



# **FUTURE TRENDS IN INFORMATION TECHNOLOGY**

*Identified by North Texas Industry  
Thought Leaders*



## PARTNERS

### INTERLINK INDUSTRY TRENDS TASK FORCE LEADERS:

**Chair: Tu Huynh**, Vice President, Infrastructure Technology Services, Comerica Bank

**Vice Chair and Thought Leader Facilitator: Leon Kao**, Certified R6σ Expert, SAS

Engineering North Texas Regional Lead, Raytheon

**Partner Organization: Helen Sullivan**, Director Convergence Technology Center, Collin College

**Member: Mabrie Jackson**, President, North Texas Commission

**Member: Larry Pereira**, Wireless Marketing, Alcatel-Lucent

**Staff: Candy Slocum**, Executive Director, InterLink

### NORTH CENTRAL TEXAS INTERLINK, INC.:

InterLink is a nonprofit organization with 26 years of labor market and industry trend forecasting. InterLink acts as a bridge between business and education. Secondary and post-secondary education institutions in the Dallas/Fort Worth region use InterLink's forecasts for of Career and Technical Education program planning and curriculum development to train a highly skilled regional workforce.

NORTH CENTRAL TEXAS  
**INTERLINK** Est. 1987 [www.interlink-ntx.org](http://www.interlink-ntx.org)

### CONVERGENCE TECHNOLOGY CENTER, COLLIN COLLEGE:

The Convergence Technology Center (CTC) is a National Science Foundation Advanced Technical Education National Center of Excellence. Collin's Convergence Technology program introduces the "triple play" combining voice, video and integrated data over an IP network. The program focuses on key content in all three areas and gives students experience in solving real-world problems through case study courses. The two novel case study courses address contemporary Small Office Home Office (SOHO) and the Enterprise network business situations, allowing students to utilize the college's state-of-the-art Convergence Lab to build a portfolio of completed projects prior to entering the workforce.


[www.ConnectedTech.org](http://www.ConnectedTech.org)



Project Sponsored by:



# CONTENTS



*“Heraclitus is incorrect – change is actually evolving these days at a much faster rate - it is no longer a constant!”*

Bill Johnson, TDI  
Technologies

Introduction - 3

Methodology - 4

Information Technology Industry Trends Thought Leaders - 4

Fifteen Information Technology Industry Trends – 5-19

Mobility – 5

Security – 6

The Internet of Things – 7

Business Transformation – 8

Lean Agile Process – 9

Personalization – 10

Telepresence - 11

Robotics – 12

Three Dimensional (3D)

Digitization - 13

Natural User Interface (NUI) - 14

Socially Enabled Enterprise

Consumerization – 15

Artificial Intelligence (AI) – 16

Augmented Reality (AR) – 17

Visualization Management – 18

Power Generation Consumption

Management – 19

Assumed Timelines for the Fifteen Trends - 20

Workplace Basic Skills for Entry Level Workers - 21

Suggested Skills and Knowledge Mastery by College Graduation – 22-25

Recommended Emerging and Evolving Occupations - 26

Glossary of Terminology – 27-35

# INTRODUCTION

We live in a time when discoveries in science and technology are happening at a pace that makes it difficult to stay informed. The full potential of these changes are continuously evolving.

Research by Susanto Basu of Boston College and John Fernald of the San Francisco Federal Reserve conclude that there is up to a 15-year lag between investments in information and communication technologies and improvements in productivity.

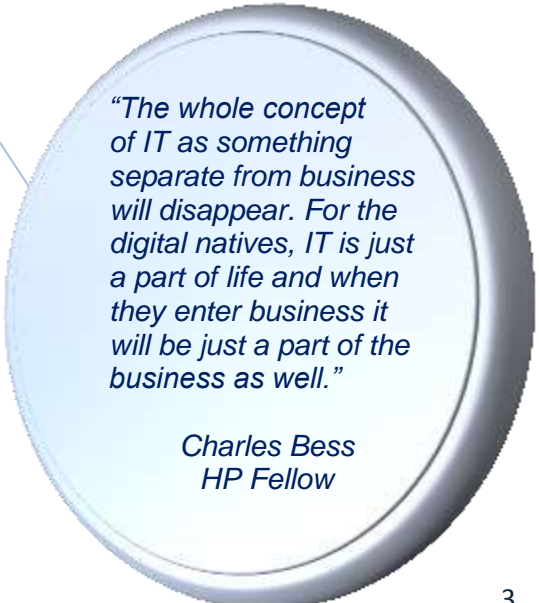
Discussions with the business community reflect concern that demand for innovators is greater than the supply. In Texas, we have discovered a leak in the pipeline between the number of students who enter into college and the number who exit, which results in costly loss of expenditures and leads to a loss of skilled workers.

Since 1987, North Central Texas InterLink has been the leader in labor market forecasting for the North Central Texas region to influence the future of career and technical education programs at the secondary and post-secondary levels, which prepare students for the workforce.

This report identifies future trends in Information Technology to help guide educators toward the next wave of technologies for inclusion in future programs. Subsequent reports will be published identifying the future of other industries.

Industry Thought Leaders and Futurists from the Information Technology Industry participated with this initiative. They were adamant that soft skills should be included in all curricula because entry level employees need to be prepared for the workforce in which they will enter.

They also imparted that the speed of knowledge and technological advances assures that the future of Information Technology will be reshaped beyond anything that is suggested in this report.



*“The whole concept of IT as something separate from business will disappear. For the digital natives, IT is just a part of life and when they enter business it will be just a part of the business as well.”*

*Charles Bess  
HP Fellow*

# METHODOLOGY

The process used was advancing foresight methodologies, using multiple techniques to aggregate expert opinions into the discipline of forecasting. By utilizing multiple sources of data collection such as forecast predictions, a thought leader/futurist work shop, as well as an industry survey, the Interlink task force was able to gather a comprehensive view of what industry leaders see as the future of Information Technology.

InterLink’s annual 25<sup>th</sup> Regional Labor Market Five-Year Forecast began as a starting point.

The research was enhanced by a workshop with North Texas Information Technology thought leaders and futurists from a diverse range of disciplines and professional backgrounds, engaging them in exercises to identify key drivers of change and how these will shape work skill requirements. Thought Leaders were surveyed the next day for additional thoughts and input.

Finally, peer reviewers analyzed the results of the thought leader session to enrich and vet the research.

This structured and disciplined process will be followed for subsequent thought leader groups, as we research other industries, to ensure systematic and robust data collection.



With gratitude to the following workshop participants and peer reviewers:

### Workshop Participants

- **Richard Askew**, Lean Enterprise
- **Charlie Bass**, HP
- **Ron Halbach**, Juniper Network
- **Tu Huynh**, Comerica Bank
- **Patricia “Pat” Johnson**, Texas Health Resources
- **Paul Kimbel**, Microsoft
- **Van Lam**, Summus Industries
- **Larry Pereira**, Alcatel-Lucent
- **Scott Veibell**, Cisco
- **Glenn C. Wintrich, Jr.**, Dell

### Peer Reviewers

- **Bill Johnson**, TDI Technologies
- **Kurtis Sampson**, Phillips Healthcare

### Assistance with Terminology


- **Danielle Smith**, Dallas County Community College
- **Shannon Ydoyaga**, Dallas County Community College
- **Workshop Participants**

### Special Recognition

**Nathan Schwendeman**, who helped initiate the InterLink Industry Trends Task Force.

# 1. MOBILITY

Today many employees already have hand-held devices such as smartphones or tablets. These devices can be repurposed to access enterprise services. Organizations may experience challenges with the bring-your-own-devices (BYOD) method: which devices, what carrier, and who will support the solution. What is the organization's policy and does it include standardization of operating systems, handheld devices, and streamlined operations for a wireless broadband environment?




*An integrated mobility solution consists of software (security and management), hardware devices (smartphones, tablets, and notebooks), and cellular wireless activation services.*

## **Skills and Knowledge for Mobility include:**

Bandwidth Management	Mobile device as the only network device used - no need for a computer
Big Data- Data collection	Mobility Monitorization
Bring your own device (BYOD)	Privacy
Creating a platform (PaaS) to host approved apps	Radio Frequency theory
Hardware attachments, such as credit card machines and laser measuring tools	Routers
Hotspots	Secure data
Installation/support	Security
Manufacturing	Software and hardware Integration
Mobile device management (MDM)	Software development
Mobile apps	User interface
	VPN access
	Wireless

## 2. SECURITY



*A form of protection where a separation is created between the assets and the threat.*

Security provides "a form of protection where a separation is created between the assets and the threat."

These separations are generically called "controls," and sometimes include changes to the asset or the threat. In most security systems, the "weakest link in the chain" is the most important. The situation is asymmetric since the 'defender' must cover all points of attack while the attacker need only identify a single weak point upon which to concentrate. In the IT Realm security includes: Application security; Computing security; Data security; Information security; and Network security.

### **Skills and Knowledge for Security:**

Assurance

Behavior analysis

Big data analysis

Disaster recovery

Ethics

Financial management

Foreign policy

Forensics

Hacking - Distributed Denial of Service (DDoS)

Mathematics

Military/encryption

Multilingual

Pattern recognition

Predictive analytics

Problem solving

Psychology

Quantum mechanics theory

Risk analysis

Six Sigma

Sociology

Statistics and probability

Surveillance

# 3. THE INTERNET OF THINGS

A global network infrastructure includes existing and evolving Internet and network developments. It will offer specific object-identification, sensor and connection capability as the basis for the development of independent cooperative services and applications. These will be characterised by a high degree of autonomous data capture, event transfer, network connectivity and interoperability.



## Skills and Knowledge for The Internet of Things:

- |                                               |                                           |
|-----------------------------------------------|-------------------------------------------|
| Analytics                                     | Interoperability                          |
| Application development                       | Logistics and inventory tracking          |
| Cloud networking                              | M2M - Machine to machine communication    |
| Cloud storage                                 | Modeling                                  |
| Control theory                                | Networking                                |
| Data storage (storage technology)             | RFID - radio frequency information device |
| Decision theory                               | Sensor                                    |
| Electrical engineering/electronics technology | Software development                      |
|                                               | Supply chain                              |



# 4. BUSINESS TRANSFORMATION



Business transformation is achieved by realigning the way staff works, how the organization is structured and how technology is used. Typically organizations go through several stages in transforming themselves.

## Skills and Knowledge for Business Transformation:

Business enablement  
Contract creation and comprehension  
Customer Vision  
Disruption/entrepreneurial  
Ethics  
Finance  
Futurist  
IDC-10 Transition  
Marketing

Mission  
Organizational change management  
Predictive analytics  
Remote workers  
Strategic planning  
Using foresight and insight research to  
Discover potential future challenges and opportunities  
Value

# 5. LEAN AGILE PROCESS

Lean is the 'What' and Agile is the 'How.' Lean evolved from process improvement efforts of manufacturing organizations. Initial improvement efforts focused on operations but later included 'Services' as found in the 'office' (e.g., HR, Order Delivery) and R&D (e.g., Product Development and Software Development). Lean Thinking helps us understand what our customer truly values and establishes metrics designed to provide evidence of our ability to satisfy their needs.



## Skills and Knowledge for Lean Agile Process:

Budgeting

Experimentation

Financial analysis

Human Resources

IT Infrastructure Library - ITIL

Process efficiency

Process management

Project management


Regulations

Six Sigma training/Lean

Statistics and probability

Value stream management

## 6. PERSONALIZATION



*The ability to provide content and services that are tailored to individuals based on knowledge about their preferences and behavior.*

Personalization is the combined use of technology and customer information to tailor electronic commerce interactions in “business to business” and “business to consumer” settings. Once confined mainly to the Web, it is becoming a factor in education, health care, the media, and social network websites.

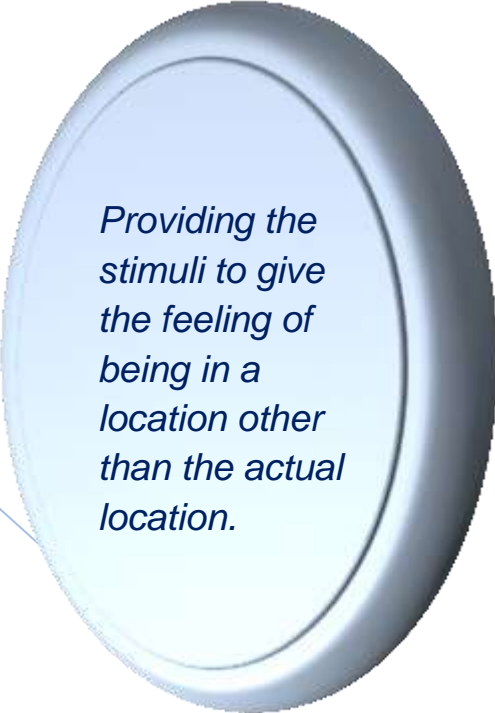
### **Skills and Knowledge for Personalization:**

Adaptation to changing environment  
Artificial Intelligence  
Business analytics  
Data management  
Ergonomics  
Genetics  
Imprint  
Integration of users social networks

Psychology  
Security  
Social networking, User Experience  
Software Development Gamification  
Speech recognition  
Statistics/demographic analysis  
Storage

# 7. TELEPRESENCE

Telepresence refers to a set of technologies which allow a person to feel as if they were present, to give the appearance of being present, or to have an effect, via telerobotics, at a place other than their true location. It requires that the users' senses be provided with such stimuli as to give the feeling of being in that other location.



*Providing the stimuli to give the feeling of being in a location other than the actual location.*

## Skills and Knowledge for Telepresence:

Augmented reality

Bandwidth

Bring Your Own Device (BYOD)

Graphics

Haptics

Holographic theory

Identity

Mobility

Networking

Privacy

Psychology

Radio Frequency

Security

Traffic

Video/codec

# 8. ROBOTICS



*Technology dealing with automated machines.*

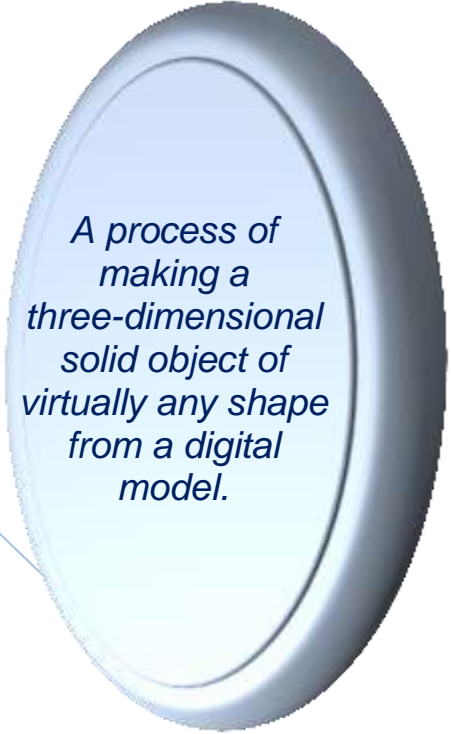
The Robotics branch of technology deals with the design, construction, operation, development and application of robots, and computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans, in dangerous or manufacturing processes, or simply just resemble humans. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics.

## **Skills and Knowledge for Robotics:**

- |                                  |                             |
|----------------------------------|-----------------------------|
| Artificial Intelligence          | Process design              |
| Automation                       | Programming                 |
| Ethics                           | Sensors                     |
| Human interaction and experience | Simulations                 |
| Manufacturing                    | Software                    |
| Marketing                        | Speech/facial recognition   |
| Mechanical theory                | Statistics                  |
| Nanotechnology                   | User interface              |
| Physics                          | Vendor implemented security |

# 9. THREE DIMENSIONAL (3D) PRINTING

3D printing is achieved using an additive process, where successive layers of material are laid down in different shapes. A materials printer usually performs 3D printing processes using digital technology and varied materials.



*A process of making a three-dimensional solid object of virtually any shape from a digital model.*

## Skills and Knowledge for Three Dimensional (3D) Printing

Bioprinting

Business modeling

CADD

Chemistry

Data

Logistics

Manufacturing

Materials science

Mechanical engineering

Nanotechnology

Platform design

Software design

Supply chain management (distribution)

# 10. NATURAL USER INTERFACE (NUI)



A NUI may be operated in a number of different ways, depending on the purpose and user requirements. Some NUIs rely on intermediary devices for interaction (such as joystick for video gaming) but more advanced NUIs are either invisible to the user or so unobtrusive that they quickly seem invisible.


## **Skills and Knowledge for Natural User Interface (NUI) include:**

Ease of use  
Ergonomics  
Facial recognition  
Fractal geometry  
Future appliances such as Google Glasses, Apple Watches, etc.  
Graphics

Mathematics  
Physics  
Sensors/sensing  
Shadowing or mimicking  
Software development  
Text to speech (speech recognition)  
User Experience, User Center Design

# 11. SOCIALLY-ENABLED ENTERPRISE ~ CONSUMERIZATION

An enterprise environment that, at its foundation, makes it easy to share information while maintaining the key tenets of an enterprise software deployment: easy systems management, easy systems integration, enterprise-level support, continual feature enhancement and user training and adoption.



*Enabling collaboration  
and communication  
using social tools.*

## **Skills and Knowledge for Socially-Enabled Enterprise Consumerization:**

Bring Your Own Device - BYOD –  
Enterprise data management  
Complex adaptive systems  
Cross platform development  
Gamification  
Multilingual

Multi-platform or Operating system  
(Android, iOS, Text based as well as  
Graphical User Interface (UI))  
Predictive modeling (role based)  
Social networks  
Sociology  
Visually or Hearing Impaired



# 12. ARTIFICIAL INTELLIGENCE (AI)



*Intelligence of  
machines  
and robots*

Artificial Intelligence is the intelligence of machines and robots and the branch of computer science that aims to create it. The study and design of intelligent agents where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.

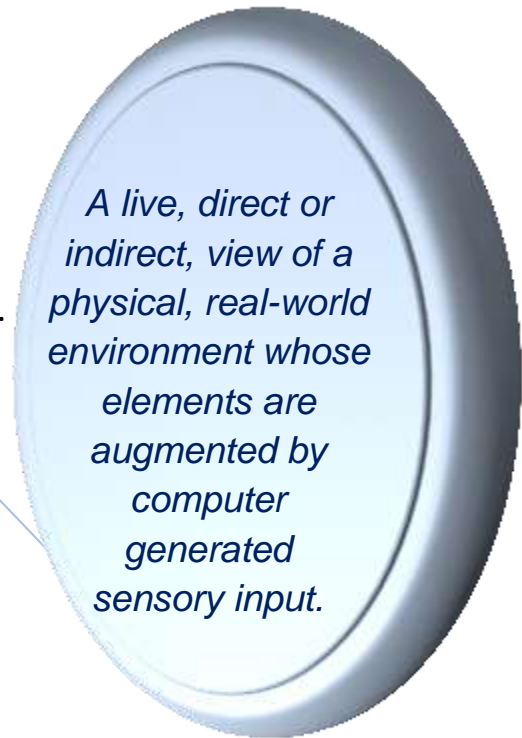
## **Skills and Knowledge for Artificial Intelligence (AI):**

Artificial learning  
Computer science  
Context recognition  
Ethics  
Human interaction and expectations  
Interpret environment/Sense making  
Pattern recognition

Prediction  
Predictive modeling/prescriptive  
Simulations  
Speech/language communication  
Statistics  
Vendor implemented security

# 13. AUGMENTED REALITY (AR)

Augmented is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. As a result, the technology functions by enhancing one's current perception of reality. By contrast, virtual reality replaces the real world with a simulated one. Augmentation is conventionally in real-time and in semantic context with environmental elements, such as sports scores on TV during a match. With the help of advanced AR technology (e.g. adding computer vision and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulable. Artificial information about the environment and its objects can be overlaid on the real world




## Skills and Knowledge for Augmented Reality (AR):

- |                       |                                    |
|-----------------------|------------------------------------|
| Biology               | Geolocation                        |
| Cartography           | Graphics                           |
| Context awareness     | H2M - Human to machine interaction |
| Data management       | HMI - Human Machine Interface      |
| DB optimization       | M2M – Machine to machine           |
| Ease of use           | Mobility                           |
| End to end            | Physics                            |
| Environment Interface | Radio Frequency (RF)               |
| Ergonomics            | Sensors                            |

# 14. VISUALIZATION MANAGEMENT

Visualization Management occurs through well---defined interactions between the IT silos by considering factors such as where applications reside; where virtual machines reside; what resources they are using; how they are performing; and are more or less resources required to meet service level agreements. VM also considers: are there bottlenecks in the environment, and if so, where they are; what is needed to maintain optimal operations immediately and constantly; is it necessary to start a VM or stop a VM, or move a VM; where would that happen; would the change necessitate reconfiguration of any of its resources, or provide more, or less; and, what would be needed to address any bottlenecks?



*Allows administrators to manage their environment and prevent resource contention and performance problems from happening.*

## **Skills and Knowledge for Visualization Management:**

Attention engineering (focusing and manipulating attention)

Brain science

Data Mining

Graphics

Lean IT

Modeling

Open Source

Process analytics

Psychology

Reporting and automation of reports

Retina Technology

Saving the visualization rule/profile set and allowing multiple versions

Smart computer interfacing with personalization

Statistics

Story boarding

Time sensing graphic changes

Virtual reality

Visually impaired - zooming in etc.

# 15. Power Generation, Consumption, Management

Integrated design, build and operate solutions for the Power industry that covers IT for multi-fuel power generation from a diverse mix of fossil fuels, renewables and biomass sources in operations, maintenance, metering, trading, billing, real-time enterprise asset management, GIS, SCADA systems (EMS, DMS) and all corporate applications.



## **Skills and Knowledge for Power Generation, Consumption, Management:**

- |                                                    |                                      |
|----------------------------------------------------|--------------------------------------|
| Artificial Intelligence                            | Lean technology/software development |
| Automation                                         | Legal                                |
| Battery technology                                 | Mechanical engineering               |
| Chemical engineering                               | Modeling                             |
| City planning                                      | Nanotechnology                       |
| Civil engineering (right of way)                   | Power consumption and management     |
| Consumption and creation modeling                  | Regeneration                         |
| Customer profiling                                 | Risk mitigation and analysis         |
| Embedded Systems with ability to update or upgrade | Security                             |
| Entrepreneurship                                   | Security                             |
| Environmental science                              | Sensors                              |
| Flexible solar sheets                              | Sustainability                       |
| Green                                              | Sustainability management            |

# ASSUMED TIMELINES FOR THE FIFTEEN TRENDS

*These timelines were assumed for the trends and when they might emerge and evolve, with the caveat that new and potentially disruptive technologies could change everything.*

	0-3 years	3-5 years	5-7 years	7+ years	Group's top 4 for 2013
1. Mobility	✓	✓	✓	✓	✓
2. Natural user interface		✓	✓	✓	
3. Personalization	✓	✓	✓	✓	✓
4. Socially-enabled enterprise/consumerization		✓	✓	✓	
5. Visualization management			✓	✓	
6. Internet of things	✓	✓	✓	✓	✓
7. Lean agile process	✓	✓		✓	
8. Business transformation	✓	✓			
9. Robotics	✓	✓	✓	✓	
10. Artificial Intelligence (AI)		✓	✓		
11. Augmented Reality (AR)		✓	✓	✓	
12. Three Dimensional ( 3-D) Printing	✓	✓			
13. Telepresence	✓	✓			
14. Security	✓	✓	✓	✓	✓
15. Power generation/consumption/management			✓		

# WORKPLACE BASIC SKILLS FOR ENTRY LEVEL WORKERS

*The following skills were identified by the Texas Workforce Commission as “Basic Skills Needed for Entry Level Workers.” These skills were validated by the Thought Leaders and Reviewers.*

Basic Entry Level Skill	Response Rate	Response Count N=9
Oral Communication	100%	9
Written Communication	100%	9
Teamwork/Collaboration	100%	9
Work Ethic	100%	9
Problem-solving	89%	8
Time Management	89%	8
Integrity	89%	8
Customer Service	78%	7
Initiative	78%	7
Attention to Detail	78%	7
Willingness to continue learning	78%	7
Adaptability	56%	5
Creativity	67%	6
Perseverance	67%	6
Pride in Work	67%	6
Following Directions	67%	6

Basic Entry Level Skill	Response Rate	Response Count N=9
Professionalism	67%	6
Numerical and Arithmetic Application	56%	5
Decision-making	56%	5
Technology and Tool Usage	56%	5
Dedication	44%	4
Information Gathering	44%	4
Conflict Management	44%	4
Stress Management	44%	4
Appreciation of Diversity	33%	3
Conflict Management	33%	3
Organization	33%	3
Resource Allocation	22%	2
Leadership	11%	1
Intellectual Risk-taking	11%	1
Thoughtful Reflection	11%	1
Multi-tasking	11%	1

# SUGGESTED SKILLS AND KNOWLEDGE MASTERY BY COLLEGE GRADUATION

*The Thought Leaders identified the following skills and knowledge for Information Technology which should be mastered by college graduation.*

## Advanced Medical Technology

Basic Robotics  
Bio Sensors  
Biomedical Engineering  
Clinical Decision Support  
Human Augmentation  
Personalized Medicine

## APP Development

App Maintenance (AMS)  
APPS (Not application)  
Ethics (Intellectual Property)  
IT Truck Roll  
Mobile App Development

## Apps

Business Applications (How to Use)  
Business Process Management (BPM)  
Mobile Apps  
Programming Languages Methodologies

## Automated Data Collection

Sensor Application Specialist  
Sensing Probe Integration  
Sensor's (Data Collection From)

## Automation

Basic Robotics  
Context derivation  
Critical Thinking

## Basic/Foundation/Business Skills

Basic Computer Skills  
Basic Office Applications (Word, Excel)  
Budgeting  
Business Plan and Communication  
Business Writing  
Collaborative Thinking  
Critical Thinking  
Entrepreneurial Skills  
Finance/Financial Planning/Budgeting  
People Skills  
Problem Solving  
Self Direction  
Self Education  
Time Management  
Work at Home Skills  
Writing

## Business Intelligence

Attention Engineering  
Big Data  
Big Data: Machine to Machine  
Business Intelligence  
Data Mining  
High Performance Computing  
Security  
Sensors (interpreting the data)

## Cloud

Big Data  
Capacity Planning  
Cloud  
Cloud Application  
Cloud Computing

### Cloud - Continued

Cloud Platforms: IAAS/PAAS/SW  
Distance Learning  
Ecosystems Management  
Networking Processing Storage  
Private Cloud  
Public/Private Cloud Computing  
Resource Optimization  
Security  
UC Architect  
Virtualization  
Virtualization (Hardware)  
Virtualization (Software)

### Data Center

Capacity Planning  
Data Backup/Automation Knowledge  
Disaster Recovery  
Electrical Environmental  
Financial Planning  
ITIL  
Logic Flow  
Power Analysis and Optimization  
SAN NAS  
Virtualization

### Data Center Optimization

Big Data  
CO\_LO Data Center  
Convergence (DC, FC, FENET)  
Convergence Technology/UCC/Data Center  
Green Technology

### Development

Flow vs. Utilization  
Form Factor Analysis  
Marketing  
Object Oriented Systems  
OSI Model  
Program Management  
Programming/Scripting  
Requirements Definition

Software Development  
Systems Architect  
Systems Integration  
UX Designer  
Visualizing Work

### Gaming

Application Development  
Game Tester  
Gamification and Behavior Modification  
Graphics  
Logic Flow  
Physics

### Graphics

Games  
Graphic Arts  
User Interface Design

### Networking

Hardware/Software Integration and Engineering  
High level communication collaboration  
Home and Small Business Installation  
IP Communication Fundamentals  
LAN/WAN Installation and Maintenance  
Media over IP Application  
Network Monitoring  
Network Trouble Shooting  
Networks  
SDN Software Defined Network  
Telecom Truck  
Wi-Fi Public/Community  
Wireless Cell Size, Installation and Maintenance  
Wireless Networking  
WLAN  
WLAN -Install, Testing, Security



### Practical Application

Alternative Energy Installer  
Artificial Intelligence  
Cable Installation  
Programming  
Sensors Installation  
Software Programming  
Water Purification Installer  
Writing Scripts (Automated)

### Process

Analytical  
ITIL  
Means Thinking vs. Results Thinking  
Measurement  
Process Decomposition  
Project Management  
Quality Software Test

### Process Automation

Alternative Energy Creation  
Automation (SDN/Puppet)  
Basic Robotics  
Knowledge flow management (Software, Infrastructure)

### Security & Risk Management

Access Controls  
Behavior Analysis  
Bring Your Own Device -Security/Integration  
Business Disaster Recovery Planning  
Business to Business (B2B) Communication  
Home and Small Business Network Installation

Industry Legal Knowledge  
Integration of Personal Devices (BYOB) Installation  
National Security/Uncertain Risk  
Network Security  
Psychology  
Security  
Security Forensics  
Security Systems: Proactive/Learning  
Situational Awareness and Response  
Telecom Truck

### Sensors

Application Development  
Context Awareness  
Data Integration  
Data Transport and Storage

### Social Networking & Collaboration

Collaboration and Data Relationships  
Collaboration Tools  
Media over IP Application  
Social Marketing  
Social Media  
Social Media Business Applications

### Story Architecture

Game Designer  
Game Script Writer  
Game Tester  
Logic Flow  
Return on Investment (ROI) Analysis  
Statistics

*Networking will remain relevant as sources for communication continues to evolve. More communication will be machine to machine in the future, and the bandwidth needed for this is significantly greater than what we have available today.*

*Scott Veibell  
Cisco Systems*

# RECOMMENDED EMERGING AND EVOLVING OCCUPATIONS

Employers who participate with InterLink’s annual labor market survey provide their employment needs for five years in the future. The results of InterLink’s 26th Annual Survey indicate the following occupations are emerging (new) or evolving (changing), and could be considered as a guideline for new education programs and occupations.

SOC Code or ONET # EE = Emerging or Evolving Occupation	Occupation Title
EE	Advanced Digital Mfg.(ADM)Tech.
EE	Bioinformatics Technicians
19-4021.00	Biological Technicians
EE	Cloud Architect
EE	Composite Tech. (Bond Assembler)
EE	Computer & Digital Forensics Tech.
EE	Computer Security Specialists
EE	Convergence Technology Spec./Tech.
EE	Data Mining Tech/Data Scientist
17-3024.00	Electro-Mechanical Technicians (MEMS)
17-3025.00	Environmental Engineering Technicians
17-3029.10	Fuel Cell Technicians
45-3021.00	Gaming/Computer Simulation Tech.
O*NET 17-3031.00	Geographic Information Systems (GIS) (includes Engineering & Mapping Technicians.)

SOC Code or ONET # EE=Emerging or Evolving Occupation	Occupation Title
EE	Global Positioning Systems (GPS) Technician
15-1122	Information Security Analysts
EE	Installer/Integrator/NOC/Network Associate/Engineer
EE	Materials Analyst
17-3029.12 /17/3029.11	Nanotechnology Engineering Technicians/Technologists
29-1171.00	Nurse Practitioners
EE	Patient Care Technician
17-2072.01	Radio Frequency Information Device Specialists
EE	Risk Managers
17-3024.01	Robotics Technicians
EE	Social Media Architects
EE	Social Networking Specialists
EE	Solar Photovoltaic Technicians (Electric) Installers
EE	Solar Thermal Installers & Techs.
49-9081.00	Wind Turbine Service Technicians
EE	Wireless Network Engineers/Technicians

# GLOSSARY OF TERMINOLOGY FOR INFORMATION TECHNOLOGY

- **Adaptation to changing environment** - Adaptation is a process of deliberate change in anticipation of or in reaction to external stimuli and stress. The dominant research tradition on adaptation to environmental change primarily takes an actor-centered view, focusing on the agency of social actors to respond to specific environmental stimuli and emphasizing the reduction of vulnerabilities.
- **Analytics** - The discovery and communication of meaningful patterns in data. Especially valuable in areas rich with recorded information, analytics relies on the simultaneous application of statistics, computer programming and operations research to quantify performance. Analytics often favors data visualization to communicate insight.
- **Application development** - The process by which application software is developed for low-power handheld devices, such as personal digital assistants, enterprise digital assistants or mobile phones. These applications can be pre-installed on phones during manufacturing, downloaded by customers from various mobile software distribution platforms, or delivered as web applications using server-side or client-side processing (e.g. JavaScript) to provide an "application-like" experience within a Web browser. Application software developers also have to consider a lengthy array of screen sizes, hardware specifications and configurations because of intense competition in mobile software and changes within each of the platforms
- **Artificial Intelligence (AI)** - The intelligence of machines or software, and is also a branch of computer science (Applied logic) that studies and develops intelligent machines and software. Major AI researchers and textbooks define the field as "the study and design of intelligent agents" where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.
- **Assurance** – assures processes and products meet their specified requirements, are consistent, complete, correct as warranted for the system and operating environment, and satisfies stakeholder needs; and enables proactive identification and addresses areas of inadequate analysis, deficient risk mitigation plans, certification/verification inadequacies, or process/product non-compliances having the potential to impact safety, reliability, availability, maintainability, or overall mission-assured success.
- **Attention engineering** - Focusing and manipulating attention.
- **Augmented reality** - A live, direct or indirect, view of a physical, real-world environment whose elements are *augmented* by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented), by a computer.
- **Automation** - The use of machines, control systems and information technologies to optimize productivity in the production of goods and delivery of services. The correct incentive for applying automation is to increase productivity, and/or quality beyond that possible with current human labor levels so as to realize economies of scale, and/or realize predictable quality levels.
- **Bandwidth Management** - the process of measuring and controlling the communications (traffic, packets) on a network link, to avoid filling the link to capacity or overfilling the link, which would result in network congestion and poor performance of the network Bandwidth management is measured in bits per second (bps) or Bytes per second (Bps).
- **Bandwidth** - The rate of data transfer, bit rate or throughput, measured in bits per second (bps).
- **Battery Technology** - Galvanic cells that store chemical energy.
- **Behavior analysis** - There are two major areas of behavior analysis: experimental and applied. Experimental behavior analysis involves basic research designed to add to the body of knowledge about behavior. Applied behavior analysis, on the other hand, is focused on applying these behavior principles to real-world situations.
- **Big data analysis** - Big data analytics is the process of examining large amounts of data of a variety of types (big data) to uncover hidden patterns, unknown correlations and other useful information.
- **Big Data- Data Collection** - A collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications. The challenges include capture, curation, storage, search, sharing, transfer, analysis, and visualization.

- **Biology** - A natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, and taxonomy. Biology has many sub disciplines unified by five so-called axioms of modern biology.
- **Bioprinting** – The construction of a biological structure by computer-aided, automatic, layer-by-layer deposition, transfer, and patterning of small amounts of biological matter.
- **Brain science** - The interdisciplinary scientific study of the mind and its processes. It examines what cognition is, what it does and how it works. It includes research on intelligence and behavior, especially focusing on how information is represented, processed, and transformed (in faculties such as perception, language, memory, reasoning, and emotion) within nervous systems (human or other animal) and machines (e.g. computers).
- **Bring Your Own Device (BYOD)** - Also called bring your own technology (BYOT), bring your own phone (BYOP), and bring your own PC (BYOPC))- means the policy of permitting employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace, and use those devices to access privileged company information and applications.
- **Budgeting** - A quantified financial plan for a forthcoming accounting period.
- **Business Analytics (BA)** - The skills, technologies, applications and practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods.
- **Business enablement** – A business practice and application development process to effectively analyze current business processes to enhance customer service and create a competitive advantage.
- **Business Modeling - Business Process Modeling (BPM)** - In systems engineering is the activity of representing processes of an enterprise, so that the current process may be analyzed and improved. BPM is typically performed by business analysts and managers who are seeking to improve process efficiency and quality. The process improvements identified by BPM may or may not require information technology involvement, although that is a common driver for the need to model a business process, by creating a process master.
- **Cartography** - The study and practice of making maps. Combining science, aesthetics, and technique, cartography builds on the premise that reality can be modeled in ways that communicate spatial information effectively
- **Chemical Engineering** – The branch of engineering that applies to interactions with other atoms, and particularly with the properties of chemical bonds.
- **Chemistry** - A branch of physical science is the study of the composition, properties and behavior of matter. Chemistry is concerned with atoms and their interactions with other atoms, and particularly with the properties of chemical bonds. Chemistry is also concerned with the interactions between atoms (or groups of atoms) and various forms of energy
- **City planning** - A technical and political process concerned with the control of the use of land and design of the urban environment, including transportation networks, to guide and ensure the orderly development of settlements and communities. It concerns itself with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation and management.
- **Civil engineering (right of way)** – A professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings. It is traditionally broken into several sub-disciplines including environmental engineering, geotechnical engineering, geophysics, geodesy, control engineering, structural engineering, biomechanics, nanotechnology, transportation engineering, earth science, atmospheric sciences, forensic engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering surveying, and construction engineering. Civil engineering takes place on all levels: in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies.
- **Cloud networking** - The use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the common use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation.
- **Cloud storage** - A model of networked online storage where data is stored in virtualized pools of storage which are generally hosted by third parties.
- **Complex adaptive systems** – as a multi-agent system with seven basic elements in which a major part of the environment of any given adaptive agent consists of other adaptive agents, so that a portion of any agent's efforts at adaptation is spent adapting to other adaptive agents. Monostori, L. (2006). *Design of complex adaptive systems: Introduction. Advanced Engineering Informatics*, 20(3), 223-225.

- **Computer-aided Design (CAD)** - CAD - Computer-aided design (**CAD**) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic files for print, machining, or other manufacturing operations.
- **Computer science - Computer science or computing science** (abbreviated **CS** or **CompSci**) is the scientific and practical approach to computation and its applications.
- **Consumption modeling** - Describes how supply is separated from demand, and that service capacity is created just-in-time. Services are generated from an approved inventory stored in a service catalog (self-service, if you're in IT); with each service having clear pricing. The pricing could be variable and "consumption based" that is, it's not only metered, but based on both true cost as well as opportunity cost for access to the infrastructure. Lastly, the consumption model can also include services brokering - that is, it can include services generated from outside IT as well as those generated within/by IT. Both sources are equally valid, so long as IT still provides common governance, access, pricing and secure delivery to internal LoB customers. <http://fountthead.blogspot.com/2011/08/it-as-service-models-for-consumption.html>
- **Context awareness** – A property of mobile devices that is defined complementary to location awareness. Whereas location may determine how certain processes in a device operate, context may be applied more flexibly with mobile users, especially with users of smart phones. Context awareness originated as a term from ubiquitous computing or as so-called pervasive computing which sought to deal with linking changes in the environment with computer systems, which are otherwise static. The term has also been applied to business theory in relation to business process management issues
- **Context recognition** – The state of a context at a certain point (or region) in space at a certain point (or interval) in time, identified by name.
- **Contract creation and comprehension** - The management of contracts made with customers, vendors, partners, or employees. Contract management includes negotiating the terms and conditions in contracts and ensuring compliance with the terms and conditions, as well as documenting and agreeing on any changes or amendments that may arise during its implementation or execution. It can be summarized as the process of systematically and efficiently managing contract creation, execution, and analysis for the purpose of maximizing financial and operational performance and minimizing risk
- **Control theory** - An interdisciplinary branch of engineering and mathematics that deals with the behavior of dynamical systems with inputs. The external input of a system is called the *reference*. When one or more output variables of a system need to follow a certain reference over time, a controller manipulates the inputs to a system to obtain the desired effect on the output of the system.
- **Creating a platform (PaaS) to host approved apps.** – (**Platform as a service (PaaS)**) Is a category of cloud computing services that provide a computing platform and a solution stack as a service. Along with software as a service (SaaS) and infrastructure as a service (IaaS), it is a service model of cloud computing. In this model, the consumer creates the software using tools and/or libraries from the provider. The consumer also controls software deployment and configuration settings. The provider provides the networks, servers, storage and other service to ensure the apps are secure and compatible.
- **Creation modeling** - Technology visionaries (TVs) have a special set of skills that enable them to lead their companies to the marketplace with successful new products and services. One of those skills is the ability to model customer needs, company hurdles, and technological and market challenges in an integrative fashion through creative modeling, both qualitative and quantitative, that are useful in the creation of new categories of product and service.
- **Cross platform development** - An attribute conferred to computer software or computing methods and concepts that are implemented and inter-operate on multiple computer platforms. Cross-platform software may be divided into two types; one requires individual building or compilation for each platform that it supports, and the other one can be directly run on any platform without special preparation, e.g., software written in an interpreted language or pre-compiled portable byte code for which the interpreters or run-time packages are common or standard components of all platforms.
- **Customer profiling** - The ability to use technology extract detailed data for current and future customers to determine patterns of activity such as shopping, travel, dining, etc.
- **Customer Vision** - An articulation of the promise a business makes to the customer and indicates how the business intend to achieve the promise, and guide long-term decisions, planning, and strategic initiatives.
- **Data** - Distinct pieces of information usually formatted in a special way. All software is divided into two general categories: data and programs. Programs are collections of instructions for manipulating data. Data can exist in a variety of forms -- as numbers or text on pieces of paper, as bits and bytes stored in electronic memory, or as facts stored in a person's mind.
- **Data management** - Comprises all the disciplines related to managing data as a valuable resource.
- **Data Mining** – Searching through gigabytes of information looking for anticipated or unanticipated patterns.
- **Data storage** (storage technology) - the place where data is held in an electromagnetic or optical form for access by a computer processor. <http://searchstorage.techtarget.com/definition/storage>
-

- **Database (DB) optimization** - All database information is stored in files. When a query to delete a post, thread, member, or any other piece of data is executed, it removes the data from the file. When this happens, it leaves empty space in the file which takes up a few bytes. After time, this space adds up and can impact performance. Optimizing the database reclaims this space, and more often than not reduces your database size.
- **Decision theory** - The study of principles and algorithms for making correct decisions—that is, decisions that allow an agent to achieve better outcomes with respect to its goals.
- **Disaster recovery (DR)** - Is the process, policies and procedures that are related to preparing for recovery or continuation of technology infrastructure which are vital to an organization after a natural or human-induced disaster.
- **Disruption/entrepreneurial** - An event which causes an unplanned, negative deviation from the expected delivery according to the organization's objectives.
- **Ease of use** – The ability of a user to readily and successfully perform a task with a product without the need for an advanced explanation and/or the instruction manual.
- **Electrical engineering/electronics technology** - A field of engineering that generally deals with the study and application of electricity, electronics, and electromagnetism. Electrical engineering may include electronic engineering. Where a distinction is made electrical engineering is considered to deal with the problems associated with systems such as electric power transmission and electrical machines, whereas electronic engineering deals with the study of electronic systems including computers, communication systems, integrated circuits, and radar.
- **Embedded Systems** - A computer system designed for specific control functions within a larger system, often with real-time computing constraints. It is *embedded* as part of a complete device often including hardware and mechanical parts. with ability to update or upgrade -
- **End to end** - A classic design of computer networking in which application-specific functions ought to reside in the *end hosts* of a network rather than in *intermediary nodes*
- **Enterprise data management** - The ability of an organization to precisely define, easily integrate and effectively retrieve data for both internal applications and external communication.
- **Entrepreneurship** - One who organizes, manages, and assumes the risks of a business or enterprise
- **Environmental science** - is a multidisciplinary academic field that integrates physical and biological sciences, (including but not limited to ecology, physics, chemistry, biology, soil science, geology, atmospheric science, and geography) to the study of the environment, and the solution of environmental problems.
- **Ergonomics** - An applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely
- **Ethics** - A set of moral principles : a theory or system of moral values
- **Experimentation** - An operation or procedure carried out under controlled conditions in order to discover an unknown effect or law, to test or establish a hypothesis, or to illustrate a known law
- **Facial recognition**- A type of biometric software application that can identify a specific individual in a digital image by analyzing and comparing patterns. <http://whatis.techtarget.com/definition/facial-recognition>
- **Finance** - The system that includes the circulation of money, the granting of credit, the making of investments, and the provision of banking facilities
- **Financial analysis** - Answers specific business questions and forecast possible future financial scenarios. <http://searchfinancialapplications.techtarget.com/definition/financial-analytics>
- **Financial management** - The branch of finance that concerns itself with the managerial significance of finance techniques. It is focused on assessment rather than technique.
- **Flexible solar sheets** - Solar panels are devices that convert light into electricity, also known as photovoltaic. The panel is a collection of thin solar cells that are manufactured on a rollable sheet.
- **Foreign policy** - A policy pursued by a nation in its dealings with other nations, designed to achieve national objectives.
- **Forensics** - Used to collect raw data from digital storage devices, including the recovery of hidden and deleted files, in support of e-discovery and investigations of digital activity. <http://www.gartner.com/it-glossary/forensic-software/>
- **Fractal geometry** - non-regular geometric shapes that have the same degree of non-regularity on all scales. <http://whatis.techtarget.com/definition/fractal>
- **Future appliances** – Innovative appliances of the future, such as Google glasses and Apple Watch.
- **Futurist** – One who studies and predicts the future especially on the basis of current trends.

- **Gamification** - The use of game mechanics to drive engagement in non-game business scenarios and to change behaviors in a target audience to achieve business outcomes. <http://www.gartner.com/it-glossary/gamification-2/>
- **Genetics** - A branch of biology that deals with the heredity and variation of organisms
- **Geolocation** - The wireless detection of the physical location of a remote device. <http://searchmobilecomputing.techtarget.com/definition/geolocation>
- **Graphics** - Of or relating to the pictorial arts, or involving such reproductive methods as those of engraving, etching, lithography, photography, serigraphy, and woodcut
- **Green** - Concerned with or supporting environmentalism, tending to preserve environmental quality (as by being recyclable, biodegradable, or nonpolluting)
- **Human to Machine interaction (H2M)/Human-computer Interaction (HCI)** Involves the study, planning, and design of the interaction between people (users) and computers. It is often regarded as the intersection of computer science, behavioral sciences, design and several other fields of study.
- **Haptics** - A tactile or force-feedback technology that leverages a person's sense of touch by applying vibrations and/or motion to the user's fingertips. <http://www.gartner.com/it-glossary/haptics/>
- **Hardware attachments** – Attachments to computers and mobile devices such as Credit Card machines and Laser measuring tools.
- **Human Machine Interface, HMI** - In complex systems, the human-machine interface is typically computerized. The term Human-computer interface refers to this kind of systems. The engineering of the human-machine interfaces is by considering ergonomics (Human Factors). The corresponding disciplines are Human Factors Engineering (HFE) and Usability Engineering (UE), which is part of Systems Engineering. Tools used for incorporating the human factors in the interface design are developed based on knowledge of computer science, such as computer graphics, operating systems, and programming languages. Primary methods used in the interface design include prototyping and simulation. [http://en.wikipedia.org/wiki/Human-machine\\_interface](http://en.wikipedia.org/wiki/Human-machine_interface)
- **Hotspots** -Area, often public, such as an airport, coffee shop or convention center that is covered with a WLAN service. <http://www.gartner.com/it-glossary/hot-spot/>
- **Human Interaction and Expectations (HCI)** - An automated system designed to recognize a user's affective states-in order to become more human-like, more effective, and more efficient by modulating nonverbal communicative cues (facial expressions, body movements, and vocal and physiological reactions).
- **Human Resources** - A division of an organization concerned with personnel or the knowledge capital within an organization.
- **ICD-10 Transition** - Represents a major update to how health providers get paid - one that impacts almost every aspect of service delivery, billing, claims processing and reimbursement. ICD-10 will require testing changes in PM and EMRs, billing reporting packages, decision and analytical tools, as well as training coders and providers.
- **Identity** - The condition of being the same with something described or asserted.
- **Imprint** -To fix indelibly or permanently (as on the memory).
- **Installation/support** – Technology that is installed for use with support services offered in-house or off site.
- **Intellectual property** - Includes assets that are protected through regulatory methods such as patents, copyrights and regulatory licenses; however, this protection is being expanded to include software and business processes when these can be demonstrated to be original, novel and non-obvious. <http://www.gartner.com/it-glossary/intellectual-property/>
- **Interoperability** - The ability for a device from one manufacturer to work with one from another. <http://www.gartner.com/it-glossary/interoperability/>
- **Interpret environment/Sense making** - The process by which people give meaning to experience. While this process has been studied by other disciplines under other names for centuries, the term "sensemaking" has primarily marked three distinct but related research areas: Human-computer interaction; information science and; organizational studies. In information science the term is most often written as "sense-making." In both cases, the concept has been used to bring together insights drawn from philosophy, sociology, and cognitive science (especially social psychology).
- **ITIL**- Information Technology Infrastructure Library. <http://searchdatacenter.techtarget.com/definition/ITIL>
- **Leadership/Transformational - Transformational Leadership** - Enhances the motivation, morale, and performance of followers through a variety of mechanisms. These include connecting the follower's sense of identity and self to the project and the collective identity of the organization; being a role model for followers that inspires them and makes them interested; challenging followers to take greater ownership for their work, and understanding the strengths and weaknesses of followers, so the leader can align followers with tasks that enhance their performance. [http://en.wikipedia.org/wiki/Transformational\\_leadership](http://en.wikipedia.org/wiki/Transformational_leadership)

- **Lean IT** - A customer-value focused approach to the provision of effective solutions involving the consumption of a minimum of resources. <http://www.gartner.com/it-glossary/lean/>
- **Leaning technology** - Learning technology refers to any type of technology that is used to help in the process of teaching a particular subject. It can also be used to facilitate easier learning and to evaluate how well someone is progressing through a particular learning process.
- **Legal** - Conforming to or permitted by law or established rules
- **Logistics**- The process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods, including services and related information, from the point of origin to the point of consumption. <http://searchmanufacturingerp.techtarget.com/definition/logistics>
- **Logistics and inventory tracking** - The aspect of an organization dealing with the procurement, maintenance, and transportation of material, facilities, and personnel; the handling of the details of an operation.
- **Machine to machine communication (M2M)** - Is used for automated data transmission and measurement between mechanical or electronic devices. The key components of an M2M system are: Field-deployed wireless devices with embedded sensors or RFID-Wireless communication networks with complementary wireline access includes, but is not limited to cellular communication, Wi-Fi, ZigBee, WiMAX, wireless LAN (WLAN), generic DSL (xDSL) and fiber to the x (FTTx). <http://www.gartner.com/it-glossary/machine-to-machine-m2m-communications/>
- **Manufacturing** - The process of making wares by hand or by machinery especially when carried on systematically with division of labor.
- **Marketing** - The process or technique of promoting, selling, and distributing a product or service.
- **Materials science** - Study of the properties of solid materials and how those properties are determined by the material's composition and structure.
- **Mathematics** - the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations.
- **Mechanical engineering** - a branch of engineering concerned primarily with the industrial application of mechanics and with the production of tools, machinery, and their products.
- **Mechanical theory** – Development of new surface treatments for metals, polymers and fibers and has assisted in giving an understanding of their efficacy. <http://people.bath.ac.uk/mssdep/dep70yrs.htm>
- **Military/encryption** -The conversion of data into a form, called a ciphertext that cannot be easily understood by unauthorized people. <http://searchsecurity.techtarget.com/definition/encryption>
- **Mission** – A statement regarding an organizations core purposes citing what a company does and why they exist.
- **Mobile apps** - Software programs that can be downloaded and accessed directly using mobile phone or another mobile device – like a tablet or music player.
- **Mobile device management (MDM)** - includes software that provides the following functions: software distribution, policy management, inventory management, security management and service management for smartphones and media tablets. <http://www.gartner.com/it-glossary/mobile-device-management-mdm/>
- **Modeling** - A system of postulates, data, and inferences presented as a mathematical description of an entity or state of affairs; *also* : a computer simulation based on such a system.
- **Multilingual** - Using or interpreting several languages or codes especially with equal fluency within a computer system.
- **Multi-platform or Operating system** - (Android, IOS, Text based as well as graphical UI)- allows multiple application programs to be installed and to reside separately and securely on a smart card. . <http://whatis.techtarget.com/definition/MULTOS-Multiple-Operating-System>
- **Nanotechnology** - A branch of engineering that deals with the design and manufacture of extremely small electronic circuits and mechanical devices built at the molecular level of matter. <http://whatis.techtarget.com/definition/nanotechnology-molecular-manufacturing>
- **Networking** - The construction, design, and use of a network, including the physical (cabling, hub, bridge, switch, router, and so forth), the selection and use of telecommunication protocol and computer software for using and managing the network, and the establishment of operation policies and procedures related to the network. <http://searchnetworking.techtarget.com/definition/networking>
- **Open Source** - Software that comes with permission to use, copy and distribute, either as is or with modifications, and that may be offered either free or with a charge. <http://www.gartner.com/it-glossary/open-source/>



- **Organizational change management** - An approach to shifting/transitioning individuals, teams, and organizations from a current state to a desired future state. It is an organizational process aimed at helping change stakeholders to accept and embrace changes in their business environment or individuals in their personal lives.
- **Pattern recognition** - The assignment of a label to a given input value
- **Physics** - A science that deals with matter and energy and their interactions
- **Platform design** - An operating system, the computer system's coordinating program, which in turn is built on the instruction set for a processor or microprocessor, the hardware that performs logic operations and manages data movement in the computer. <http://searchservvirtualization.techtarget.com/definition/platform>
- **Power consumption and management** –Devices which consume electric energy to generate desired output.
- **Prediction** – Something that is forecasted based on current trends.
- **Predictive Analytics** - Describes any approach to data mining with four attributes: an emphasis on prediction (rather than description, classification or clustering), rapid analysis measured in hours or days (rather than the stereotypical months of traditional data mining), an emphasis on the business relevance of the resulting insights (no ivory tower analyses) and (increasingly) an emphasis on ease of use, thus making the tools accessible to business users. <http://www.gartner.com/it-glossary/predictive-analytics/>
- **Predictive modeling (role based)** – A commonly used statistical technique to predict future behavior. Predictive modeling solutions are a form of data-mining technology that works by analyzing historical and current data and generating a model to help predict future outcomes. In predictive modeling, data is collected, a statistical model is formulated, predictions are made, and the model is validated (or revised) as additional data becomes available. <http://www.gartner.com/it-glossary/predictive-modeling/>
- **Predictive modeling/prescriptive** - A process used in predictive analytics to create a statistical model of future behavior.
- **Predictive analytics** - The area of data mining concerned with forecasting probabilities and trends. <http://searchdatamanagement.techtarget.com/definition/predictive-modeling>
- **Privacy** - What personal information can be shared with whom; Whether messages can be exchanged without anyone else seeing them; Whether and how one can send messages anonymously. <http://searchdatamanagement.techtarget.com/definition/privacy>
- **Problem solving** -Cognitive modeling is an area of computer science that deals with simulating human problem solving and mental task processes in a computerized model. <http://whatis.techtarget.com/definition/cognitive-modeling>
- **Process analytics** – The process or method of logical analysis.
- **Process design** – The process or method of conceiving and planning a specific function.
- **Process efficiency** - Effective operation as measured by a comparison of production with cost (as in energy, time, and money), or the ratio of the useful energy delivered by a dynamic system to the energy supplied to it.
- **Process management** -Specific to the communications environment, the practice of telecom expense management (TEM) encompasses the business processes conducted by IT and finance departments to acquire the provision (and support) of corporate telecommunications assets. <http://www.gartner.com/it-glossary/process-management-2/>
- **Programming** – The process of designing, writing, testing, debugging, and maintaining the course code of computer programs.
- **Project management** - is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. <http://www.gartner.com/it-glossary/project-management/>
- **Psychology** – an applied science discipline that involves the scientific study of mental functions and behavior.
- **Quantum mechanics theory** – A theory of matter that is based on the concept of the possession of wave properties by elementary particles, that affords a mathematical interpretation of the structure and interactions of matter on the basis of these properties, and that incorporates within it quantum theory and the uncertainty principle.
- **Radio Frequency theory** - Any of the electromagnetic wave frequencies that lie in the range extending from below 3 kilohertz to about 300 gigahertz and that include the frequencies used for communications signals (as for radio and television broadcasting and cell-phone and satellite transmissions or radar signals).
- **Radio Frequency (RF)**- Refers to alternating current (AC) having characteristics such that, if the current is input to an antenna, an electromagnetic (EM) field is generated suitable for wireless broadcasting and/or communications. <http://searchnetworking.techtarget.com/definition/radio-frequency>

- **Radio Frequency Information Device (RFID)** - An automated data collection technology that uses radio frequency waves to transfer data between a reader and a tag to identify, track and locate the tagged item. <http://www.gartner.com/it-glossary/radio-frequency-identification-rfid/>
- **Regeneration** - The renewal, regrowth, or restoration of a body or a bodily part, tissue, or substance after injury or as a normal bodily process.
- **Regulations** - Laws that a business must obey, or risk legal sanctions, up to and including prison for its officers. <http://www.gartner.com/it-glossary/regulatory-compliance/>
- **Remote workers** – Employees working from places, such as the home or at customer sites, other than the organizations structured office area.
- **Retina Technology** – Scanners with the ability to read the sensory membrane that lines the eye to confirm the identity of an individual.
- **Risk analysis** -The process of defining and analyzing the dangers to individuals, businesses and government agencies posed by potential natural and human-caused adverse events. <http://searchmidmarketsecurity.techtarget.com/definition/risk-analysis>
- **Risk mitigation** - The plan(s) for what to do about the risks identified by Risk Analysis.
- **Routers** - A device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination. <http://searchnetworking.techtarget.com/definition/router>
- **Secure data** - Protecting a database from destructive forces and the unwanted actions of unauthorized users.
- **Security** – The practice of defending information from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction.
- **Sensor /Sensors**– A device that responds to a physical stimulus (as heat, light, sound, pressure, magnetism, or a particular motion) and transmits a resulting impulse (as for measurement or operating a control).
- **Sensors/sensing** - A converter that measures a physical quantity and converts it into a signal which can be read by an electronic instrument.
- **Shadowing/Mimicking** - An imitation of; simulate; resemble closely.
- **Simulations** - The use of a mathematical or computer representation of a physical system for the purpose of studying constraint effects. <http://www.gartner.com/it-glossary/simulation/>
- **Six sigma** - A business management strategy aimed at improving the quality of process outputs by identifying and removing the causes of defects and minimizing variability. "Six Sigma" refers to a six standard deviation distance between a process norm and its nearest specification limit. <http://www.gartner.com/it-glossary/six-sigma/>
- **Six Sigma training/Lean** - Seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.
- **Smart computer interfacing with personalization** - Computer interface reads its user's brainwaves, making it possible to control virtual objects, and even physical electronics, with mere thoughts (and a little concentration).
- **SoC** - System on chip verification.
- **Social networking, User Experience** - The practice of expanding the number of one's business and/or social contacts by making connections through individuals. <http://whatis.techtarget.com/definition/social-networking>
- **Social networks** - Social networking sites, such as LinkedIn, Facebook or MySpace, provide open membership where people can congregate to share information. They are an example of a decentralized network that exhibits emergent behavior. <http://www.gartner.com/it-glossary/social-networking-sites/>
- **Sociology** - The science of society, social institutions, and social relationships; **specifically** : the systematic study of the development, structure, interaction, and collective behavior of organized groups of human beings.
- **Software** - A general term for the various kinds of programs used to operate computers and related devices. <http://searchsoa.techtarget.com/definition/software>
- **Software and hardware integration - The computer system integration of application and process.**
- **Software design** - A process of problem-solving and planning for a software solution. After the purpose and specifications of software are determined, software developers will design or employ designers to develop a plan for a solution. [http://en.wikipedia.org/wiki/Category:Software\\_design](http://en.wikipedia.org/wiki/Category:Software_design)

- **Software development** - Project management, specifications, design, programming, testing, installation and training associated with a specific application development project of any size. <http://www.gartner.com/it-glossary/software-development/>
- **Speech recognition** - Interprets human speech and translates it into text or commands. Primary applications are self-service and call routing for contact center applications; converting speech to text for desktop text entry, form filling or voice mail transcription; and user interface control and content navigation for use on mobile devices, PCs and in-car systems. <http://www.gartner.com/it-glossary/speech-recognition/>
- **Speech/facial recognition** - The ability of a machine or program to identify words and phrases in spoken language and convert them to a machine-readable format. <http://searchcrm.techtarget.com/definition/speech-recognition>
- **Statistics** - A branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data
- **Statistics and probability** - The ratio of the number of outcomes in an exhaustive set of equally likely outcomes that produce a given event to the total number of possible outcomes
- **Statistics/demographic analysis** - Examines every single data sample in a population (the set of items from which samples can be drawn), rather than a cross sectional representation of samples as less sophisticated methods do. <http://whatis.techtarget.com/definition/statistical-analysis>
- **Storage** - The place where data is held in an electromagnetic or optical form for access by a computer processor. <http://searchstorage.techtarget.com/definition/storage>
- **Story boarding** -planning board is used to track the progress of a project. <http://searchsoftwarequality.techtarget.com/definition/planning-board>
- **Strategic planning** - Is an organization's process of defining its strategy, or direction, and making decisions on allocating its resources to pursue this strategy.
- **Supply chain** - The network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user. <http://whatis.techtarget.com/definition/supply-chain>
- **Supply chain management (distribution)** - A holistic perspective of supply chain processes and technologies that go beyond the focus of delivery, inventory and traditional views of cost. <http://searchmanufacturingerp.techtarget.com/definition/supply-chain-sustainability>
- **Surveying** - To query (someone) in order to collect data for the analysis of some aspect of a group or area or to examine as a condition, situation, or value.
- **Surveillance** - A digitized and networked version of closed-circuit television (CCTV). <http://whatis.techtarget.com/definition/IP-surveillance>
- **Sustainability** - Of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.
- **Sustainability management** - Managing data as it relates to the company's sustainability goals and providing automated auditing and reporting capabilities. <http://searchcio.techtarget.com/definition/sustainability-risk-management-SRM>
- **Text to speech (speech recognition)** - The translation of spoken words into text.
- **Thermal sensing** - A device that detects temperature. Thermal sensors are found in many laptops and desktop PCs in order to sound an alarm when a certain temperature has been exceeded.
- **Threat modeling** –A procedure for optimizing network security by identifying objectives and vulnerabilities, and then defining countermeasures to prevent, or mitigate the effects of, threats to the system. <http://searchsecurity.techtarget.com/definition/threat-modeling>
- **Traffic** - The amount of data sent and received by users on networks and web based systems.
- **User Experience, User Center Design** - An integrated set of technologies used to provide interaction between a user and a set of applications, processes, content, services or other users. A UXP has several components, including portals, mashup tools, content management, search, rich Internet application (RIA) tools, analytics, collaboration, social and mobile tools. <http://www.gartner.com/it-glossary/user-experience-platforms-uxp/>
- **User interface** - The set of dials, knobs, operating system commands, graphical display formats, and other devices provided by a computer or a program to allow the user to communicate and use the computer or program. <http://searchcio-midmarket.techtarget.com/definition/interface>
- **Using foresight and insight** - Research to discover potential future challenges and opportunities.
- **Value** – A numerical quantity that is assigned or is determined by calculation or measurement.

- **Value stream management** - Specific activities within a supply chain required to design order and provide a specific product or service. <http://www.gartner.com/it-glossary/value-stream/>
- **Vendor implemented security** - Implementing a vendor risk management program requires defining the roles and responsibilities as they pertain to data risk between client and vendors—and then taking appropriate steps to periodically ensure that vendors are adhering to those requirements.
- **Video/codec** - Integrated circuits, or chips that perform data conversion. <http://searchnetworking.techtarget.com/definition/codec>
- **Virtual reality (VR)** - Provides a computer-generated 3D environment that surrounds a user and responds to that individual's actions in a natural way, usually through immersive head-mounted displays and head tracking. Gloves providing hand tracking and haptic (touch sensitive) feedback may be used as well. Room-based systems provide a 3D experience for multiple participants; however, they are more limited in their interaction capabilities. <http://www.gartner.com/it-glossary/vr-virtual-reality/>
- **Visually impaired - zooming in etc.** – To manipulate a display (such as a computer screen) so as to make it larger and possibly more detailed. [http://en.wiktionary.org/wiki/zoom\\_in](http://en.wiktionary.org/wiki/zoom_in)
- **VPN access** - A system that delivers enterprise-focused communication services on a shared public network infrastructure and provides customized operating characteristics uniformly and universally across an enterprise. The term is used generically to refer to voice VPNs. To avoid confusion, IP-based data services are referred to as data VPNs. Service providers define a VPN as a WAN of permanent virtual circuits, generally using asynchronous transfer mode (ATM) or frame relay to transport IP. Technology providers define a VPN as the use of encryption software or hardware to bring privacy to communications over a public or untrusted data network. <http://www.gartner.com/it-glossary/vpn-virtual-private-network/>
- **Wireless** - A term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part or the entire communication path. <http://searchmobilecomputing.techtarget.com/definition/wireless>



**InterLink**  
**P.O. Box 610246**  
**DFW Airport, Texas 75261-0246**  
**Phone: 214.797.5056**  
**Email: [candy@interlink-ntx.org](mailto:candy@interlink-ntx.org)**  
**Website: [www.interlink-ntx.org](http://www.interlink-ntx.org)**

Project sponsored by:

