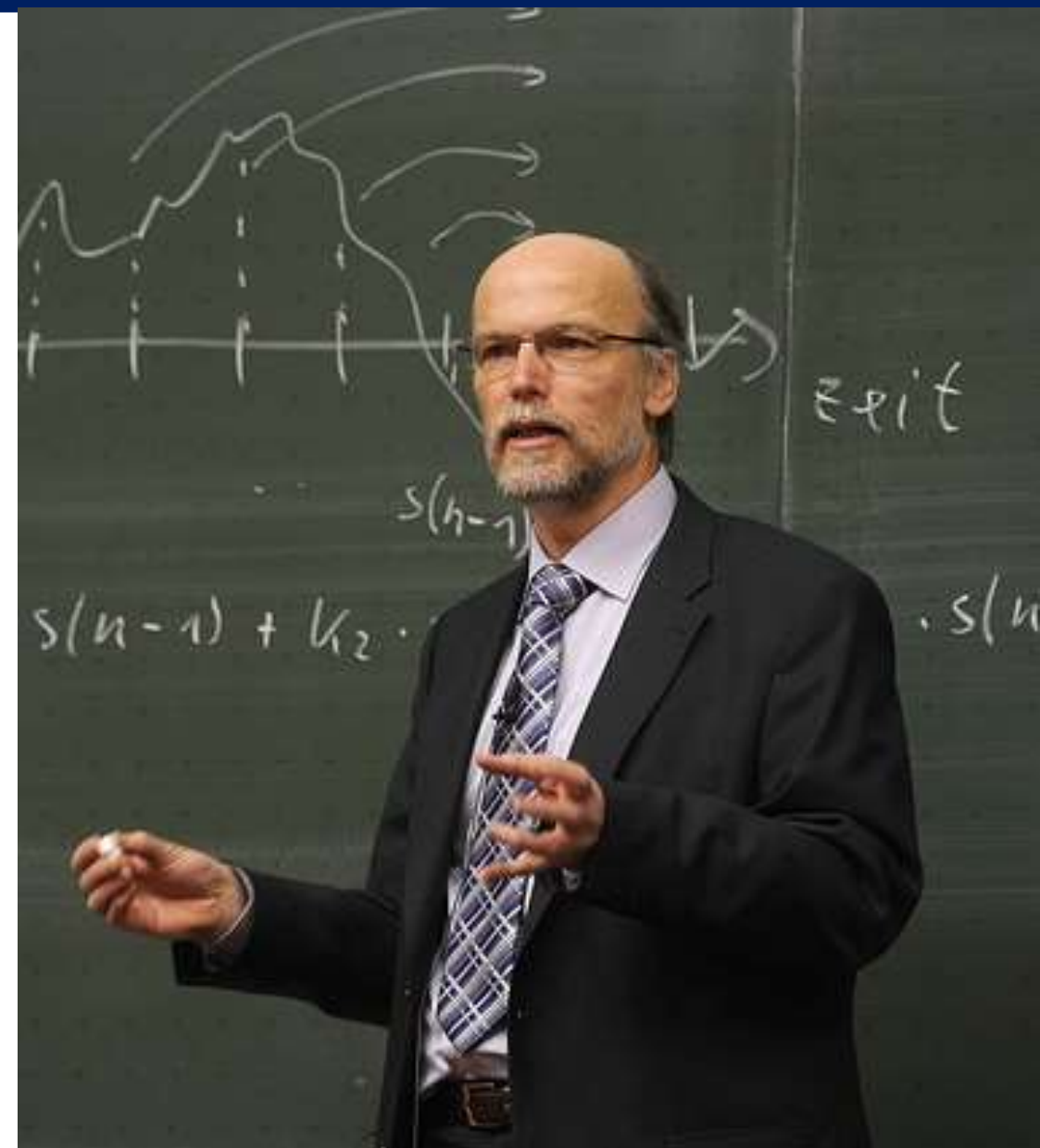
# An Instructor Teaches What Sells...

- Instructors paid by the number of students
- A low number of students
  - Class is cancelled
  - Instructor receives a lower percentage of his workload
- Instructors teach many classes...
  - They have to make a living!



# An Instructor Teaches What Sells...

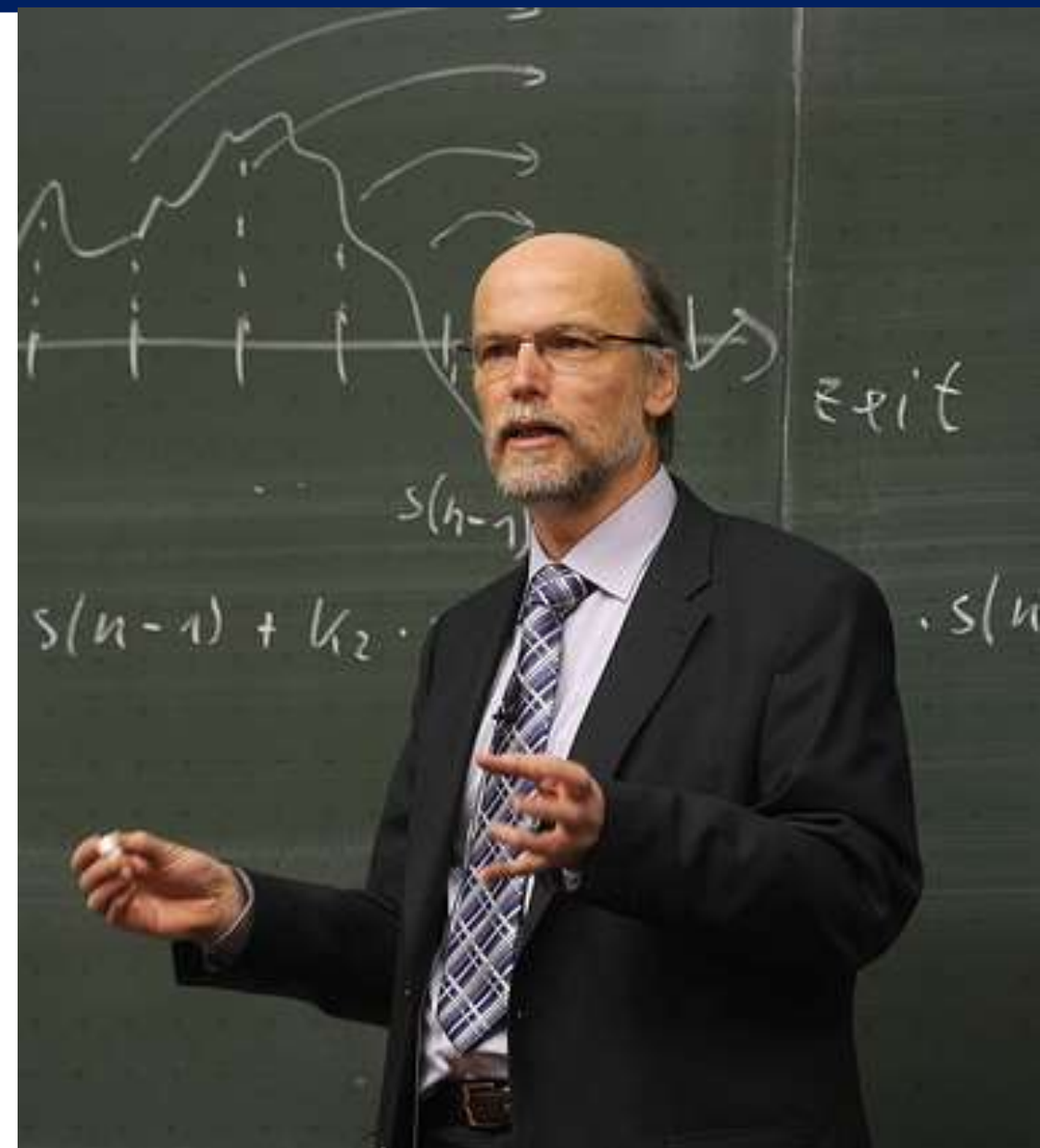
- College instructors in “Highly skilled” areas
  - Compensated at a much lower rate than their counterparts in industry
- No compensation difference between teaching
  - Microsoft Office and PC Basics
  - IBM i System Administration
- Teach Large number of classes
  - Limited time to learn new technologies





# What Instructors Do

- Teach what is easy & fun!
- What will entertain my students?
- Teach topics that
  - Are easy to learn
  - Have unlimited resources for the instructor & student
- Popular technologies lead to more students



# College performance

Question – If college's are doing a great job...

Why do we need 1.2 million H1B's?

Today's businesses have limited input on what colleges teach.

Usually a “Pizza Party” for the college to announce what they plan for their students



# Failure To Modernize Skills Gap

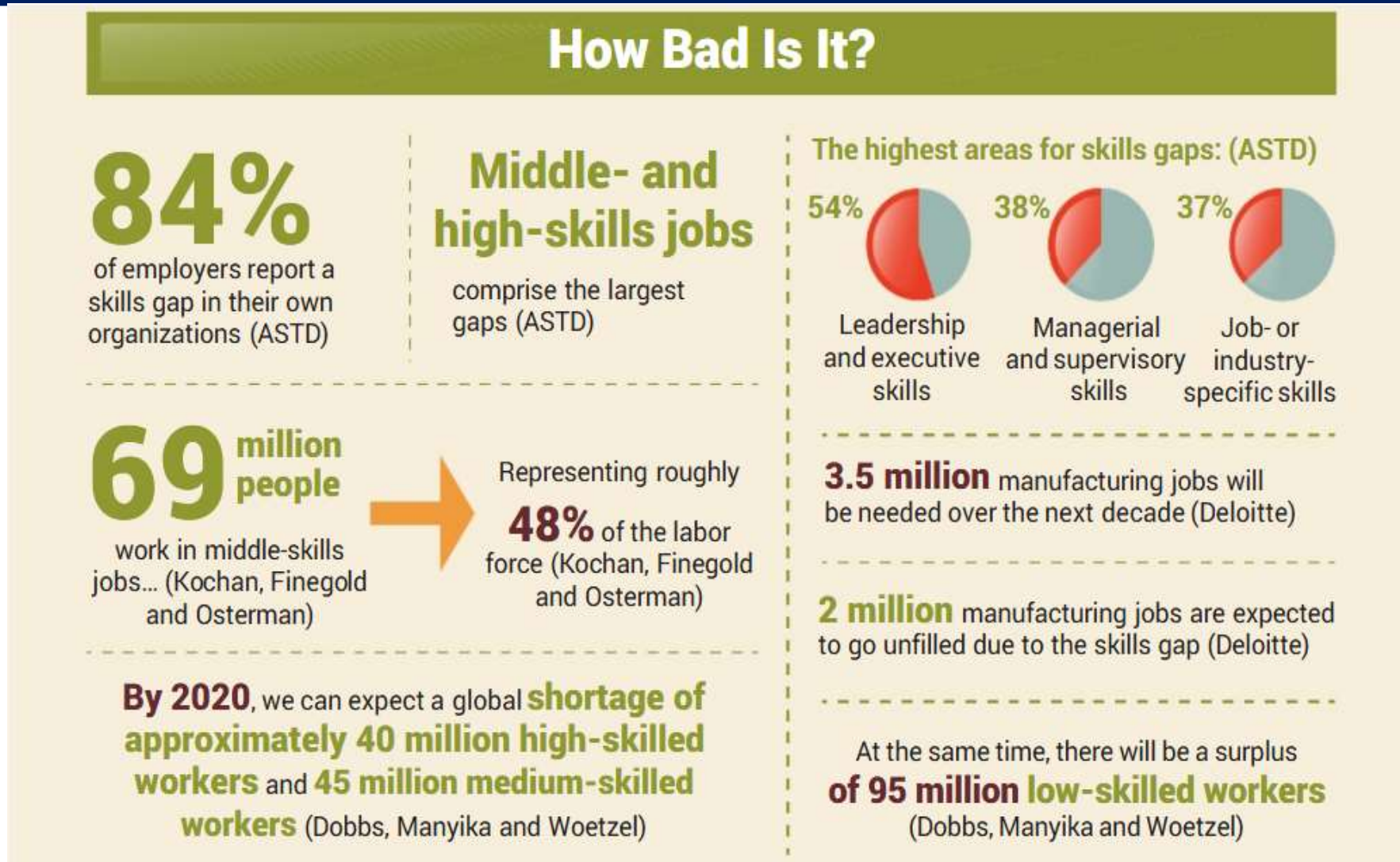


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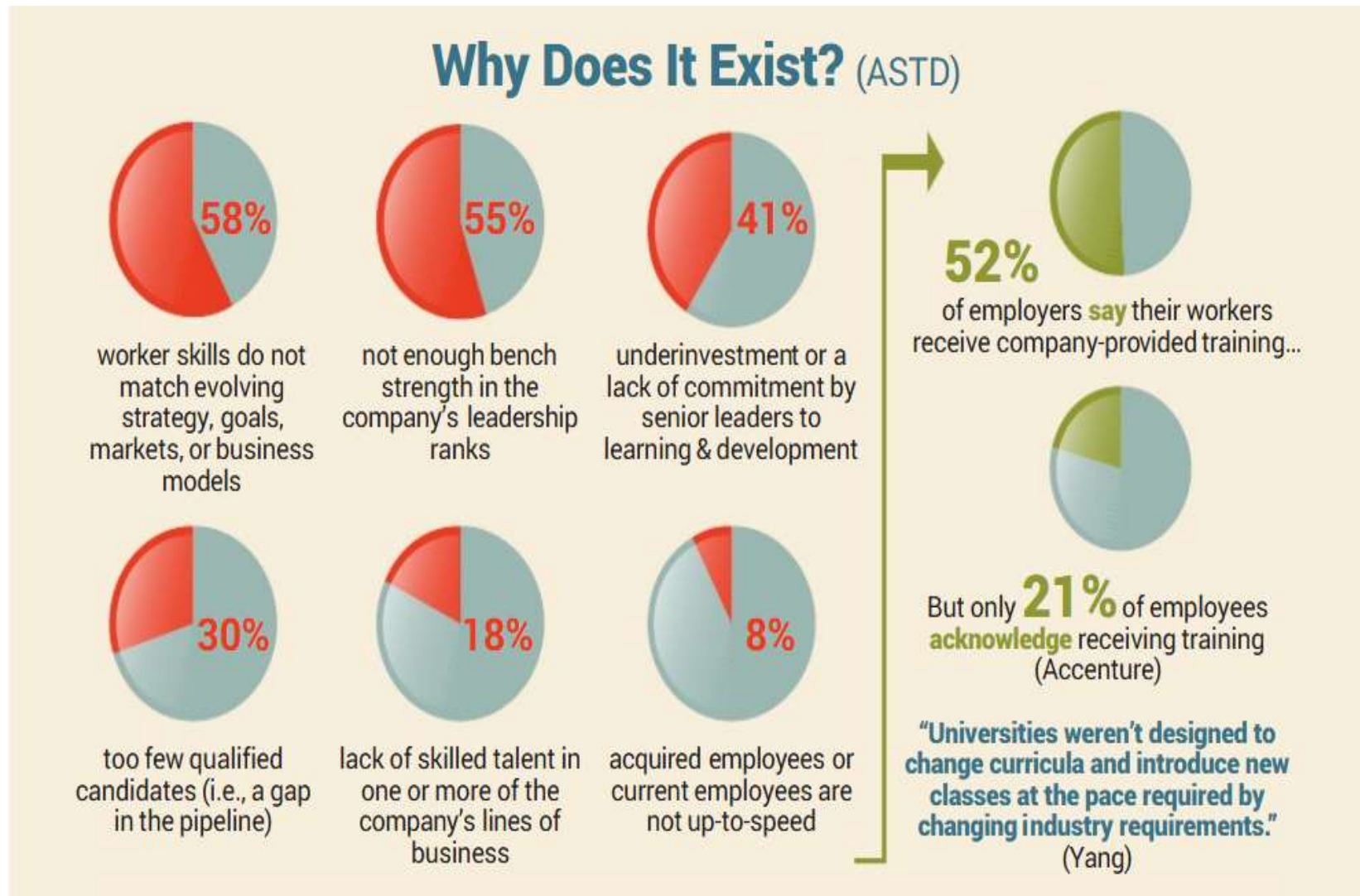
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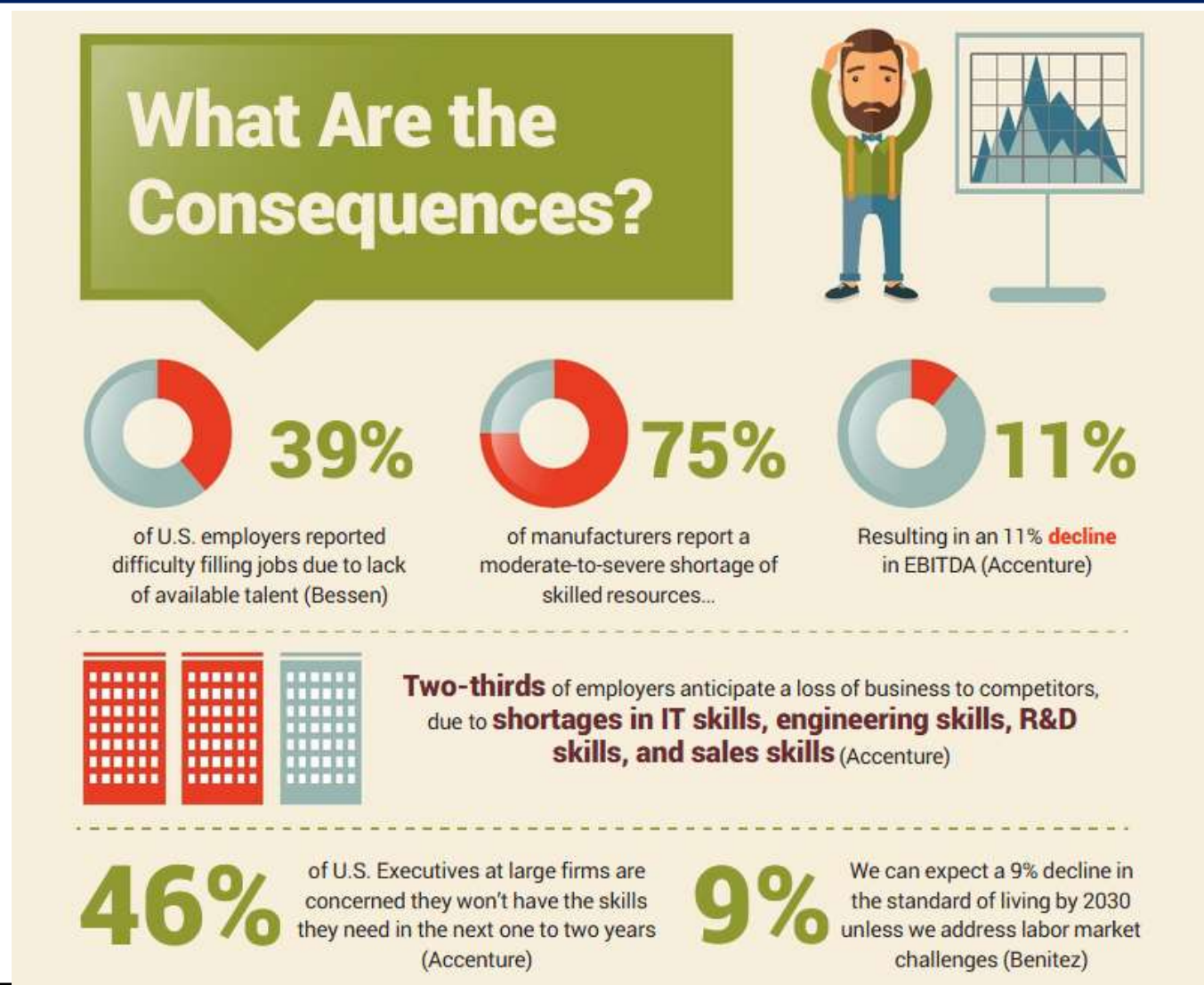
# The Skills Gap... it's a growing problem



# The Skills Gap... it's a growing problem

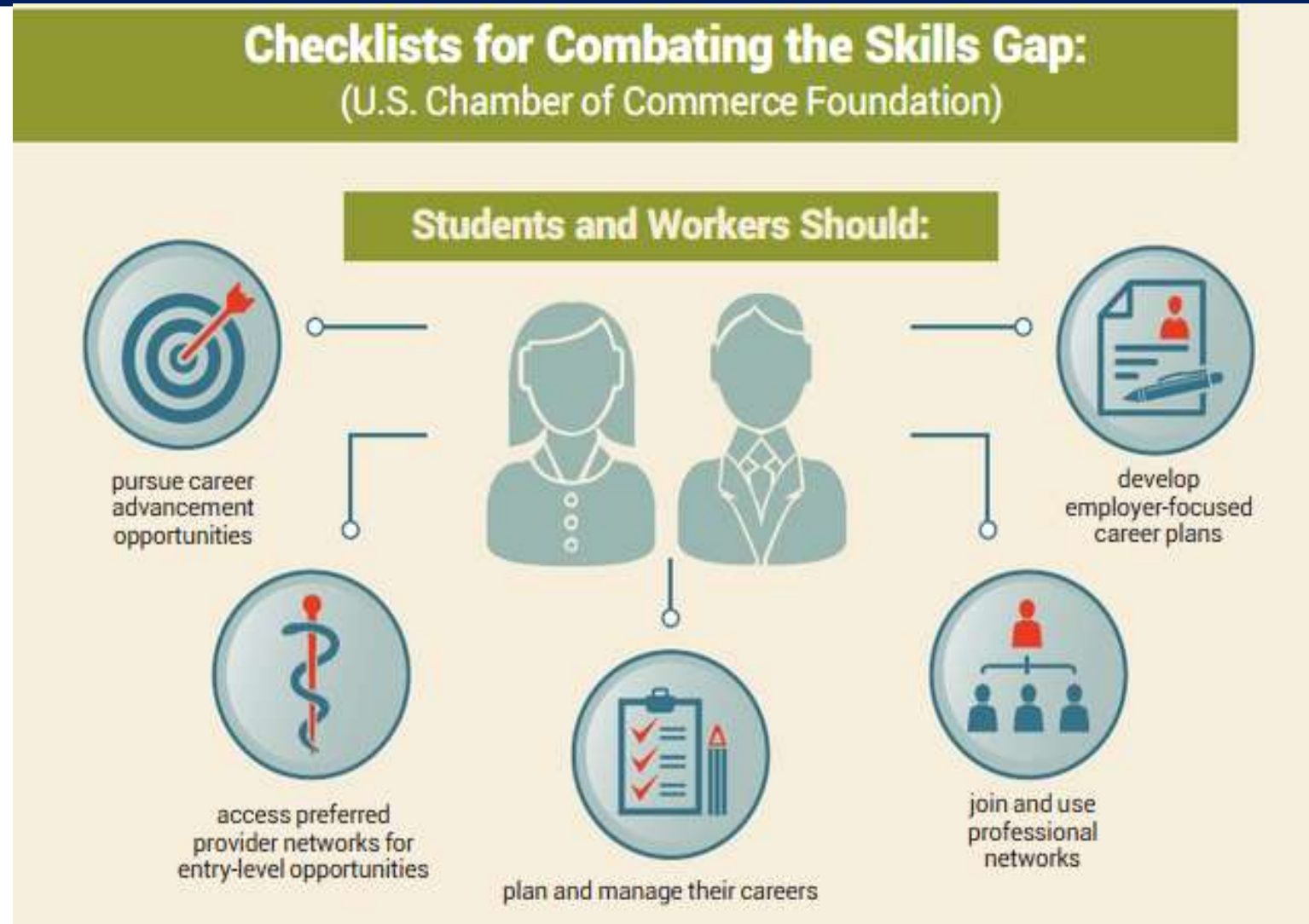


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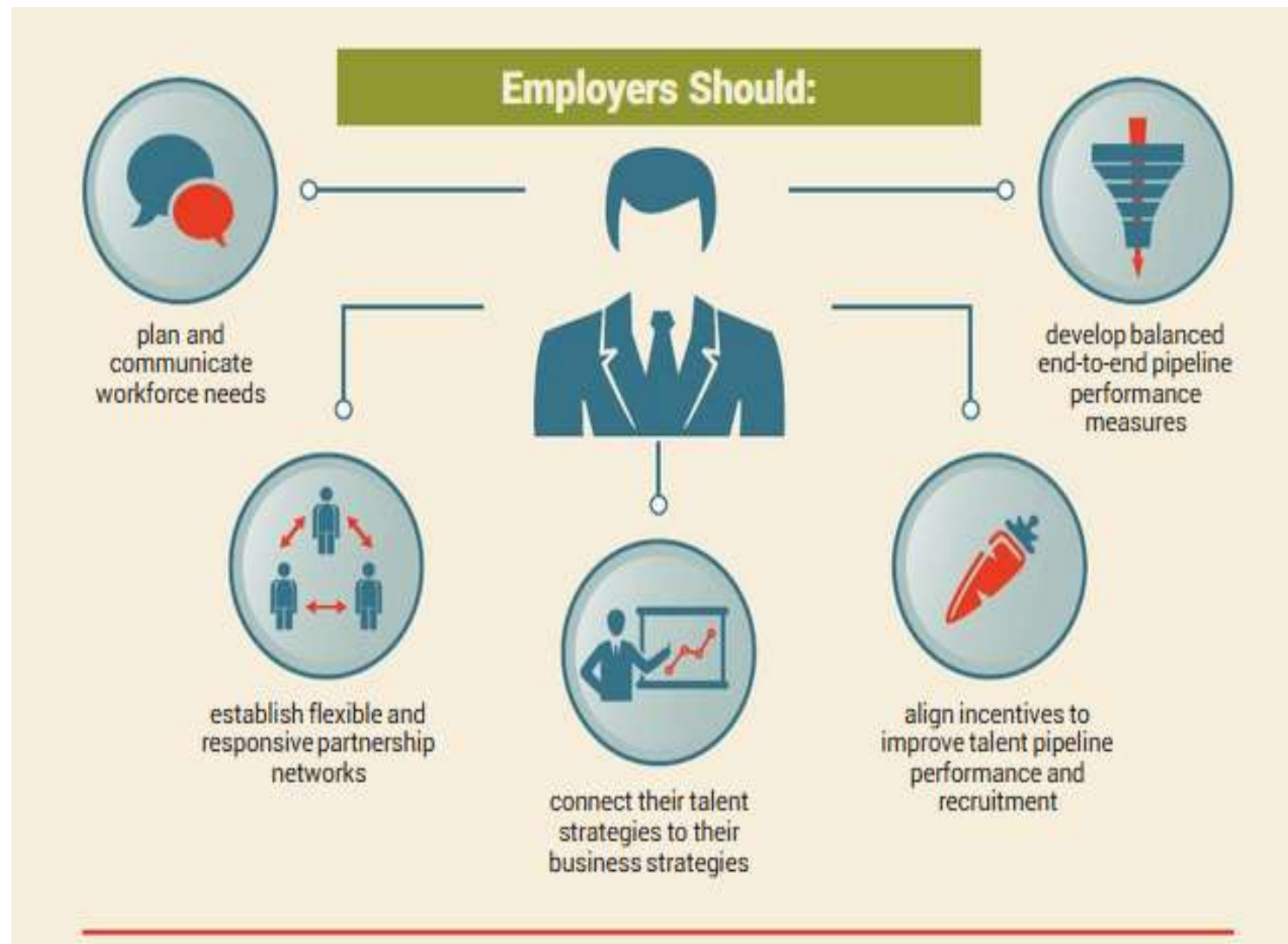





# The Skills Gap... it's a growing problem



# The Skills Gap... it's a growing problem



# The Skills Gap... What about Canada???




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Home / Workplace Research / Demand for Skilled Talent

## Demand for Skilled Talent



This report is a collection of the latest research, including data from Statistics Canada, to help shed light on the hiring environment and talent shortage, and why hiring managers need to move quickly in their recruiting efforts.

Workplace Research ▾

Demand for Skilled Talent

### Search Jobs

Keywords

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Learn more. Download our free report *The Demand for Skilled Talent* Volume

[https://www.roberthalf.ca/sites/roberthalf.ca/files/rh-pdfs/rh\\_demand\\_skilled\\_talent\\_vol13\\_can.pdf](https://www.roberthalf.ca/sites/roberthalf.ca/files/rh-pdfs/rh_demand_skilled_talent_vol13_can.pdf)



# The Skills Gap... it's a growing problem

Employers are having difficult time filling jobs

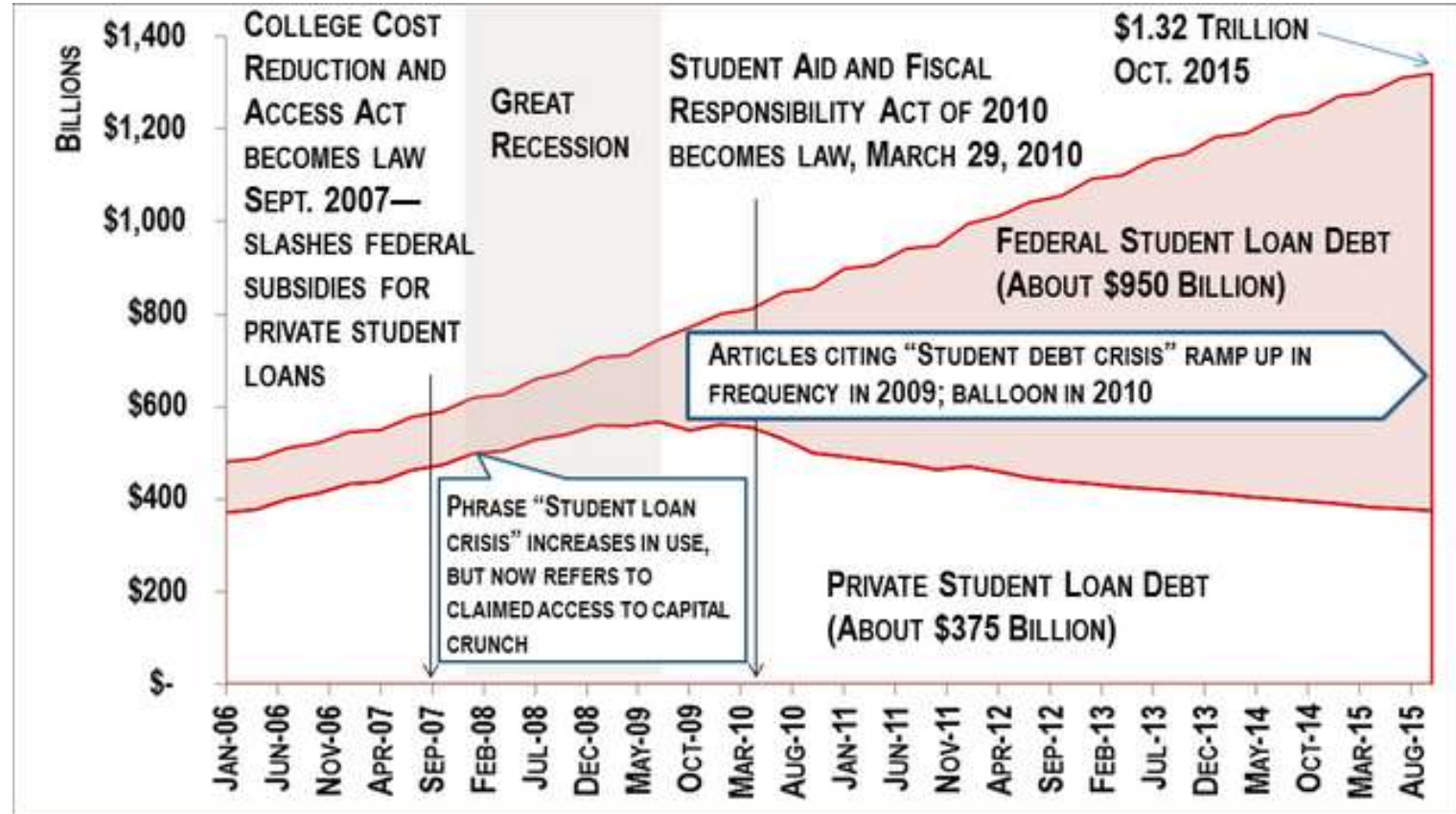
- Interesting fact when more people are graduating with college degrees then ever before;
- 39% of people under 25 unemployed or underemployed
- 64% of today's jobs don't require a college education



# The Skills Gap... it's a growing problem

## Student Debt:

- Totals 1.3 Trillion
- This amounts to 2/3 of total Credit Card and Auto Loans
- 15 percent of retirees have student loan debt



[Student Debt Crisis: The Recession Started It; Colleges Sustain It; And Politicians Make It Worse](#) - Forbes

# The Skills Gap...What about Canada???



Since 1999

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**KA-CHING!**  
How your family can cut thousands off your student debt without spending a cent  
[SERIOUSLY]  
Jeannine Mitchell

[useful? spread the word!](#)

How Big is Canada's Student Debt Today?

The Canada Student Loan Debt Clock

The Canadian Federation of Students (CFS) has something special on its website. A *Canada Student Loan Debt clock* lets you watch student debt adding up across the country. *Tick-tick tick-tick tick-tick tick-tick tick-tick...*

**CANADA STUDENT LOAN DEBT**

**\$16,699,861,138**

This represents only debt owed for Canada Student Loans and excludes debt owed for provincial and private student loans.

[CLICK HERE TO LEARN MORE ABOUT STUDENT DEBT IN CANADA](#)

<http://www.debt101.ca/news/how-big-is-canadas-student-debt-today>



# The Skills Gap... What about Canada???

News • Canada

## Clampdown on student debts leads to bump in collections for government

CRA collection efforts were ramped up two years ago after the government decided that loan writeoffs had spun out of control.



**Liberals move to write off student loans**  
Last year, the government wrote off 33,967 student loans  
The Canadian Press Posted: Feb 14, 2017 4:17 PM ET | Last updated: Feb 14, 2017 4:17 PM ET

The federal government wrote off 33,967 student loans last year totalling \$175 million

CANADA March 27, 2017 3:14 pm  
**The number of bankruptcies**

Updated: March 28, 2017 8:31 am  
**Canadians going bankrupt over student debt**  
Global News

Email Print

payday loans  
cheques cashed  
WESTER UNION

OPEN  
I could use an extra \$1,500  
Payday loans  
Up to \$1,500  
Add as low as \$100  
Canadian Press

expensive debt

<http://www.debt101.ca/news/how-big-is-canadas-student-debt-today>

# The Skills Gap... it's a growing problem

## Three Players:

- The Employer
- The Job Seeker
- Academia



# The Skills Gap... it's a growing problem

## The Employer

- Complain about a shortage of qualified workers
- Hiring managers want workers that are immediately productive
- 49 % of employers site... Lack of job specific skills...
  - **System Z, IBM PowerSystems, RPG & COBOL?**
- Only 24% of employers agree that lack of on the job training causes a shortage

### WHAT DO YOU FEEL IS CAUSING THE SKILLS GAP?



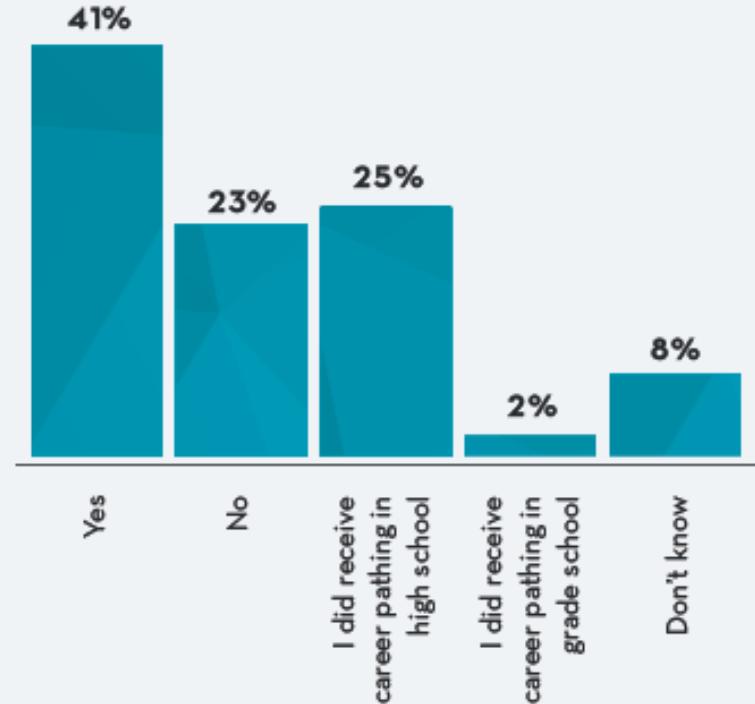


# The Skills Gap... it's a growing problem

## The Job Seeker

- Today's youth are told to "Follow your dreams"
- Little education about the entry level positions available to them
- 44% of college graduates under 25 hold jobs requiring less than a college degree.

DO YOU WISH YOU HAD RECEIVED SOME CAREER PATHING IN GRADE SCHOOL OR HIGH SCHOOL WHERE YOU WERE ADVISED TO GO INTO A CERTAIN FIELD?



# The Skills Gap... it's a growing problem

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## Academia

- 96% of academics think they should communicate with potential employers about their curriculum
- Only 45% polled report doing so on a regular basis
  - This communication is often is a biyearly meeting to tell employers about the college curriculum changes
- Changes to college curriculum often takes 2 – 3 years.
- By the time the curriculum is changed the class is no longer relevant

# Failure To Modernize Students Today



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# Would a Student Want to Code...

- Employee payroll report
- Order Entry Application

9/14/2016

Wibaux University  
Instructor Retirement Report

Instructor Number	Instructor Name	Dept.	Rank	Current Wage	Tenure	Date Hired
289134155	ADIL AL SALLEH	FRN	4	\$64,139.00	Y	10/15/2008
219844605	MESHULAM ARI GUR	MGT	2	\$48,000.00	N	5/01/2010
311241555	JOEL BECKMAN	BIS	4	\$64,500.00	Y	11/19/2009
288373915	GEORGE BENTON	BIO	2	\$45,250.00	N	3/10/2015
342187361	ROGER BLACKWARD	MUS	4	\$49,825.00	Y	5/30/2002
297567849	HENRY BOOKER	PHL	2	\$32,400.00	N	12/30/2008
354190278	KENT BRIGHAM	FIN	3	\$68,469.00	Y	4/20/1996
198745652	JAMES BUCK	CMP	2	\$75,000.00	Y	8/12/2009
322293198	HUAN LIN CHOW	FIN	4	\$78,451.00	Y	4/25/2005
388122459	DWAYNE CLARKE	HST	3	\$43,500.00	Y	5/12/2007
329883744	RUDY CLINTON	ENG	4	\$59,351.00	Y	4/21/2006
191482511	JONATHAN CURTIS	PSY	2	\$28,500.00	N	4/12/2010
288475195	MICHELLE DIXON	ECN	4	\$58,352.00	Y	5/22/2006
291827731	RICHARD DOUGLAS	HST	4	\$51,289.00	Y	4/12/2010
195241055	PHILLIP ERMIGENBURG	MTH	4	\$71,296.00	Y	8/10/1998
331456123	ANTHONY GOLDSMITH	ACT	4	\$84,194.00	Y	5/15/2004
283119853	JACK GROH	ENG	3	\$41,500.00	Y	7/21/2007
277893192	JAMES HOOD	PHL	4	\$48,294.00	Y	8/01/2004
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381899275	FRITZ LA ROBARDIERE	MTH	4	\$61,482.00	Y	7/28/2006
222184200	MICHELLE LAVIER	PSC	2	\$34,280.00	N	6/19/2009
288491078	PAUL LEE	SPN	3	\$37,450.00	Y	3/14/2004
327910466	RITA MACCAULLY	PHY	3	\$38,400.00	Y	7/01/2007
281899104	ROBERT MEADOWS	CHM	4	\$72,500.00	Y	5/10/2006
289318222	LOWELL NORSTRUP	PSC	4	\$83,510.00	Y	4/30/2006
219284481	MANUEL PEREZ	CHM	4	\$62,800.00	Y	7/10/2008
319897802	TED RAMERIZ	PED	4	\$86,395.00	Y	1/02/2009
289105752	JAMES RILEY	PED	3	\$50,500.00	Y	6/30/2009
288194222	GENE RIZZO	ENG	3	\$41,600.00	Y	3/30/2006
301928091	BURTON ROBERTS	PSY	4	\$56,249.00	Y	8/01/2002
299184742	MARIA RODRIGUEZ	SPN	4	\$46,824.00	Y	12/15/2005
288388488	MIMI ROUSSEAU	FRN	4	\$54,904.00	Y	7/30/2008
384956033	GEORGE ROMAN	ACT	3	\$62,481.00	Y	4/15/2005
900124832	ISKENDER SAHID	MKT	1	\$34,750.00	N	8/15/2005
316783022	DEBRA SANDERS	BIS	3	\$50,124.00	Y	4/19/2011
386500129	TRUDY SCHRAMM	BIS	1	\$24,000.00	N	5/30/2008
206910282	LOIS SHOWERS	ENG	1	\$28,000.00	N	8/01/2009
275255838	ELIZABETH STODDARD	PSC	4	\$56,351.00	Y	3/28/2000

# Would a Student Want to Code...

- Employee payroll report Or...
- Order Entry Application

ACS.pdf-5134318305761393987.pdf - Adobe Acrobat Pro

File Edit View Window Help

Create

9/14/2016

Wibaux University  
Instructor Retirement Report

Instructor Number	Instructor Name	Dept.	Rank	Current Wage	Tenure	Date Hired
289134155	ADIL AL SALLEH	FRN	4	\$64,139.00	Y	10/15/2008
219844605	MESHULAM ARI GUR	MGT	2	\$48,000.00	N	5/01/2010
311241555	JOEL BECKMAN	BIS	4	\$64,500.00	Y	11/19/2009
288373915	GEORGE BENTON	BIO	2	\$45,250.00	N	3/10/2015
342187361	ROGER BLACKWARD	MUS	4	\$49,825.00	Y	5/30/2002
297567849	HENRY BOOKER	PHL	2	\$32,400.00	N	12/30/2008
354190278	KENT BRIGHAM	FIN	3	\$68,469.00	Y	4/20/1996
198745652	JAMES BUCK	CMP	2	\$75,000.00	Y	8/12/2009
322293198	HUAN LIN CHOW	FIN	4	\$78,451.00	Y	4/25/2005
388122459	DWAYNE CLARKE	HST	3	\$43,500.00	Y	5/12/2007
329883744	RUDY CLINTON	ENG	4	\$59,351.00	Y	4/21/2006
191482511	JONATHAN CURTIS	PSY	2	\$28,500.00	N	4/12/2010
288475195	MICHELLE DIXON	ECN	4	\$58,352.00	Y	5/22/2006
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275255838	ELIZABETH STODDARD	PSC	4	\$56,351.00	Y	3/28/2000

# Would a Student Want to Code...

- Employee payroll report
- Order Entry Application

Or...

- \$1M iPhone App
- \$100M Online Game of the century

ACS.spfl-5134318305761393987.pdf - Adobe Acrobat Pro

File Edit View Window Help

Create

9/14/2016 Wibaux University  
Instructor Retirement Report

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384956033	GEORGE ROMAN	ACT	3	\$62,481.00	Y	4/15/2005
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275255838	ELIZABETH STODDARD	PSC	4	\$56,351.00	Y	3/28/2000





# Students Think..

*"I'll write one program & I'm done!"*



# Enterprise System Topics are Not “Sexy!”

- What’s cool about enterprise systems?
  - Usually a “*Boring*” business application
- IBM is out of business
  - They used to make good typewriters
- People talk about dead systems
  - Mainframes
  - AS400
  - iSeries
  - System i



# Enterprise System Topics are Not “Sexy!”

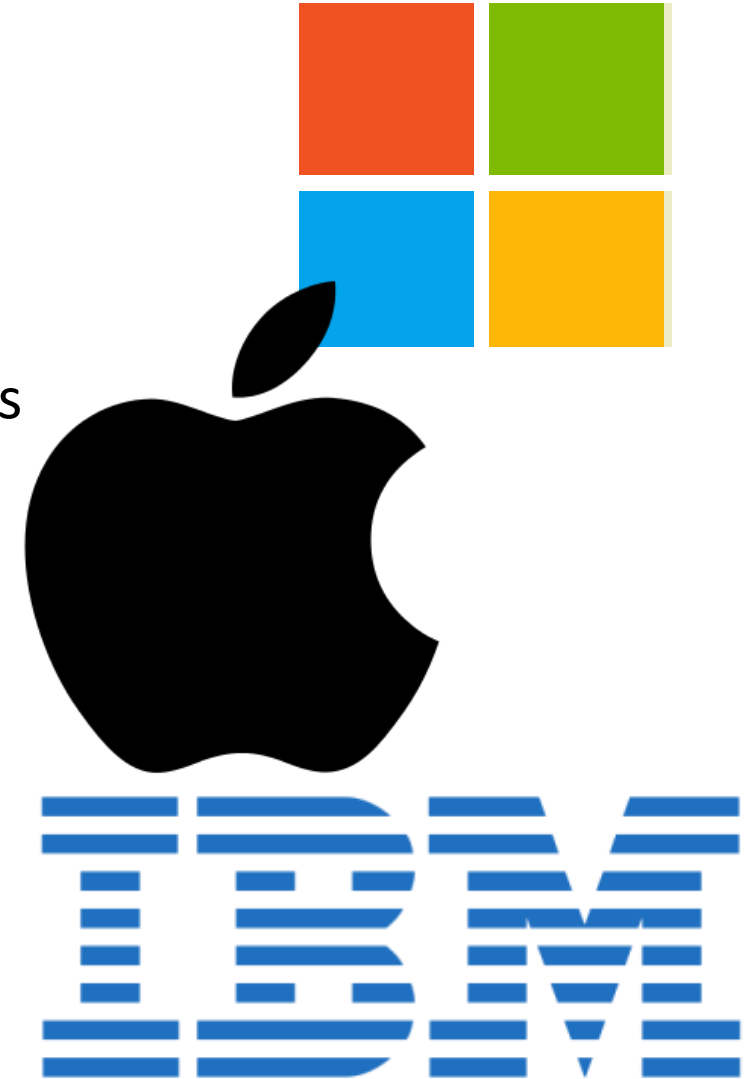
- RPG & COBOL are old...
  - No one uses those languages
  - Why would I want to learn this *“Old Stuff?”*
- Most students have had limited interaction with business
- Student life & the world’s processing is on their iPhone
- Recent Sprint Advertisement!
  - *“Now that your life is on your phone!”*





# Students Don't Understand the Big Picture

- They Grew up with Microsoft & Apple
- I asked a first semester class
  - “*What is IBM’s business?*”
  - Three had never heard of IBM
  - Five students didn’t have a clue what the company does
  - Most said “*Something to do with computers?*”
  - They are rarely exposed to Enterprise systems
    - Except in History Books!
- Even a Gateway IT program advisor
  - “IBM is out of business!”
  - “Why does the Software Developer program teach IBM classes?”
  - He thought Lenovo bought IBM!



# Perception of a Mainframe



# Perception of a Mainframe





# Z13 IBM Mainframe



# Perception of Cloud Computing





# Would a Young IT Professional Work for You?





# Failure To Modernize

## How To Fail



jbuck@ [jbuck@impowertechnologies.com](mailto:jbuck@impowertechnologies.com)

 Jbuck\_imPower

# 80's Tools & Techniques

A photograph of a dark grey IBM AS/400 computer cabinet. The cabinet has a glowing orange light panel at the top. The IBM logo and the model name 'AS/400' are visible on the front panel.

IBM AS/400

# Use 80's Tools & Techniques

```
      AAAA      $$$$$$  //  444      00000      00000
    AAA  AAA  $$$  $$$  //  444      000  000      000  000
    AAA  AAA  $$$      //  444      000      000      000  000
    AAA  AAA  $$$      //  444      000      000      000  000
    AAA  AAA  $$$      //  444  444      000      000      000  000
  AAAAAAAAAA  $$$  //  4444444444      000      000      000  000
    AAA  AAA  $$$  $$$  //      444      000  000      000  000
    AAA  AAA  $$$$$$  //      4444      000000      000000
```

Sistema : NYAS400  
Subsistema : SPECIAL  
Pantalla : DSPTST

Usuario:   
Contraseña:



# Use 80's Tools & Techniques

```
Columns . . . :    6   76          Edit          FRLIB/QRPGLESRC
SEU==>          NEWTEST2
***** Beginning of data *****
0001.00 FTESTFILE  IF    E          K DISK
0002.00 FNEWFILE   0    A E          DISK
0003.00 ** Where FIELD1 is an Alpha Field
0004.00 ** Where FIELD2 is a Numeric Field of Consecutive (1,2,3,4) numbers
0005.00 C          KEY              Klist
0006.00 C          KFld              FIELD1
0007.00 C          KFld              FIELD2
0008.00 * Read the first 1000 customers for "ATSALOT"
0009.00 C          EVAL              FIELD1 = 'ATSALOT'
0010.00 C          EVAL              FIELD2 = 1
0011.00 C          KEY              Setll  TESTFILE
0012.00 C          DoU              FIELD2 >= 1000
0013.00 C          Read              TESTFILE          9999
0014.00 C          IF              *IN99 = *On  OR
0015.00 C          FIELD2 > 1000
0016.00 C          LEAVE
0017.00 C          ENDIF
0018.00 C          WRITE              NEWFILE
0019.00 C          EndDo
0020.00 C          Eval              *INLR = *On
```

# Use 80's Tools & Techniques



# Failure to Modernize

- Deal with dwindling “AS400” or “Mainframe” professional resources
  - Higher costs to work on your “Old stuff”
  - Business costs because your system cannot adapt to changes
- Overseas skills
  - Next generation of IT professionals will “PASS” on your company
  - Will there always be “Unlimited” foreign workers
- Eventually \$\$\$\$\$\$\$.
  - Complete rewrite or migration
  - Different software and/or platform.





# Failure To Modernize

## What You Can Do



jbuck@ [jbuck@impowertechnologies.com](mailto:jbuck@impowertechnologies.com)

 Jbuck\_imPower

# What Your Company Can Do

- Work with high schools & college's
- Understand that young people will not work with old technologies
  - Modernize to attract young IT professionals.
  - They are excited about helping to move your company forward.
- Offer Internships & jobs
- Support academic & industry organizations



# Become involved with Education

---

- Support Enterprise Education
- Talk to students about enterprise systems
  - Visit colleges, high schools & middle schools
- Volunteer to help high schools & colleges
  - Computer systems and software
  - Help them with curriculum that will help business
- Typically, instructors don't interact well with businesses.
  - Most haven't been involved in business for years... if ever
  - Take one to lunch or offer to help with a class.
  - Help them understand what is going on in industry



# Lend Technical Resources to Colleges

Where are the resources.. A recent example!

Subject: Re: Problem with new ILE coding

Never mind on this.....I went ahead and contacted IBM and I needed to turn off the 'Syntax Checker' since I was using SEU. / are wondering.....yes we have RDi loaded, but are still having issues with the licensing per my previous email to you. I have person that set up our SWMA and find out what to do in order to get that resolved. Thanks!

From: [REDACTED]

Sent: Thursday, September 1, 2016 10:00:46 AM

To: Jim Buck

Subject: Problem with new ILE coding

Hey Jim! I am trying to create a very simple program using the new format, but I am receiving errors and from what I read or they did not apply all the PTFs required when I upgraded last May. Can you please look at the screenshot below and the error you think that is the case?

```
SEU==>
FMT ** ... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+...
***** Beginning of data *****
0001.00 DCL-F GTCSTP DISK USAGE(*INPUT);
0002.00 DCL-F GTCSTPAP PRINTER USAGE(*OUTPUT) OFLIND(EndOfPage);
0003.00
0003.01 Dcl-s EndOfPage Ind Inz(*On);
0017.02 READ GTCSTP;
0017.04 DOH NOT %EOF(GTCSTP);
```

# Young People Won't Work with OLD Technology

- Your company **MUST** develop a modernization plan
  - The software & tools to modernize are available
- Less expensive to modernize than
  - Changing platforms
  - Completely rewriting your system
- Modernization
  - Keep your Core Business Logic
  - Modernize your Database
  - Modernize your User Interface



# Young People Won't Work with OLD Technology

## Modernization Steps

- Start slow
- Concentrate on one area
- Model, View, Controller architecture
- Be prepared for the next “Final Solution!”





# Replace your “Retro” RPG Code

```
Columns . . . : 6 76          Edit          FRLIB/QRPGLESRC
SEU==>          NEWTEST
***** Beginning of data *****
0001.00 FTESTFILE  IF  E          K DISK
0002.00 FNEWFILE   O  A E          DISK
0003.00 D XX              S          5  0
0004.00 ** Where FIELD1 is an Alpha Field
0005.00 ** Where FIELD2 is a Numeric Field of Consecutive (1,2,3,4) numbers
0006.00 C          KEY          Klist
0007.00 C          KFld          FIELD1
0008.00 C          KFld          FIELD2
0009.00 C          For          XX = 1 to 1000
0010.00 C          EVAL          FIELD1 = 'ATSALOT'
0011.00 C          EVAL          FIELD2 = XX
0012.00 C          KEY          CHAIN          TESTFILE          99
0013.00 C          IF          *IN99 = *Off
0014.00 C          WRITE          NEWFILE
0015.00 C          ENDIF
0016.00 C          EndFor
0017.00 C          Eval          *INLR = *On
***** End of data *****
```

<sup>1</sup> As Michelle Lyons refers to the old stuff!

# Use RDi & Modern RPG

The screenshot displays the IBM Rational Developer for i (RDi) interface. The top menu bar includes File, Edit, Source, Compile, Navigate, Search, Project, Run, Window, and Help. The left pane shows a project structure for 'RPGWORK' with various source files. The main editor window displays the source code for 'CUSTLSTSQLSRPGLE', which includes control options, program name, description, file definitions, and procedure definitions. The bottom pane shows an error list with five entries, all indicating that certain SQL indicators are not referenced.

**Project Structure (Left Pane):**

- QUSRSYS.\*lib.prod-sys
- RPGWORK.\*lib.prod-cur
  - EVFTMPF01.\*file.pf-src
  - QCLFIBER.\*file.pf-src
  - QCLLESRC.\*file.pf-src
  - QCMDSRC.\*file.pf-src
  - QCPYLESRC.\*file.pf-src
  - QDDSSRC.\*file.pf-src
  - QRPGCVTSRC.\*file.pf-src
  - QRPGFIBER.\*file.pf-src
  - QRPGLEPROF.\*file.pf-src
  - QRPGLESRC.\*file.pf-src
  - QRPGLESRC.\*file.pf-src
  - QRPGLESRC.\*file.pf-src
  - QRPGLESRC.\*file.pf-src
  - QRPGSQLSRC.\*file.pf-src
    - CHP10EZP01.sqlrpgle
    - CMCOMM.sqlrpgle
    - CRTRANDOM#.sqlrpgle
    - CUSTLSTSQL.sqlrpgle
    - CUSTLSTSQO.sqlrpgle
    - EXAPPCM.sqlrpgle
    - LISTGTCSTP.sqlrpgle
    - RANDNBRI.sqlrpgle
    - RANDOMWRK.sqlrpgle

**Source Code (Main Editor):**

```
000102 // Control Options
000103 Ctl-Opt Option(*NoDebugIO);
000104 Ctl-Opt DftActGrp(*No);
000105 //
000106 // Program Name : STATICSQL5
000107 // Description : Lists out the CUSTOMER Table
000108 // By : Jim Buck
000109 // Date : 01/10/2016
000110 //
000111 // File Definitions
000112 //
000113 Dcl-f CustListp Printer Usage(*Output) Oflind(Endofpage);
000114 //
000115 // Procedure Definitions
000116 //
000117 Dcl-pr Main ExtPgm('STATICSQL5');
000118 *N Char(2);
000119 End-Pr;
000120
000121 Dcl-pi Main;
000122 StateParm Char(2);
000123 End-Pi;
```

**Error List (Bottom Pane):**

ID	Message	Severity	Line	Location	Connection
RNF7031	The name or indicator SQL_00047 is not referenced.	00	120	RPGWORK/QRPGSQLSRC(STATIC...	Deathstar - Power
RNF7031	The name or indicator SQL_00049 is not referenced.	00	120	RPGWORK/QRPGSQLSRC(STATIC...	Deathstar - Power
RNF7031	The name or indicator SQL_00050 is not referenced.	00	120	RPGWORK/QRPGSQLSRC(STATIC...	Deathstar - Power
RNF7031	The name or indicator SQL_00051 is not referenced.	00	120	RPGWORK/QRPGSQLSRC(STATIC...	Deathstar - Power
RNF7031	The name or indicator SQL_00027 is not referenced.	00	86	RPGWORK/QRPGSQLSRC(STATIC...	Deathstar - Power

# By Buying An Old Mainframe Computer

IBM z890 Mainframe computer weighs 1,500 pounds and stands over five feet tall. When it was first unveiled in 2004, it cost over \$300,000

19-year-old Connor Krukosky bought a used one last year. He always had an interest in the behemoth machines.

Krukosky also enjoys taking computers apart. For years he did just this: Tinker with old machines and peek into their insides to try and figure out what precisely they did.

**There's a lot of these young people!**





# Offering Internships & Jobs

- What are the Benefits of Young IT Professionals?
- New skills
  - Linux, PHP, HTML, JavaScript
- Many new technologies are second nature to young people
- You will teach young IT professionals your business
  - Retirements lose technical skills
  - Retirements lose business knowledge
- Old timers will learn from the youngsters and vice versa!



# MARIST - Poughkeepsie, NY



The screenshot shows the top portion of a website. The header is dark with the IDCP logo (a blue arrow pointing right with 'IDCP' text) and 'THE INSTITUTE FOR DATA CENTER PROFESSIONALS' on the left. The 'MARIST' logo is in red on the right. A navigation menu includes 'Home', 'Enterprise Systems Education', 'Data Center Education', and 'Cybersecurity'. Below this is a link for 'Educational Partners'. The main content area features a large banner for 'z/OS Online Education' with a blue link 'Click here for Spring 2018 courses - Register Now'. The background of the banner is split: the left side has a dark blue background with orange bokeh lights, and the right side shows a perspective view of a computer keyboard with blue light reflecting off the keys.

**IDCP** | THE INSTITUTE FOR DATA CENTER PROFESSIONALS **MARIST**

[Home](#) [Enterprise Systems Education](#) [Data Center Education](#) [Cybersecurity](#)

[Educational Partners](#)

## z/OS Online Education

[Click here for Spring 2018 courses - Register Now](#)

# Building IBM Z skills

IBM Z

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Solutions ▾

Systems and software ▾

Resources ▾

It infrastructure > Z > Education >

## Building IBM Z skills

Find and develop IT and mainframe skills for your digital transformation

Talk to an expert

### Helping to staff the workforce of the cognitive era

Competing in the cognitive era requires the right enterprise IT platforms and skilled IT professionals. This work force will need to meet multiple challenges associated with the digital era.

IBM works with students, professors and businesses around the world to ensure that the next generation of mainframe experts will be ready to leverage the superior security, availability, scalability, and efficiency of the mainframe.



<https://www.ibm.com/it-infrastructure/z/education/academic>



# IBM z Academic Initiative Universities

IBM Offering Information

Explore financingDownload

## IBM z Academic Initiative Universities

List of global universities actively incorporating Enterprise Computing/Mainframe topics in their curriculum.

1 of 27Automatic Zoom

### Participating Schools

Educators from all over the world are currently investigating or actively teaching mainframe technologies. This is a partial listing of the most active schools listed by country, state or province.

**Attention: If you are interested in locating and recruiting new talent for internships and hiring, contact the educator listed or select the associated profile link to view curriculum details. Additional profiles will be added as available.**

For general inquiries about the IBM Academic Initiative program or if you're an educator that would like to be included in this list, contact the System z Academic Initiative team at [zskills@us.ibm.com](mailto:zskills@us.ibm.com).

Check out our [Google Map](#) for a global view.

### Alabama

Contact IBM

<https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=ZSL03445USEN>

# IBM Master the Mainframe

[It infrastructure](#) > [Z](#) > [Education](#) >

## Master the Mainframe

Developing enterprise computing and coding skills around the world

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### What is the Master the Mainframe contest?

The contest is sponsored by the IBM Z Academic Initiative, which has provided mainframe training and resources to students at more than 1,000 schools in 70 countries. By participating in the contest you learn, prepare for a career – and you may win prizes.

Due to the contest's success, the challenges and systems from the contest are now available to anyone, year-round, through the Learning System.

[Hear from an intern \(02:35\)](#)



The IBM Master the Mainframe World Championship

[Watch the video \(02:35\)](#)

# The Inevitable Return of COBOL

🕒 JULY 6, 2015 👤 BY RITIKA TRIKHA

## The Inevitable Return of COBOL

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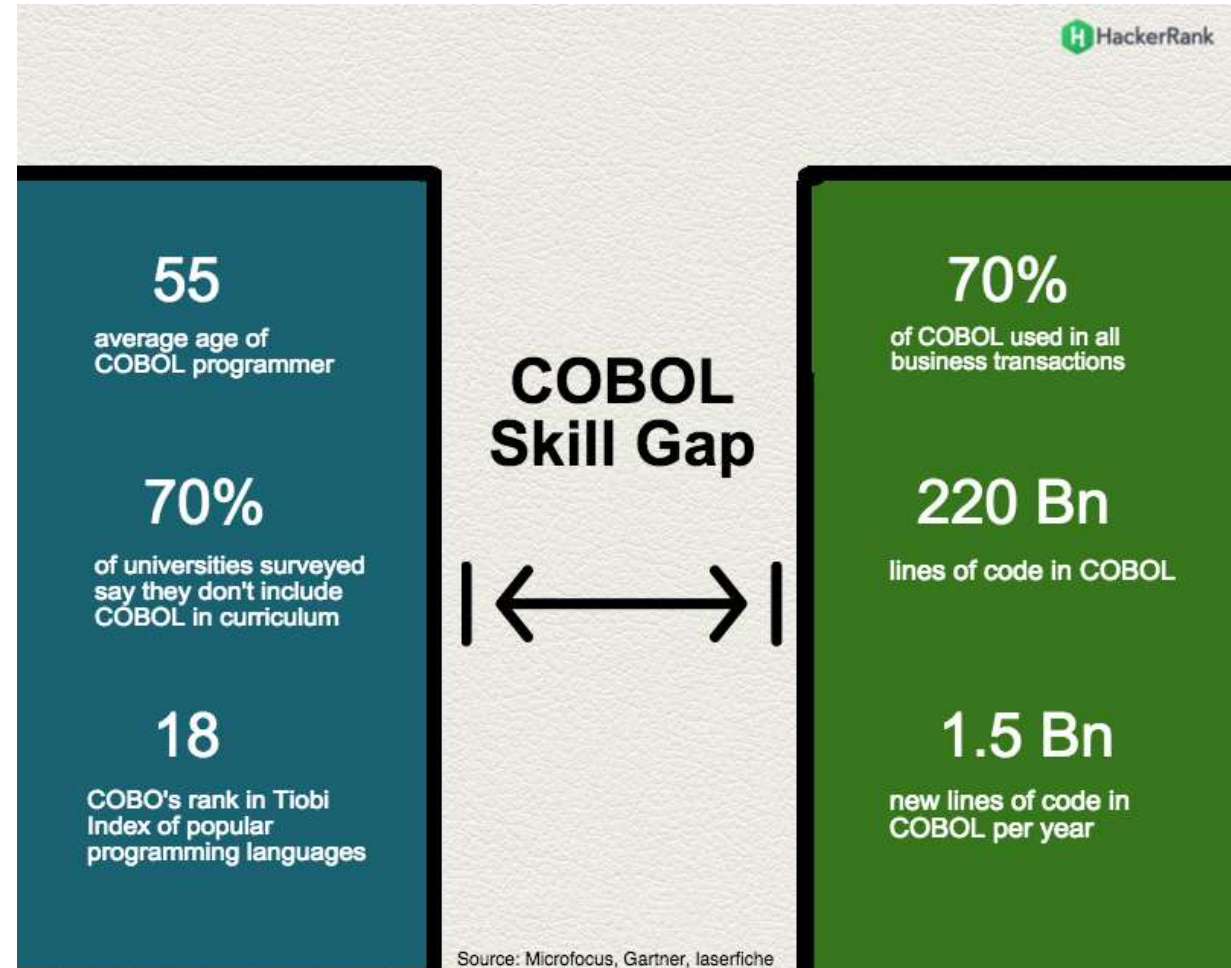
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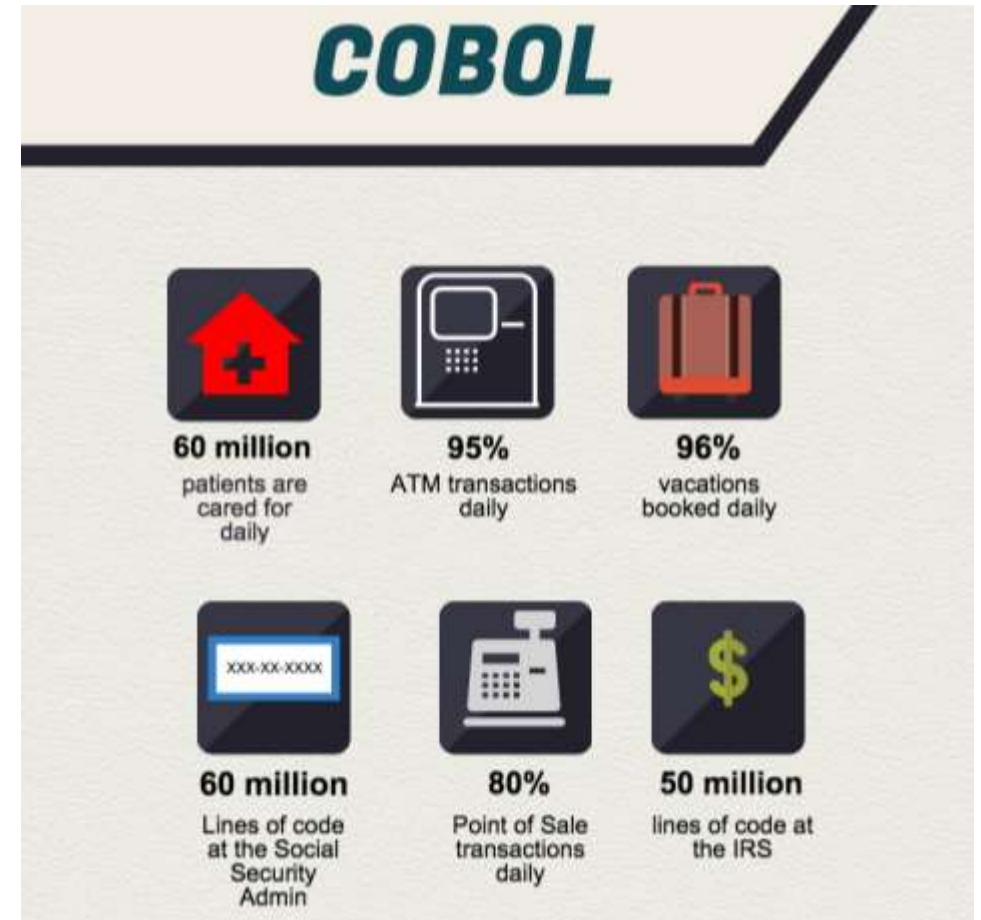




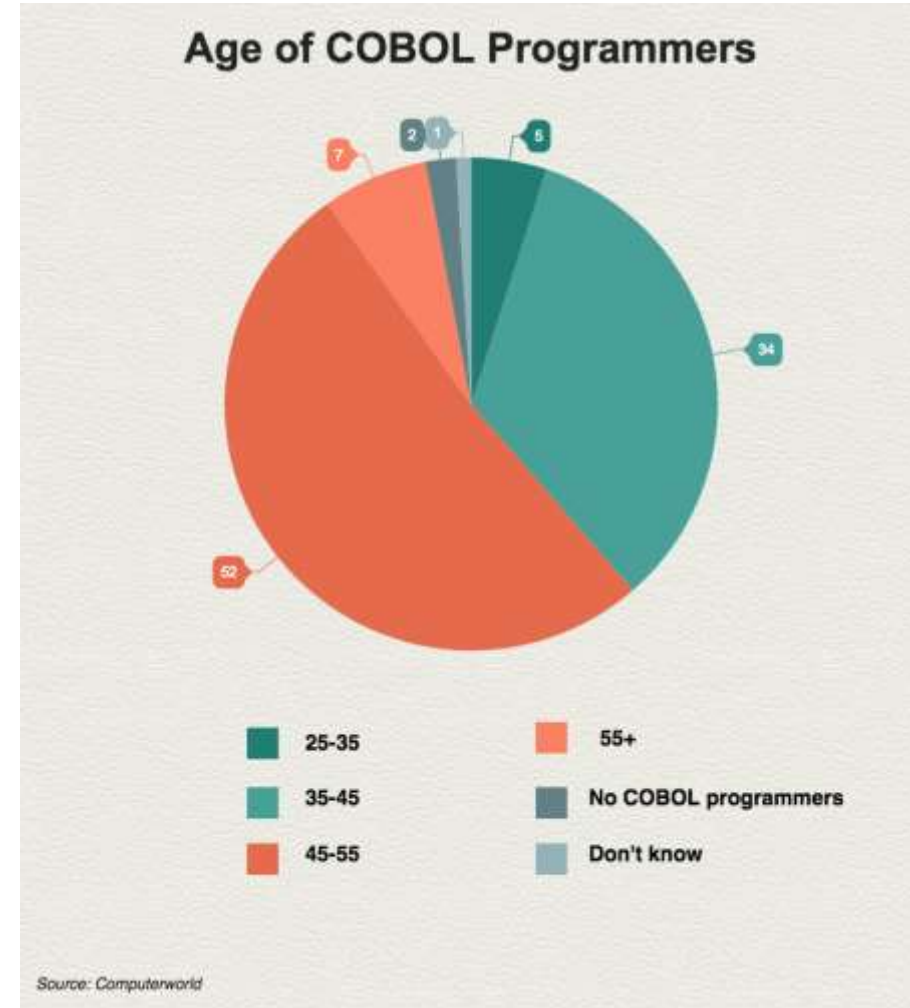
# The Inevitable Return of COBOL

If COBOL's been such a foundational root of business apps for decades, why hasn't something better come along?

The short answer: *If it ain't broke, don't fix it.*  
The long answer requires us to take a step back in time. COBOL was created in 1959, the computing era when programming languages were tailored for specific purposes.



# The Inevitable Return of COBOL



# Industry Organizations

- SHARE, COMMON & Local user groups
  - The web has hurt these organizations...
    - The boss says *"Can't you watch a webinar or something?"*
  - Attend conferences & learn new skills
  - Volunteer with COMMON
  - Volunteer with your local user group
  - Invite local Colleges to attend user group events
    - College Administrators
    - Instructors
    - Students



[share.org](http://share.org), [common.org](http://common.org) & [wmcpa.org](http://wmcpa.org)



# Questions or Comments



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# Failure to Modernize... The Real Cost



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