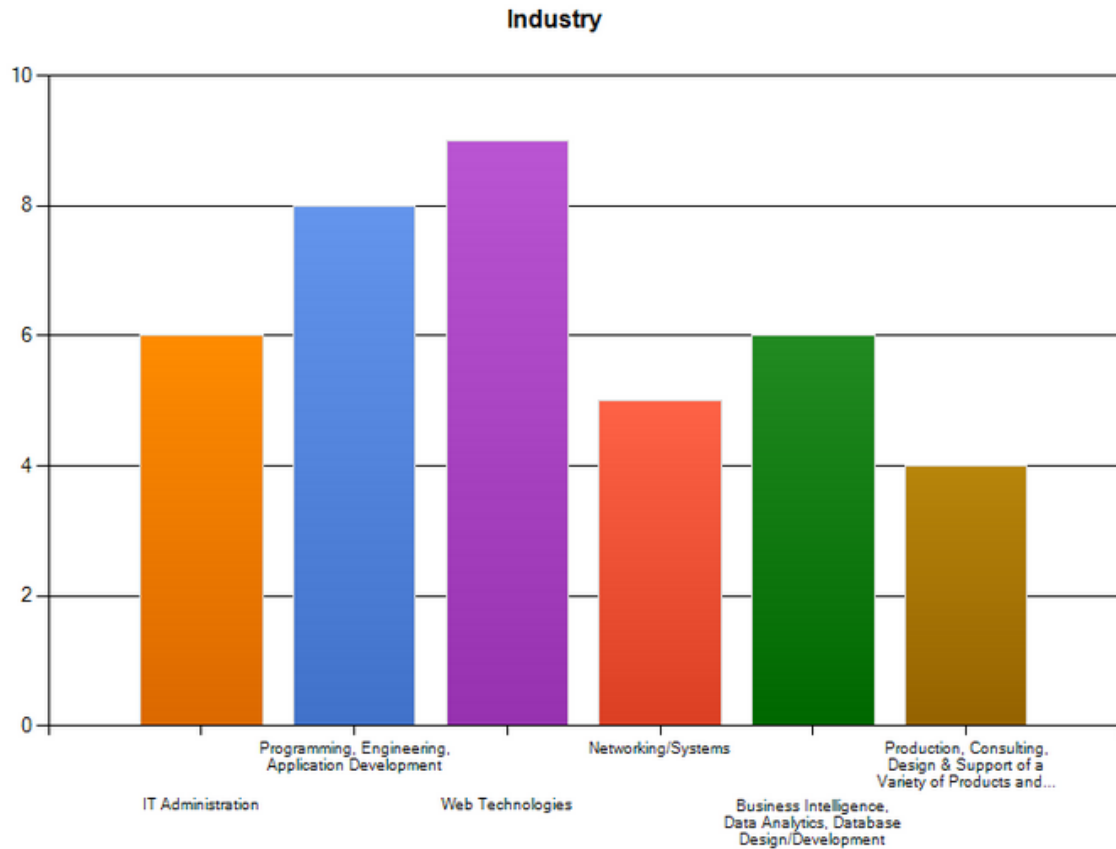


IT Skills Gap Questionnaire Results
March 22, 2013

What products or services do you provide?



IT Administration – 16%

- Development of IT Strategies, implementation of technology solutions, for a variety of customers

Programming, Engineering, Application Development—21%

- Software development, services, and devices
- Information Security
- Testing
- Software Devices, Services

Web Technologies—23%

- Web Services, Development, Content Management Services (CMS)
- Web and Mobile Application development
- Social Media

Networking/Systems—13%

- Cloud Implementation
- Networking/Systems
- Training, end-user administration/support

Business Intelligence, Data Analytics, Database Design/Development—16%

- Business Intelligence, analytics, data warehouse

Production, Consulting, Design & Support of a Variety of Products and Services (industry sector: education, insurance, health care, energy, retail, IT, manufacturing, and communications)—11%

- Customer Relationship Management (CRM), Learning Management Systems

Not surprisingly, the highest number of IT industry professional's occupations, who answered the questionnaire, worked in the product or service categories of **Programming, Engineering, Application Development or Web Technologies (totaling 44% of all respondents)**. This is consistent with occupational employment projections that document consistent demand for software developers (applications, systems) nationally and in Washington State.

Computer and mathematical occupations.

Most new jobs:

Software developers, applications +143,800

Fastest growing (in percent):

Software developers, systems software +32.4

Slowest growing (in percent):

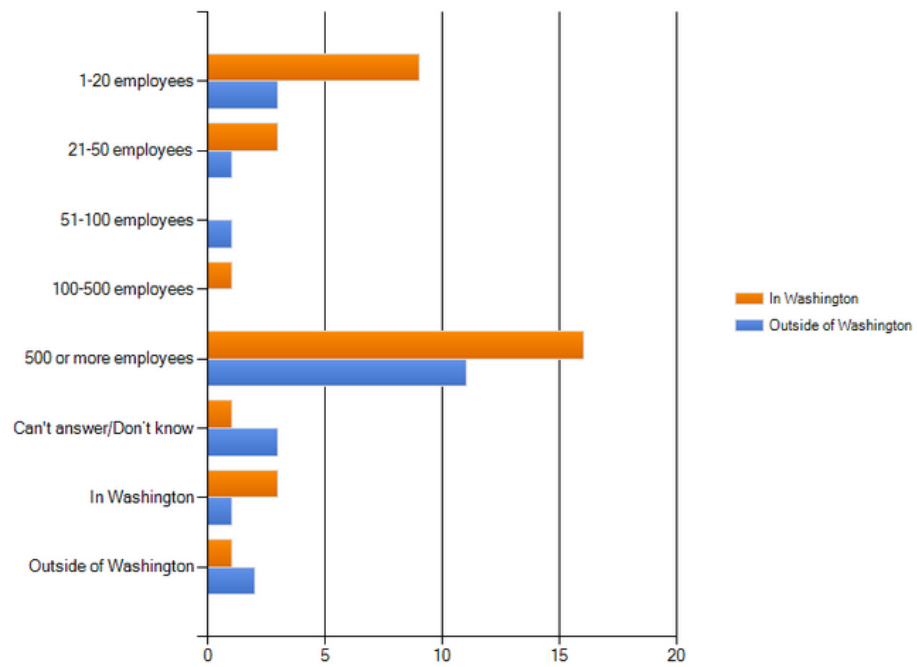
Mathematical technicians +6.2

Highest paying:

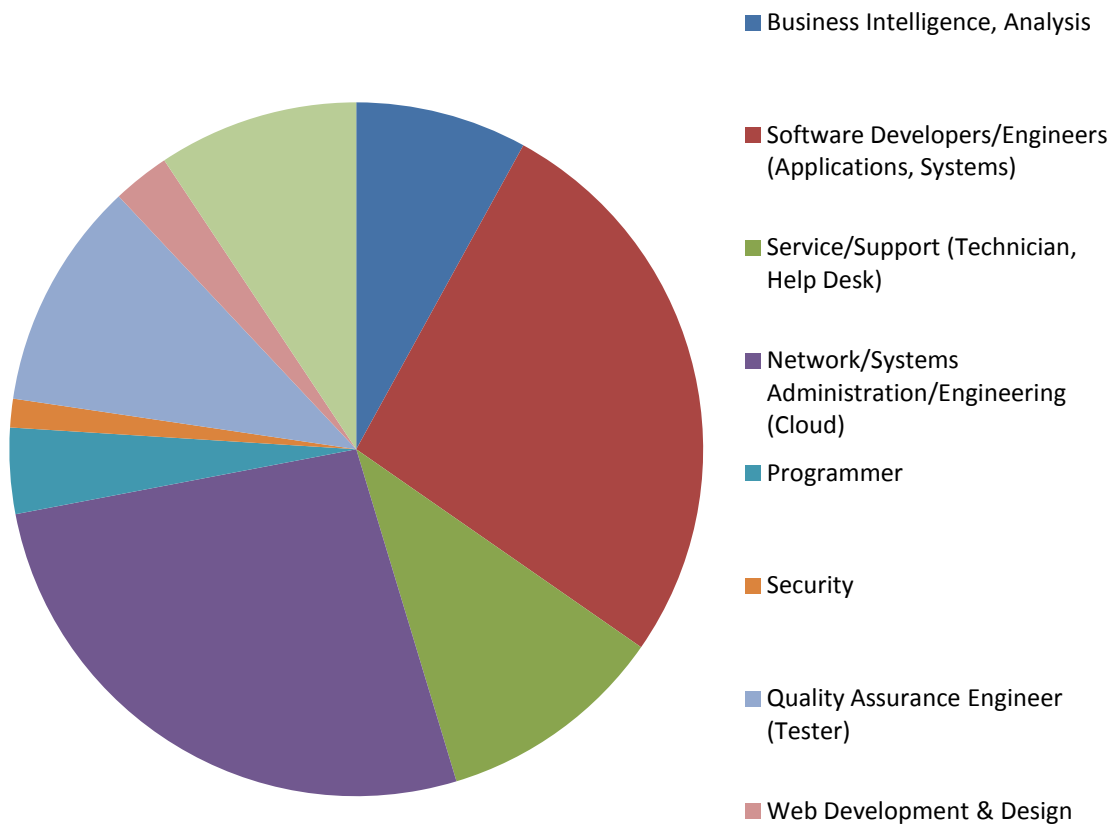
Computer and information research scientists \$100,600

Source: Bureau of Labor Statistics, [Occupational Outlook 2010-2020](#)

How many employees work for your company...

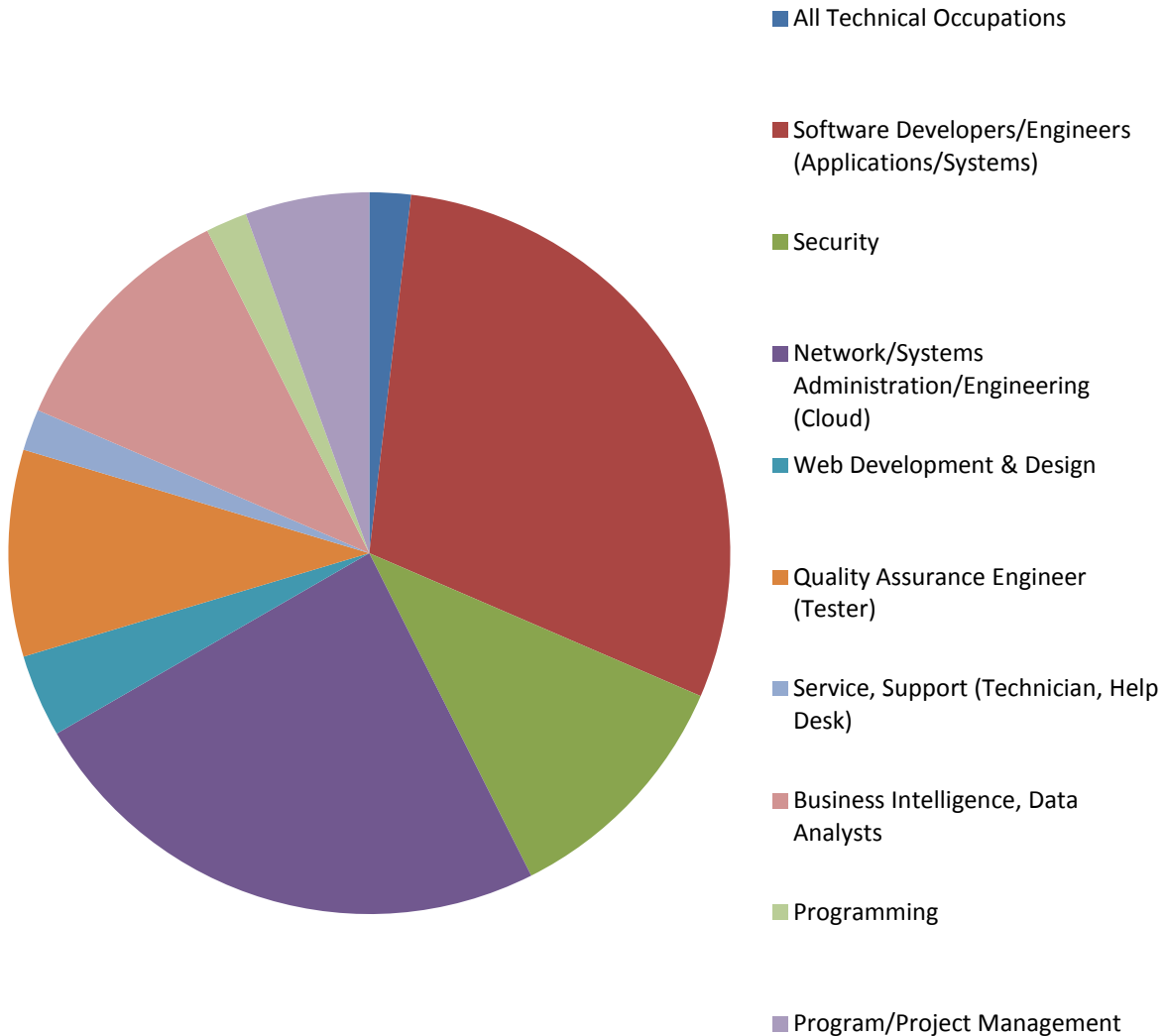


What are the three IT occupations in which you have the most employees?



Occupation	No. of Responses	No. of Responses/32 Occupations	No. of Responses/Total No. of Responses (83)
Analyst	1	3%	1%
Administration	1	3%	1%
Administrative Support	1	3%	1%
Architecture	1	3%	1%
Business Analyst	3	9%	4%
Cloud Computing and Virtualization	1	3%	1%
Database	2	6%	2%
Design	1	3%	1%
Developers (Applications)	8	25%	10%
Field Systems Engineer	1	3%	1%
Finance and Operations	1	3%	1%
Helpdesk and Support	4	13%	5%
IT Infrastructure	3	9%	4%
Network (General)	3	9%	4%
Network Administration	1	3%	1%
Network Engineer	4	13%	5%
Programmer/Analyst	1	3%	1%
Operations	1	3%	1%
Product Manager	2	6%	2%
Program/Project Management	5	16%	5%
Programming	3	9%	4%
Sales & Marketing	1	3%	1%
Sales Engineer	1	3%	1%
Security	3	9%	4%
Server Administration	2	6%	2%
Systems Administration	1	3%	1%
Systems Engineer	5	16%	5%
Software Engineer and Development	10	31%	12%
Software Tester & QA	7	22%	3%
Technical Support & Sales	3	9%	4%
Voice Engineering	1	3%	1%
Web Site Design	1	3%	1%

What IT occupations do you currently have the most trouble recruiting for and why?



Specific Technical Knowledge & Skills (including Employability/Soft):

Web Design & Development

- Artists with technical skills - Most educational programs don't stress the importance of finishing art as functional elements in a real time application.

Service, Support (Technician, Help Desk)

- Sales Personnel with technical skills, customer service experience, motivation. (2)

Software Developer/Engineer (Applications/Support)

- Ability to effectively communicate, if English is a second language.
- Android.

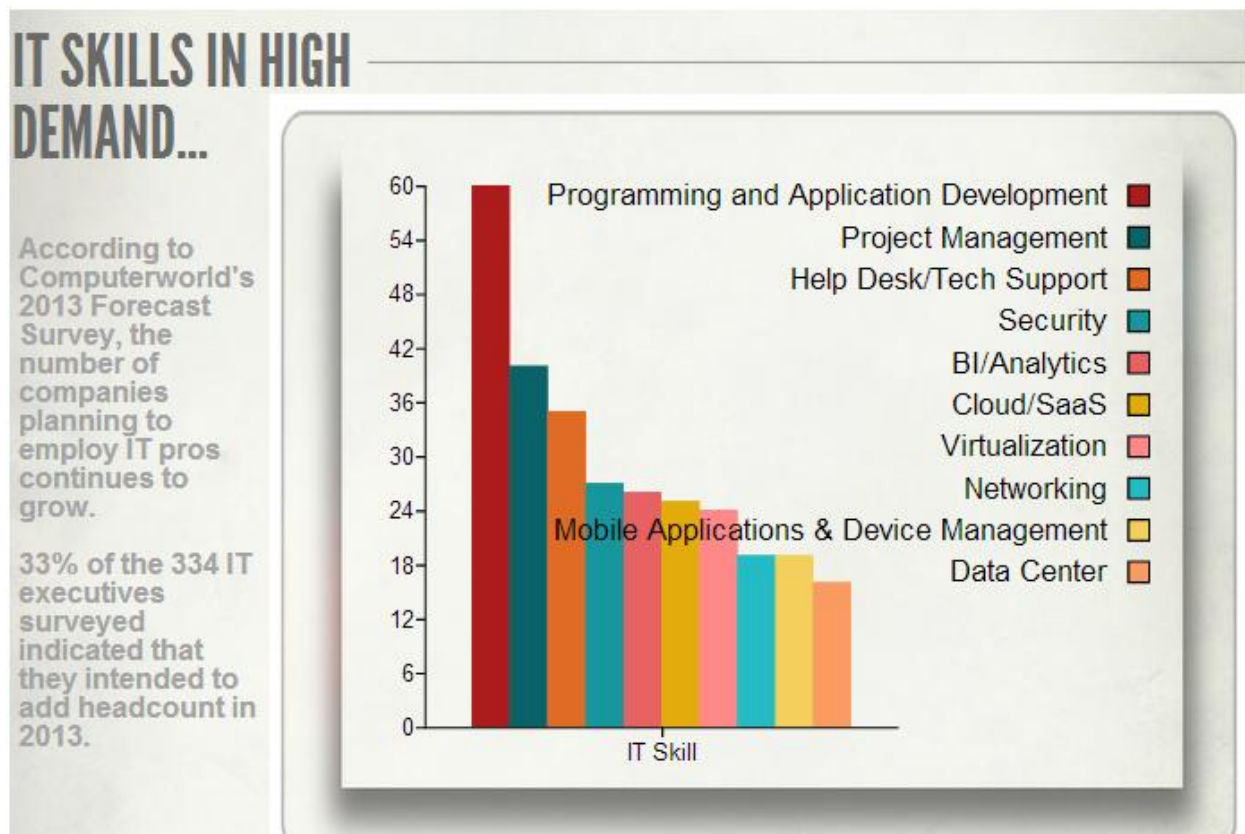
General Problems Associated with High Demand Occupations

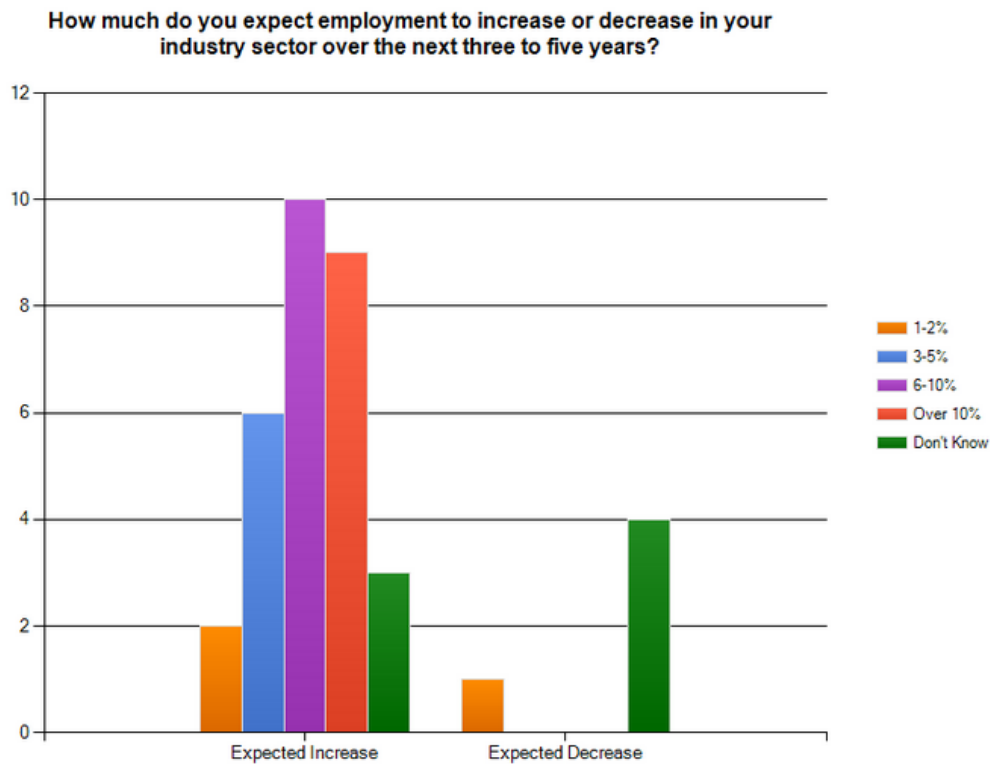
- Can't offer benefits, as well as inability to offer a competitive salary, thus difficult to recruit new employees.
- Lack of soft skills.
- Most programmers don't want to build tools, but instead re-create everything from scratch for each project.
- Difficult to find automation testers.

Programming

- Chef/Puppet

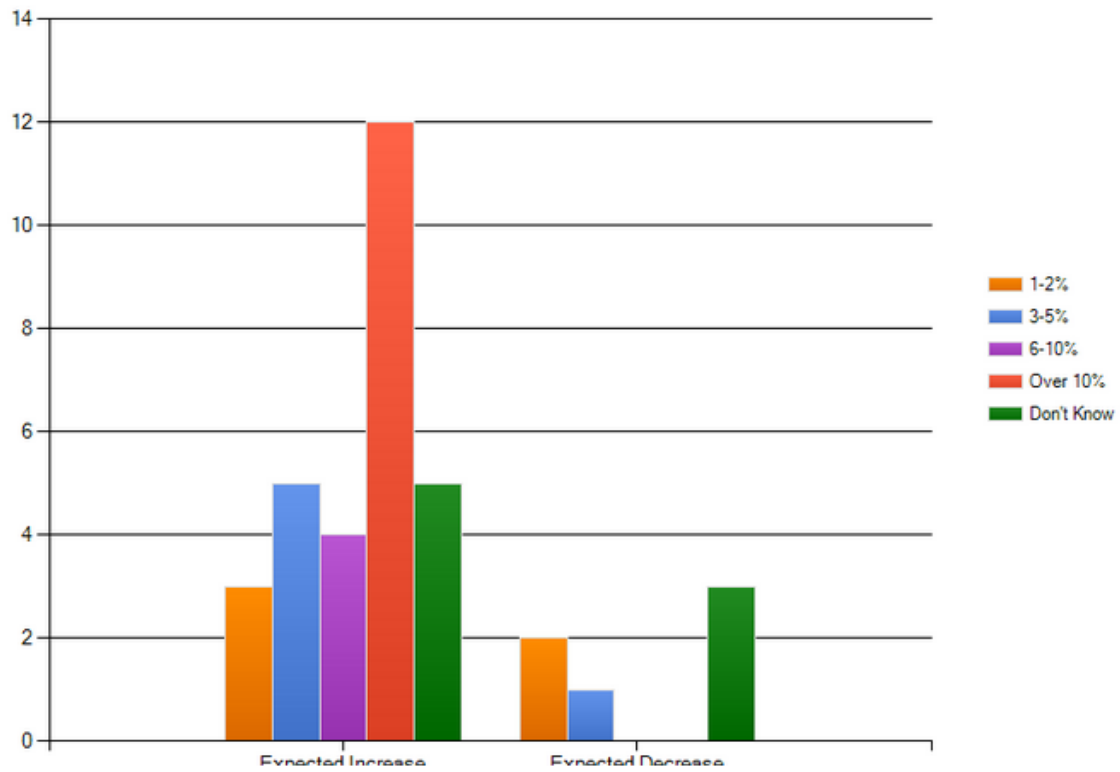
Compare the results from the IT Skills Gap Forum with this national infographics on IT Skills in High Demand...



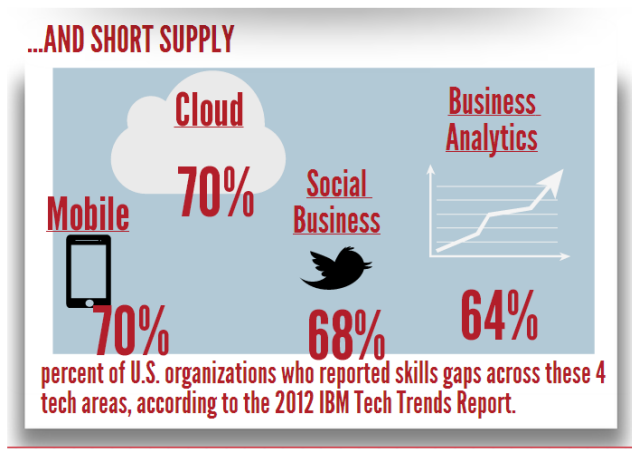
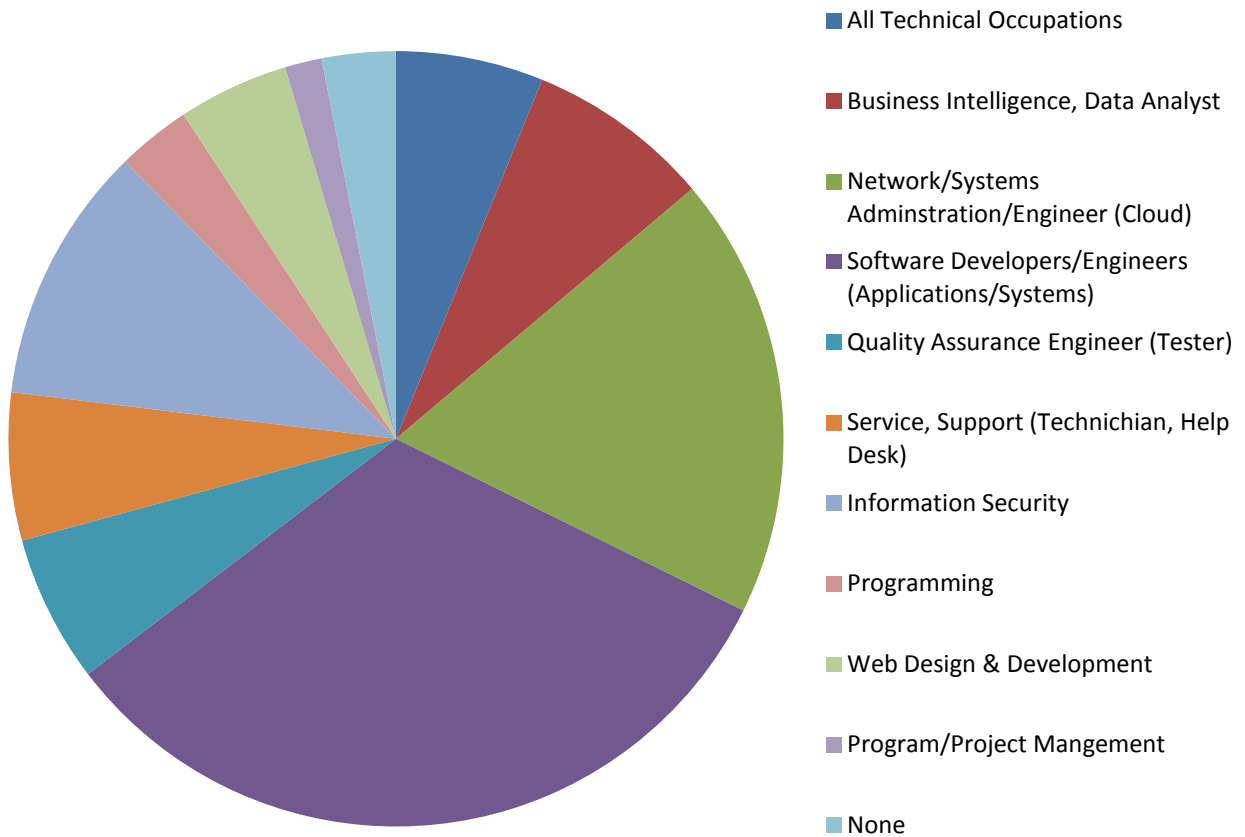


- I expect the need to increase, however companies are trying to decrease, do more with less, even while the need and responsibility increases.
- There will be another big shift in the next 2-3 years as the venture capital push and mobile device adoption wave ends. Companies will have to stand on the merits of their products, not their ability to grow. This will be a hard shift for many companies.
- The range of IT services and devices continues to grow at a rapid clip. Existing products will continue to expand. New services will come to the fore.
- Retirements/job changes.
- Don't know for sure, but anticipate a fairly steady increase.
- Gartner estimates that global business intelligence software revenue will reach a 7 per cent increase in 2013 from 2012.
- Renewable energy has been growing, if unsteadily and is projected to continue. So IT needs grow with it!
- Costco IT currently has 100+ open positions.
- Demand for cloud computing, and dev work in the mobile / social media space is expected to grow significantly over the next 3-5 years.
- Business Intelligence is a growing area.
- I don't know the numbers, but I would expect it to increase as more users move of feature phones into smart phones.
- Small increase due to the increasing use of technology.

How much do you expect employment to increase or decrease in your industry company over the next three to five years?

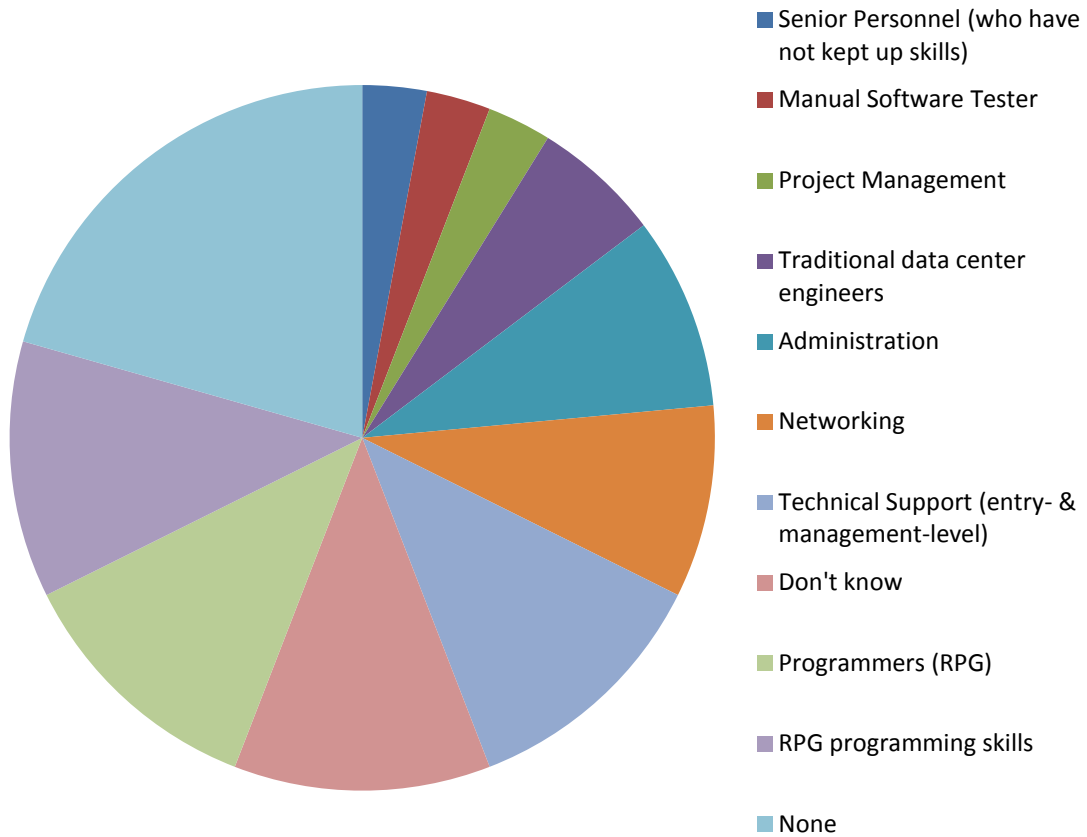


What IT occupations are likely to increase as a proportion of your IT workforce?

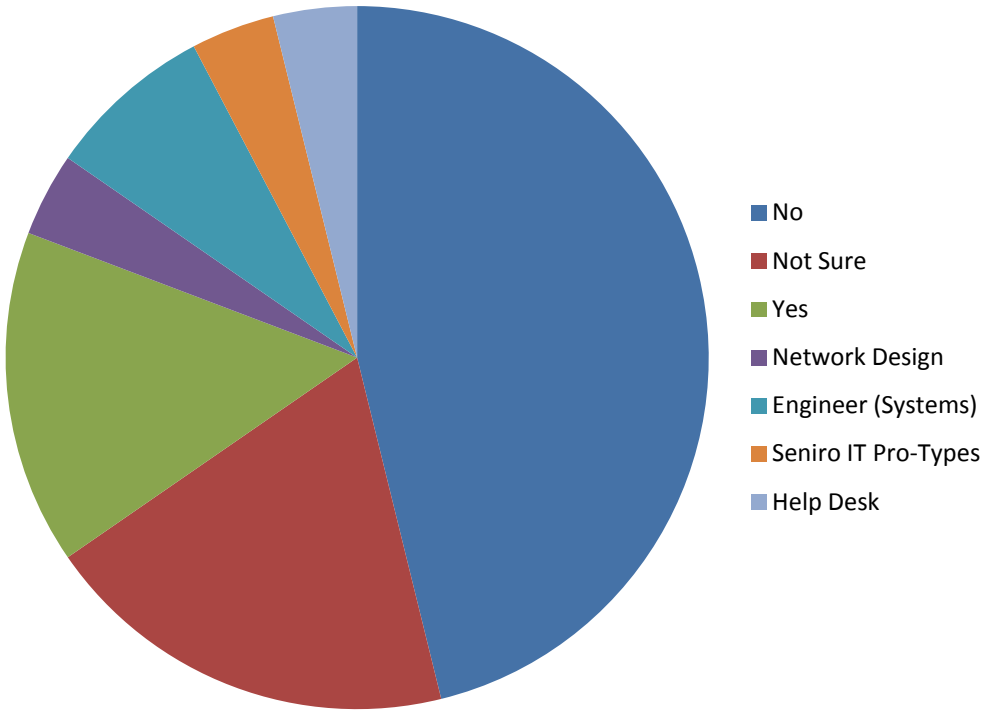


National Skills in Short Supply

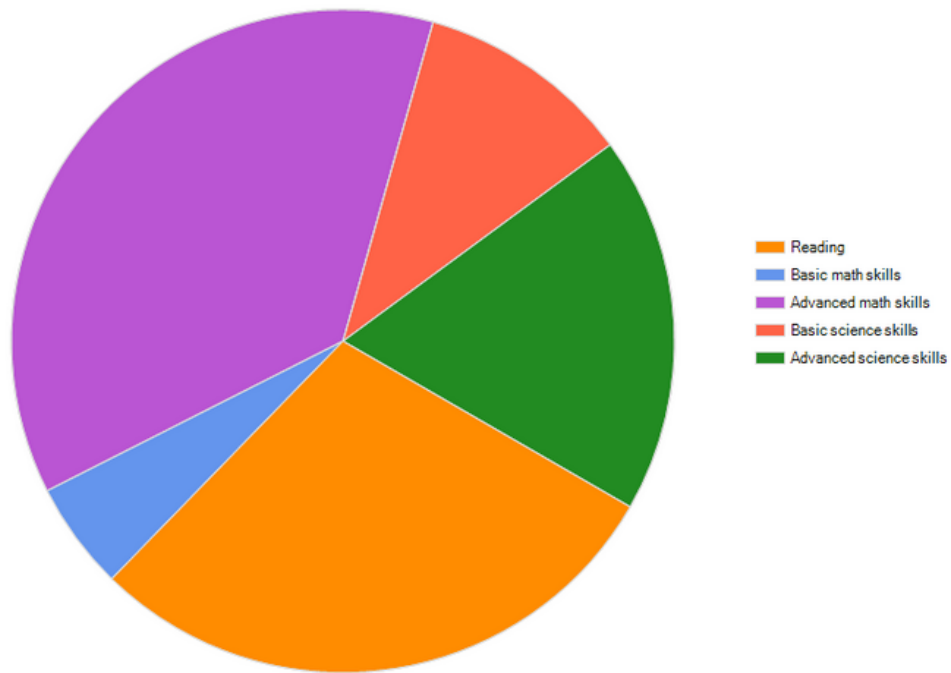
What specific occupations will likely decline as a proportion of your workforce?



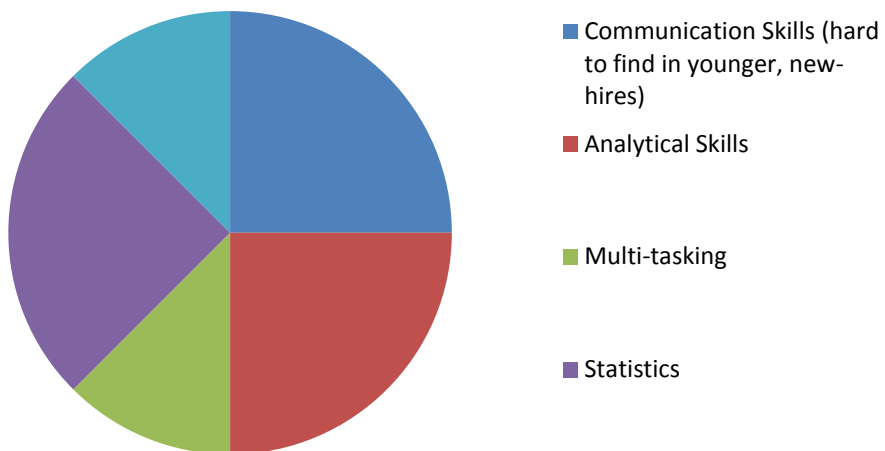
Will projected employee retirements cause your company to hire in a specific IT occupation?
If so, please identify the occupations.



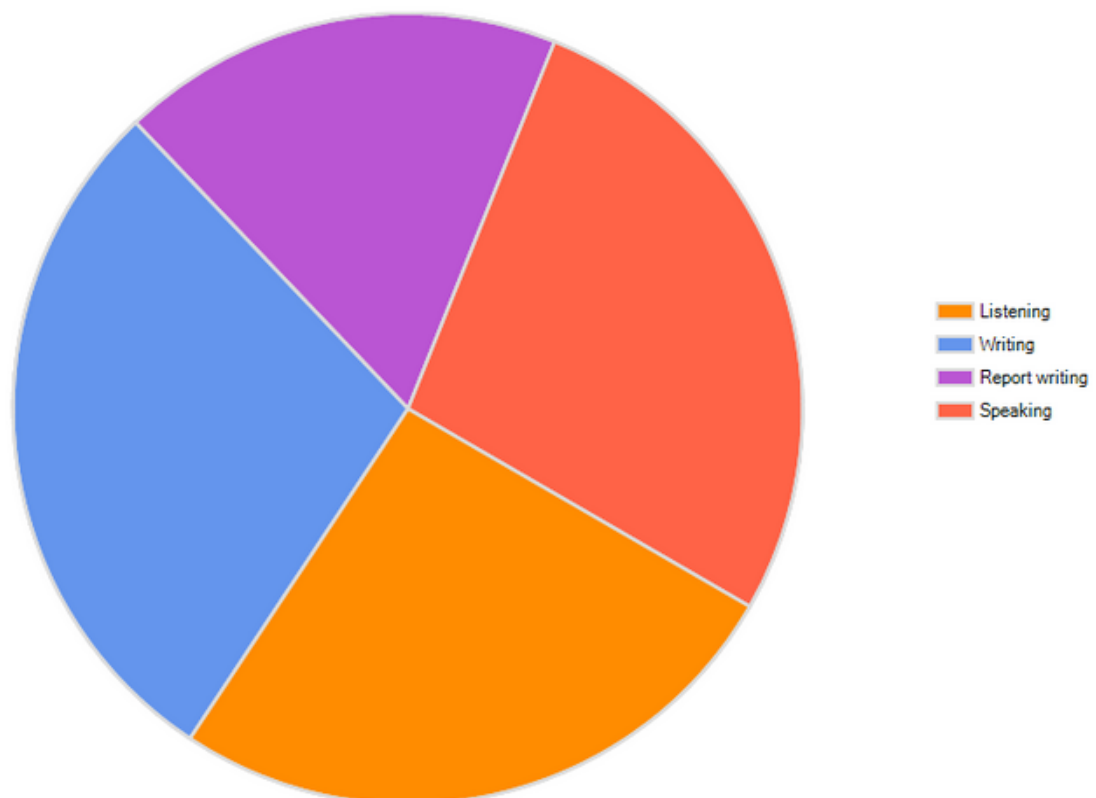
Aside from those skills specific to particular IT occupations, what are the academic skills you have the most trouble finding:



Other?



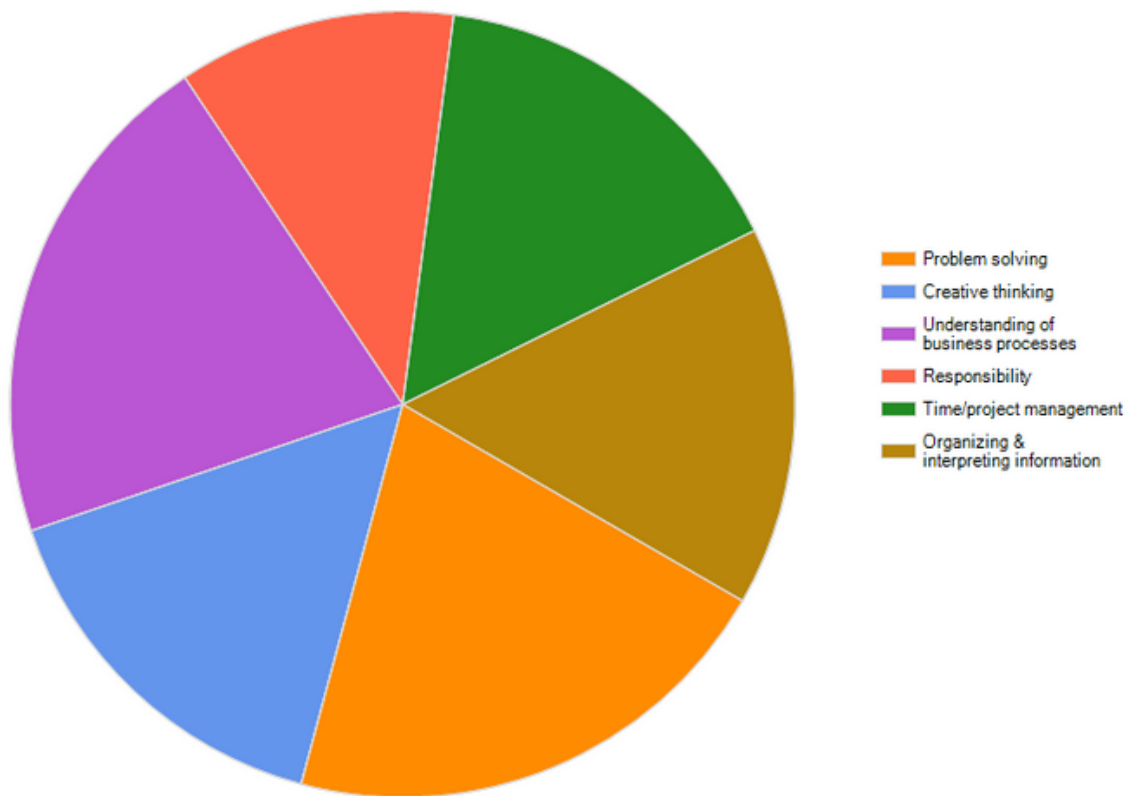
Aside from those skills specific to particular IT occupations, what are the communication skills you have the most trouble finding:



Other?

- Logical debates and discussions
- Cross-cultural communication or how to work with others when English is not a "first language."

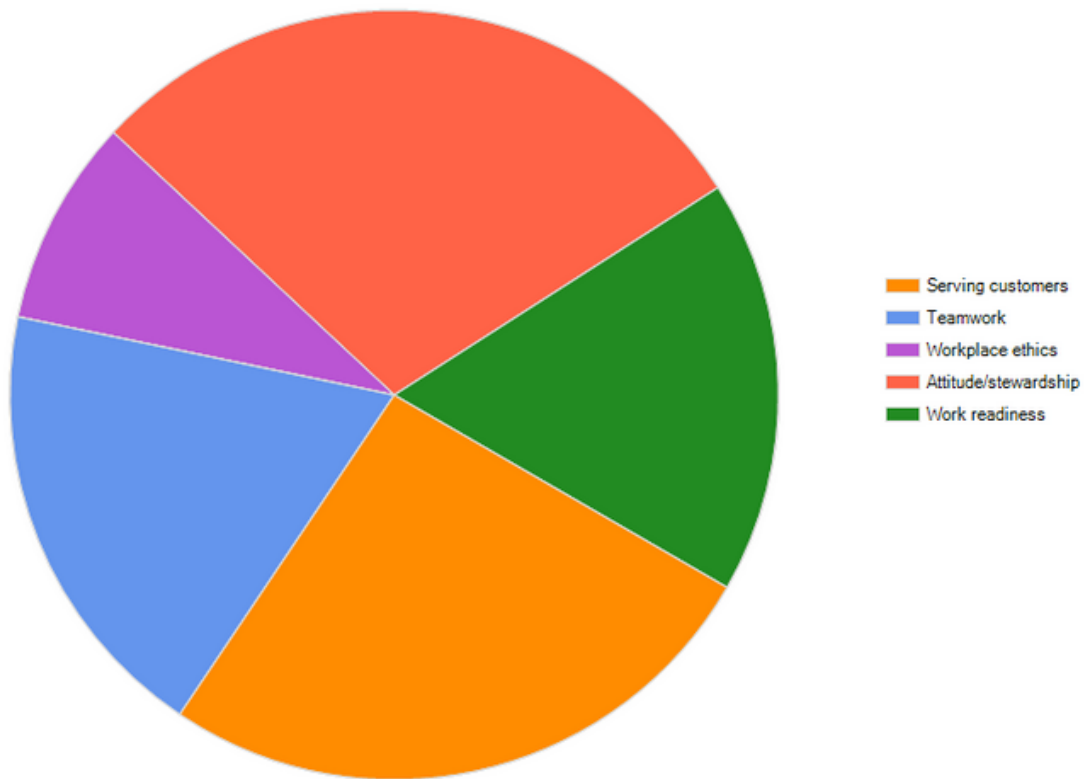
Aside from those skills specific to particular IT occupations, what are the thinking skills you have the most trouble finding:



Other?

- Focus on the task at hand, not some other task.
- Strategic thinking. Building a Business Case. Business Justification
- Many younger people expect there to be a "right answer" to things, or "one way" to do things. But there isn't.
- Problem solving through iteration and experimentation is always necessary.

Aside from those skills specific to particular IT occupations, what are the interpersonal skills you have the most trouble finding:



What other needs can you identify that might assist us in preparing potential entry-level IT employees for your company/industry?

- One of the biggest problems is finding employees that can work flexibly with different vendor's technologies. Being able to identify the difference between universal concepts vs. those that may be propriety to one vendor's product.
- Solid understanding of programming and ability to be flexible among the various languages.
- Standard organization expectations for employee's professional behavior: adhere to dress code standards, cleanliness, business etiquette, meeting preparedness.
- Open to new ideas. Ability to develop and grow creativity.
- Being able to help customer's redesign processes for optimal results, and then design systems to support those processes.
- I think it's really important to stress that the way things are right now is not the way they will remain forever. In fact, in just a handful of years the landscape will change and new problems will need to be solved in new, creative ways. Nothing can be taken for granted. There is no "best" programming language to learn, or "right" app to use, etc. The tools will change, but the core skills underneath will not.
- The ability to adapt rapidly to situations where the right path is ambiguous.
- I believe that soft skills, such as problem solving and critical thinking, are extremely important to new graduates entering the workforce. We have seen that the new hires that don't possess these skills are not successful.

- Understanding the industry and trends. A lot of employees have good skills but lack an awareness of the industry itself.
- Students should check job postings to see what employers are looking for and develop their academic career pathway accordingly.
- Employees who can think and aren't afraid to fail -- I can't tell you how many times I have been in an interview situation and tried to get the candidate to work out a problem with me on a whiteboard and they have frozen up. People need to be comfortable in today's collaborative environment.
- I would rate entry-level employees much higher if they have some internship experience and/or some experience with a mentor. League of Professional Systems Administrators (LOPSA) has a formal mentoring program which could be leveraged. Internships have become more difficult with law changes recently - companies are unwilling to hire an unpaid intern, which is probably for the best, given the demand for IT skills even at the intern-level. However, that also means (I think) that companies are less willing to hire tech interns (at all) which is bad. We need this sort of on-the-job preparation in addition to classroom training.
- Be willing to take on ANY project no matter how mundane it seems at the time with ENTHUSIASM and a desire to learn. In IT you learn something new every day so the words "I Don't Know" should never be uttered. Rather, they should be replaced with "I haven't encountered this before, however, it looks like an interesting opportunity. I'm looking forward to solving. I'll do some research and see where it leads us. Once I know more I will get back to you with some recommendations."
- Training people on conducting meetings, proper communication between internal and external parties, and being able to speak with c-level executives. Understanding business drivers and needs as well.
- Interviewing
- Agile development methodologies and a focus on 'why' -- we have a hard time finding people who ask why something is needed and really understand what they are trying to build. IT tends to focus on the solution rather than the problem trying to be solved.
- Managing data in today's distributed networks is a challenge that is reducing the market-share of traditional RDBMS systems. RDBMS is still an essential skill, but understanding what "NoSQL" is, and alternative systems to store, retrieve, and aggregate Big Data is a skill the industry is sorely lacking. Another skill that I see a need for is cross-cultural communication. In my industry, mobile telecommunications, global problems and project teams are the norm. English is the language that is used to communicate, but not everyone has the same level of skill in speaking and writing it. Further, working across time zones presents a challenge all its own.
- Problem solving (logic) and basic people skills (listening, do what you are told, know when to ask questions, reliability) are the ones we need the most.

In the following IT career pathways, please indicate how (1.a) important or (1.b) not the particular technical knowledge or skill is to the pathway, and then how (2.a) difficult it is or (2.b) not to find candidates who have experience with the particular technical knowledge or skill

Business Intelligence, Data Analytics, Database Design/Development					Keyword, Dice.com (2,528 jobs)
Integration	100%	0%	72%	20%	20%
Security	88%	12%	72%	20%	15%
Planning	88%	12%	64%	28%	17%
Reporting	79%	21%	42%	54%	13%
SQL	88%	12%	40%	52%	30%
Testing	92%	8%	71%	25%	33%
Implementation	88%	12%	60%	32%	30%
Programming, Engineering, Application Development	Important %	Not Important %	Difficult %	Not Difficult %	Demand Seattle Metro
Planning					Keyword, Dice.com (2,528 jobs)
Programming	88%	8%	58%	29%	21%
C	38%	57%	33%	57%	33%
C#	64%	36%	41%	55%	20%
C++	50%	55%	36%	64%	20%
Security	88%	12%	72%	20%	15%
Java	77%	27%	46%	50%	29%
Integration	83%	17%	69%	22%	20%
SQL	82%	18%	55%	41%	30%
Development (software)	83%	17%	65%	26%	69%
Engineering	83%	21%	63%	29%	32%
Testing	96%	4%	54%	29%	33%
Implementation	91%	9%	55%	27%	30%
Web Technologies	Important %	Not Important %	Difficult %	Not Difficult %	Demand Seattle Metro
JavaScript					Keyword, Dice.com (2,528 jobs)
Security	79%	21%	50%	30%	15%
Scripting	83%	17%	35%	48%	18%
Web Services	92%	8%	40%	40%	19%
Troubleshooting	76%	20%	36%	40%	13%
Planning	76%	24%	40%	36%	17%
Implementation	84%	12%	52%	28%	30%
HTTP	67%	33%	25%	63%	31%
HTML5	61%	39%	48%	44%	5%
Testing	96%	4%	58%	25%	33%
Design	88%	12%	50%	33%	58%
Application Development	87%	13%	39%	48%	50%
Networking/Systems	Important %	Not Important %	Difficult %	Not Difficult %	Demand Seattle Metro

					Keyword, Dice.com (2,528 jobs)
Help Desk Technology	52%	47%	21%	65%	1%
Oracle	48%	52%	52%	35%	15%
Troubleshooting	84%	16%	44%	40%	13%
Planning	75%	25%	50%	38%	17%
Security	29%	21%	50%	38%	15%
Networking	83%	17%	44%	49%	19%
Windows	70%	30%	22%	70%	16%
Testing	95%	5%	70%	20%	33%
Soft Skills	Important %	Not Important %	Difficult %	Not Difficult %	Demand Seattle Metro Keyword, Dice.com (2,528 jobs)
Project Management					
Communication	96%	4%	58%	33%	50%
Collaboration	92%	8%	58%	29%	9%
Customer Service	79%	21%	58%	29%	34%
Self-Starter	92%	8%	54%	33%	4%

From both your own professional perspective and experience, as well as your organization and the IT industry itself, what are at least three emerging technological trends that will create new career pathways/jobs or modify existing career pathways or jobs in the next three to five years? Please provide as much information as possible in your response, for example "Why do you believe this emerging technology trend will create a new IT career pathway?"

Current IT technologies that are creating career pathways, implications, changes in the technology to consider:

1.

- Cloud-based, hosted solutions
- Mobile applications development
- Database development, business intelligence

2. Mobile Devices - The days of forcing customers to use particular solutions is over. Successful companies will now have to put content and services on the devices consumers have, where and when they want it. This changes everything."

3. Cloud Architecture: An area focused on combining IaaS/PaaS/SaaS from a single or multiple vendors, across a range of standards and protocols to build compelling end-user solutions. There is a rapidly increasing range of technologies coming into the market that, when combined, can be very powerful. Having the skills and vision to deliver will be highly lucrative."

4. Cloud services - Will be more need for security and ability to leverage the technology.

5. Information Security will continue to be a major growth area. Private and public organizations will continue to focus on the protection of intellectual property through IS. Identity and authentication will continue to be areas of focus.

- 6. Mobile Technologies** are becoming increasingly integrated into all aspects of our lives. This integration will continue to provide growth opportunities within IT.
- 7. System virtualization and cloud computing** will be other areas of growth within the IT industry.
- 8. Security** -- with all of the social media and changing communication technology, security for a financial services/insurance firm is extremely important.
- 9. Data/business intelligence** -- one of the cost cutting methods is to be concise about the data you have and knowing what you are using it for. With all of the communication technology and cloud computing, we have an overwhelming amount of data that needs to be handled appropriately.
- 10. Cloud Computing** -- the way of the future -- to have as much as possible hosted away from the customer site."
- 11. SAP SOA** is the direction we are moving towards. Not clear what new positions and skills will be required as we move forward.
- 12. Big data** has taken off and will continue to grow. Data warehousing and BI tools that are not based on SQL will grow even more in the next few years.
- 13.** Mobile Business Intelligence and development. Agile methodology and development.
- 14.**
- Cloud technology
 - Internet Security
 - Mobile Device technology
- 15.**
- Big data and analytics, figuring out how/if/when/why to leverage this.
 - Data Governance/Management, how to enable the business to take control and realize the value of high data quality
 - How to leverage BYOD to maximize business value
- 16.**
- Application development for mobile devices
 - Move to Cloud technologies
 - Social media broadly
- 17.**
- Cloud computing
 - Mobile applications
 - Data integration
- 18.**
- Tablet Computing (maybe it's just computing without a keyboard)
 - Big Data and storage/retrieval beyond RDBMS

- Long running software on unreliable networks

Newer IT Technology and Implications:

1.

- **BYOD** - will create new challenges across all business organizations, some of which are increasingly intractable. Particularly in the area of security and IT support.
- **Big Data/Analytics** - will be a major growth industry over the next 3-5 years, and will face all of the challenges associated with that growth.
- **Software Defined Networking** - will probably start to kick in closer to the 5 year time frame, but will redefine the networking world and require retraining as well as reengineering.

2.

- One of the biggest trends changing the IT industry's landscape is that more companies are taking advantage of **cheap online "cloud hosting" solutions**. AWS, Azure, Google App Engine, etc. are democratizing the ability for small businesses to provide solutions that previously would require large initial investments in data centers. These cloud hosting services now require the new, mixed skill set of both a software engineer and a systems administrator. This equates to less dependence on the individual roles of the system engineer or the network administrator.

Soft Skills:

1. Perhaps these are more expansions or evolution of existing pathways, but they will all require more than ever before:

- strategic thinking
- ability to work in diverse teams
- ability to collaborate across work groups, teams and even companies;
- project-based work
- teamwork
- agility

IT-Enabled Industries:

1. **Health Information Exchange** will become increasingly important under health care reform, not only between physicians, but with patients, and accountable care organizations (definition from Wikipedia: An accountable care organization (ACO) is a healthcare organization characterized by a payment and care delivery model that seeks to tie provider reimbursements to quality metrics and reductions in the total cost of care for an assigned population of patients). So the ability to integrate inbound and outbound interfaces from EMR and Practice Management systems, and from home monitoring devices, and design user-specific web views of information with appropriate messaging and rules logic will be key.

IT Technology Developments:

1. **"Tools!"** - We are at the beginning of another huge upsurge in available high-quality content tools, this time for real-time application content development. Just as happened with the web, this is going to

enable more creative and business people to do far more, and drastically minimize the need for programmers.

2. The **merging of devices**, as well as the desire to access your information anywhere from any device is ubiquitous. Big data is driving the desire of people to understand the data they have. There is also a movement toward more services/cloud- oriented enterprise environments.

IT Business Models/Strategies:

1. **Diversification and the Long Tail:** While there will always be a few huge companies that make tons of money, mid-level companies are largely gone. Small teams can now produce content that rivals or exceeds the quality of big companies, and do so faster and cheaper. Add to this that consumers now have access to things they really want, not just things marketers tell them they want, and you have a huge amount of market potential for a lot of new smaller companies. The few remaining large companies will have slower, myopic views of the marketplace, and almost never be in a position to innovate.

IT Technologies/Industry Sector Needs Potentially Impacting Curricular or Program Development, as well as expanding or redesigning job descriptions/pathways:

1.

- **Selling IT services is HUGE.** There is no real coursework laid out here and it is becoming increasingly more difficult to find any qualified sales people in the IT industry. I cannot locate anywhere in any course work at any community college, university or other institute any specific curriculum which teaches the fundamentals of selling IT services. Industry is left to themselves to locate, hire and train people in this valuable skillset. For without a sale of a product or service there are no services for the systems engineers to provide.
- **IT Security** both physical and online is becoming more and more important every day. There are not enough IT people trained in security with recognized credentials in the industry today and there will be a bigger need tomorrow. If there were a way to implement a pathway from Security + to CISSP and receive a degree and/or pass the certification testing to become a CISSP, these people would most assuredly find jobs supporting practically any industry
- **Industry-specific IT Business Support.** ie: Healthcare, Insurance, Banking, Government, DoD, Manufacturing, Maritime and more... IT professionals with a ***business understanding of the processes involved in specific industries will be more valuable to employers as they will understand their unique needs.***

2.

- **Cloud Computing** - Specifically migrations of existing datacenter infrastructure, optimizations of existing deployments, and architecture of new environments. Also multi-cloud / hybrid cloud
- **DevOps Role** - Specifically automated Deployment - Chef/Puppet.
- **Splunk work** - specifically on cloud environments

3.

- **Business Intelligence (BI)** is a huge growth area. Companies are using both web-based as well as server based applications and need developers to help build custom reports/dashboards, and leverage API's etc. to integrate various systems. Knowledge and reporting is critically valuable to businesses.
- **Mobile Application development** is a huge growth area. Building streamlined apps that run on Android/iOS/Windows platforms and are suitable for Tablets and Phones. Apps need to integrate with networked databases etc. Apps need to leverage an ever expanding variety of technologies on devices such as Bluetooth, GPS, Accelerometers, WiFi, proximity sensors etc. This will continue to be in huge demand from businesses.
- **Smart advertising and user data collection** is being incorporated in to every website and most apps - everything from social media sites to news, retail etc. Technology pros need to understand how to use and leverage technologies to make products profitable as hardware margins continue to decline due to competition.

4. The expectations of people are rising when it comes to **web development**. People are expecting richer interaction, interactions that work across multiple devices and data integration across multiple systems in a secure and intuitive way. The effort required to meet these expectations people have will require increased workforce in areas such as:

- Software engineering
- Front-end development
- data integration
- Web Service creation
- Testing
- User experience design

5.

- **Agile methods** including test automation and *continuous integration* are making it more important for QA people to be able to program and minimizing the need for QA people in general. Also, the risk of having a bug in a web application is lower than shrink-wrap SW so QA bar is lower than it used to be.
- **Data** is becoming much more important. Now your application is more than just code, it is code plus data. For example If the price data put into Amazon's database is wrong, it doesn't matter if the code is 100% bug free, the user will see a defect.

6.

- **Software Defined Network (SDN)** is going to dramatically change the Networking pathway so you will not recognize it in 3 - 5 years. This is akin to the same change that system administration has undergone over the last few years as they moved from physical machines to virtual machines. 5 years ago we had 80 servers. Now we have 7 servers running 200 virtual machines.
- You should also provide a separate pathway for systems administration. Systems administration these days focuses on virtualization, storage (SAN and NAS), backups, configuration management and basic internet applications such as web servers, email, dns, dhcp, ntp, etc. A system admin overlaps with network, database, and application pathway in that a system administrator has to know a bit about these in order to do their job.

7.

- **Data Management and Analytics** - Commercial companies and government organizations are going to be increasing awash in data. Decision-makers are going to want to use that data to make the best decisions. There will be a sustained, high demand for employees who are able to collect, maintain, process, store, share, manipulate, access, analyze, and visualize data, and their influence in organizations is going to grow.