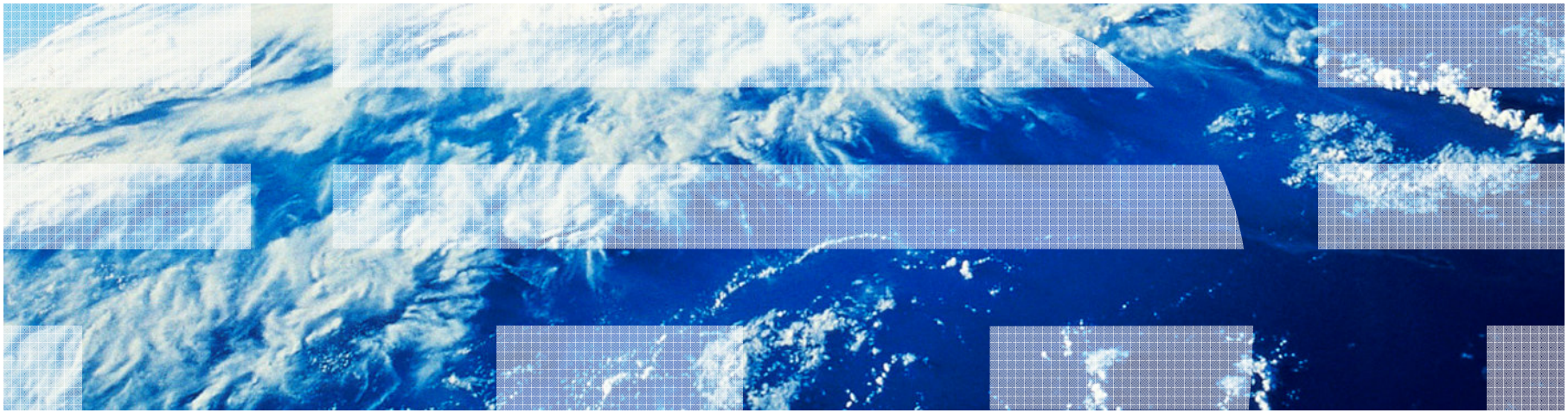
IT Services Curriculum

Cultivating in demand skills for an on demand world



Paul Kontogiorgis
IT Services Curriculum (ITSC) Program Director
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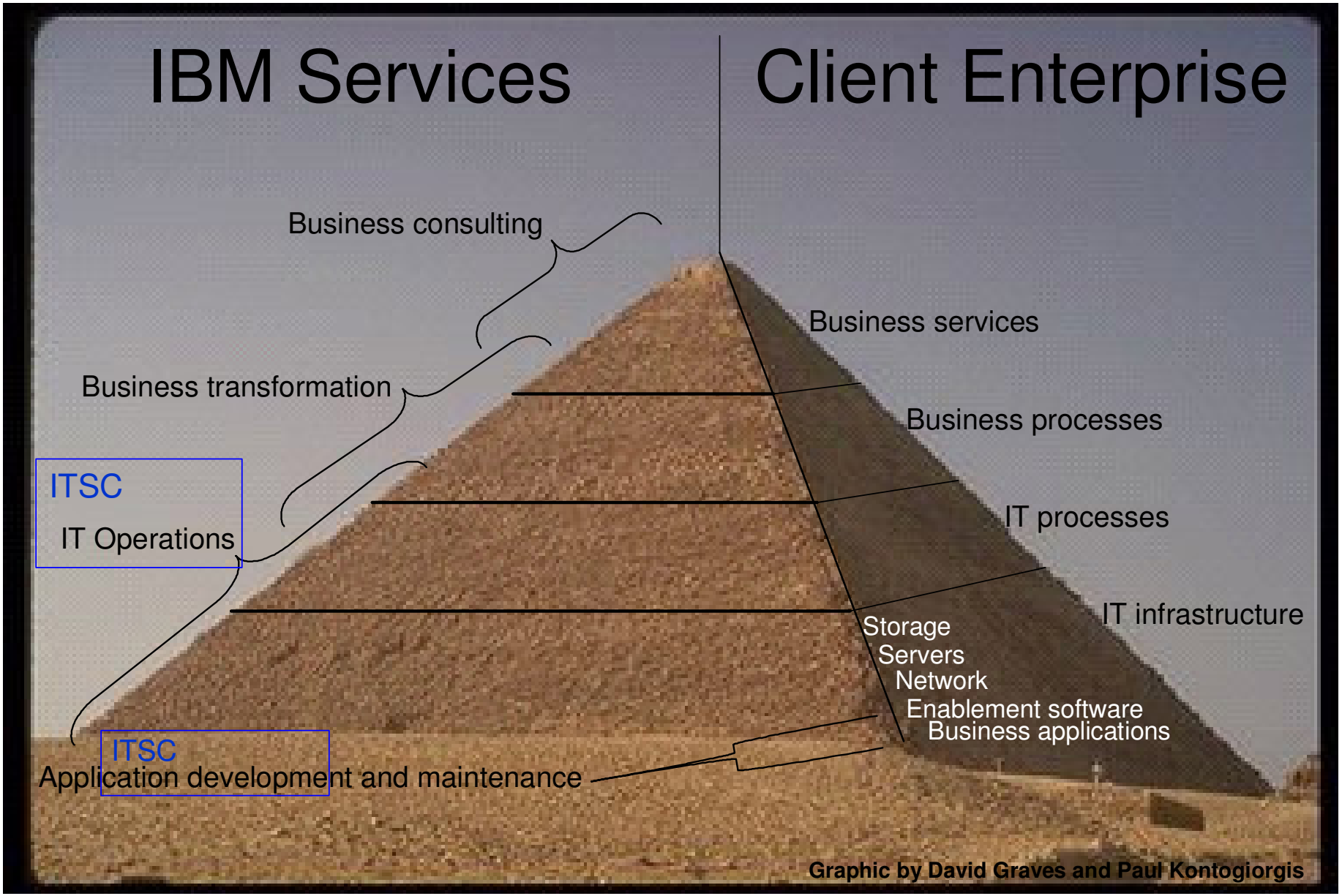
Agenda

IBM's Economy

Information Technology Services Curriculum (ITSC)

- Economy of Services
- IT services definition, examples, and positioning
- ITSC Components and Collaborations
- IT Service Topics and Streams
- Implementation
- University Program Value

ITSC Positioning



IT Services Economics at IBM

- **Global IT Services Marketplace***
  - **6% compounded annual growth rate from 2006 to 2008**
  - **2008 market should be roughly $762 Billion**
  - **North America predicted to be $337 Billion, Europe $221 Billion, Asia $44 Billion**
  - **Eastern Europe was $4.8 Billion in 2004 and should be $6.5 Billion by 2008**

    - http://www.informationweek.com/showArticle.jhtml?articleID=26800067

- **IBM IT Services Organization**
  - **Over 220,000 personnel in over 170 countries of over 386,000 total**
  - **2008 revenue was 103.6 Billion, up 5%**
  - **Managing for clients**
    - **342 data centers comprising over 6 million square feet of raised floor**
    - **1,100 mainframe servers with 10,000 terabytes of storage**
    - **166,000 distributed servers with associated Storage Area Networks**
    - **13 million LAN ports, 56,000 routers and switches, 2,400 firewalls**
    - **3.5 million end user computers generating 21 million help desk calls per year**

Information Technology (IT) Service Definition

- An IT service is the advertised and delivered function provided by the execution of repeatable IT operational processes to support business needs
- IT services can generally be classified as stakeholder or IT element focused
  - The “user request management” IT service is stakeholder focused e.g. call centers
  - The “software distribution” IT service is IT element focused e.g. data centers
  - Many cases exist that an IT service may be considered equally in both classes, for example “license management”
  - Although IT services can be delivered modularly they are often inextricably linked together

IT Service Examples

- **IT Element focused service examples**
  - Data transfer and translation
  - IT asset change control
  - Device and application availability management
  - Computing infrastructure architecture
  - Operations management
  - Software distribution
- **Stakeholder focused service examples**
  - Help desk and end user support
  - IT Security policy administration
  - Application development and maintenance
  - User authentication and authorization
  - Service request management
  - Service level attainment
  - Service creation

- **IT Taxonomy Inputs**
  - **IBM's PRM-IT**
  - **ITIL**
  - **Cobit**
  - **ISO20000**

IT Services Economics

IBM jobs posted on Nov 1, 2009

Location	Openings
India	**426**
Asia	**1,548**
Europe	**458**
United States	**797**

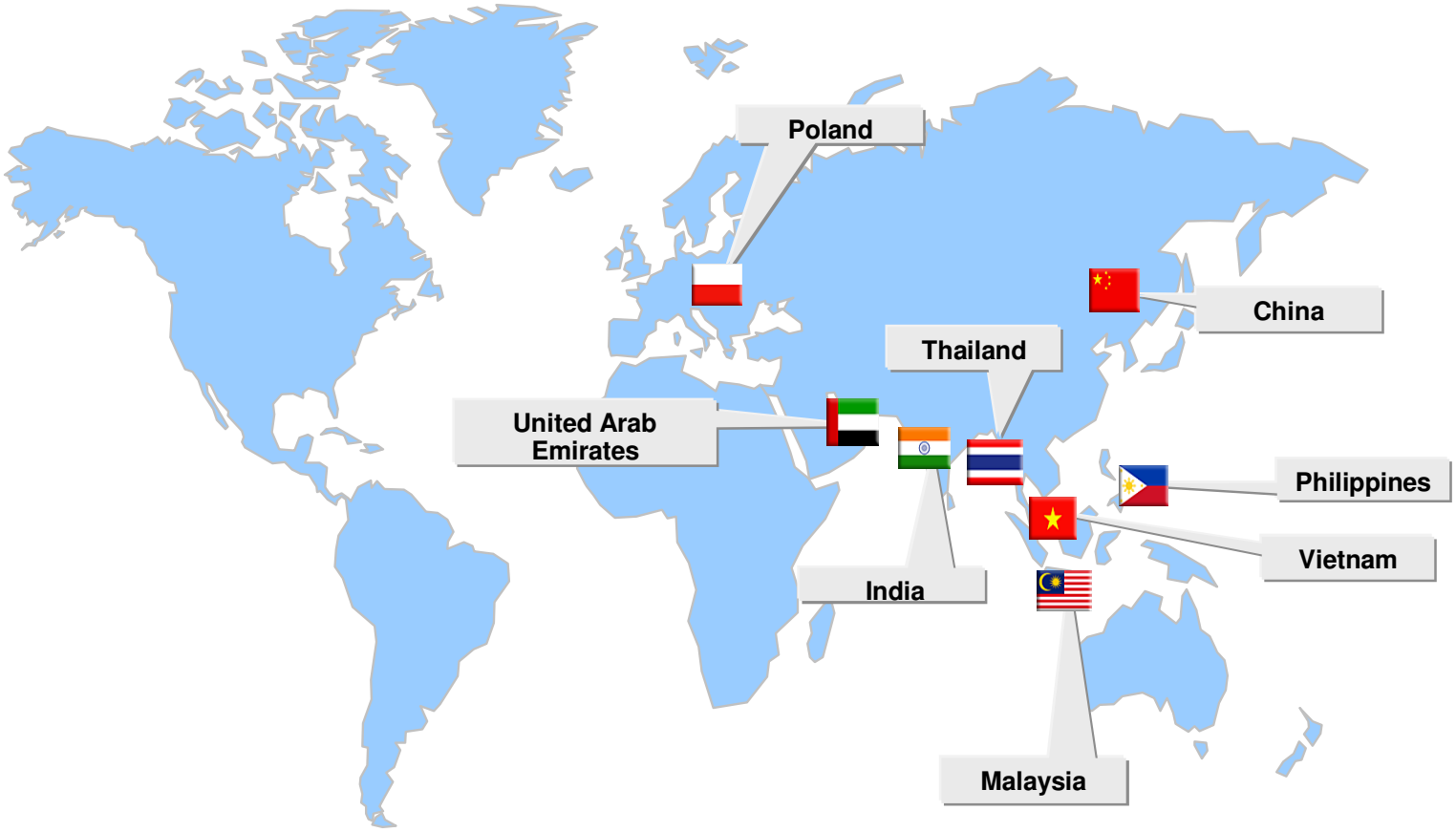
North America jobs posted at hotjobs.yahoo.com on Nov 1, 2009

Keyword	Number of Openings
Incident management	**457**
Database administrator	**6,107**
IT architect	**2,153**
Solution architect	**770**
Programmer	**5,360**
Computer operations	**9,732**
Problem management	**9,590**
IT service management	**17,771**
Systems management	**19,366**

ITSC A Worldwide View

- In 2009 university participation grew by 20% from 165 universities to 205 universities using our course materials in ISM
- In 2009 12 universities worldwide have developed full degree programs in ISM, up from 9 the previous year 25% growth
- 50 universities worldwide are in the design stage of offering full IT service degrees via the IBM'ITSC program.
- Emerging or Growth Markets, highlighted in red

Memorandums of Understanding Worldwide



- Memorandums of Understanding (MoU's) are agreements made between IBM and country government officials establishing commitment on both ends for improving academic conditions in the country
- MoU's are typically signed by an IBM senior executive or IBM country executive with a university and/or government official from Ministry of Education, or in some cases the Prime Minister or President

ITSC Components

All courses and degrees may be business or technically oriented

Bachelor Degree Tracks

IT Infrastructure Management – Managing IT Elements
IT Service Management – Managing Relationships and Service Quality

Master and Doctoral Tracks

IT Services Integration
Business Process Management
Policy Based Autonomic Infrastructures
Security
Storage

The post graduate degree tracks represent the frontier of IT Services and offer significant opportunity for contribution and innovation by participating universities and candidates

This Is What They're Saying

Hundreds of internal and external articles including a television appearance (Jalisco- Mexico) have referenced IBM's contributions through the ITSC program

"Schools are trying to offer courses to prepare the next generation for those jobs, but their efforts are lagging. As a result, some companies are taking things into their own hands." Nov. 3, 2007
http://online.wsj.com/article_email/SB119441267250085081-lMyQjAxMDE3OTE0NDQxMTQyWj.html

"Companies now demand industry knowledge and social skills in addition to technical expertise from applicants. A Gartner Group Study says by 2010, six of 10 people affiliated with IT will assume business-facing roles." Sept. 3, 2007
http://www.sptimes.com/2007/09/23/Business/Where_have_all_the_te.shtml

Internal podcast to promote IT Services in Belgium and the Nordics. Apr. 23, 2007

http://w3.webahead.ibm.com/medialibrary/media_view?id=8071

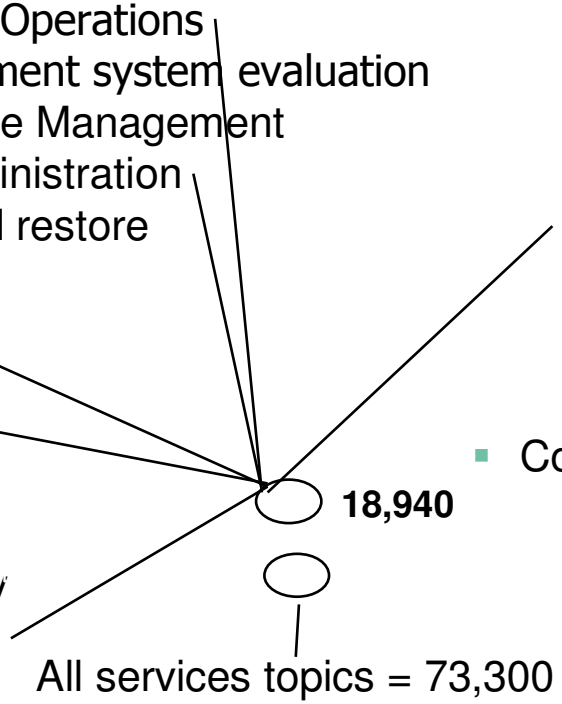
"Next fall, Missouri State University will offer a new bachelor degree program for information technology service management. The new major will include existing curriculum, such as IT networking and security classes, but will focus less on other areas, like computer programming. New courses will include service management and incident and problem management. "This is very much a blend of existing technology classes with some refocusing," says Ron Dattero, professor of computer information systems at Missouri State" Mar. 14, 2007
http://www.informationweek.com/story/showArticle.jhtml?articleID=198000930

"The visit's aim was to talk with some local universities and invite them to include in their academic burden of Scientific Services, so that their graduates are better prepared and comply with the new profile, seeking companies." (Translated from Spanish) June 15, 2007
http://electronicosonline.com/noticias/notas.php?id=4491_0_1_0_M31

ITSC Components – Services Topics

- IT Systems Architecture
  - Management system architecture
  - Service and component design
  - Service Oriented Architecture
  - Technology governance
  - Architectural methods

- Infrastructure Services
  - IT Services Operations
  - IT management system evaluation
  - Performance Management
  - Server administration
  - Backup and restore
  - Storage
  - Event
  - Availability
  - Capacity
  - Facility
  - Network
  - IT Recovery
  - Security

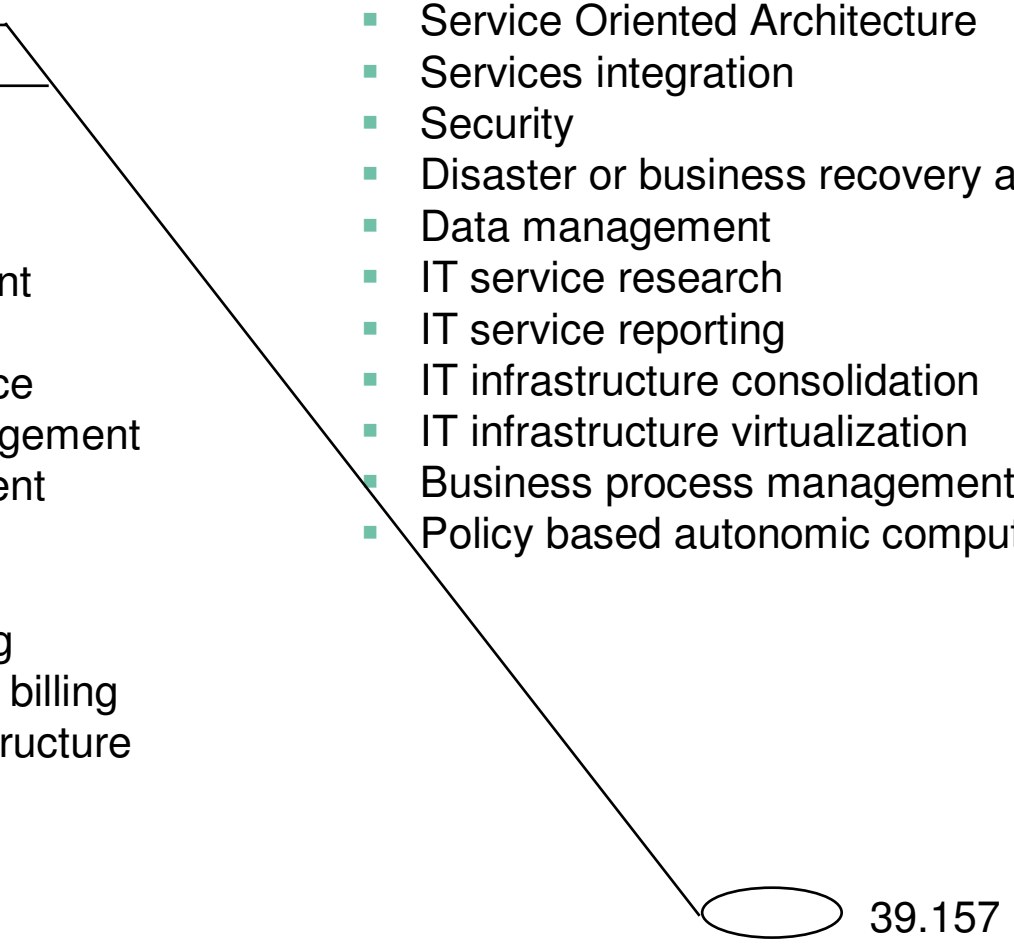


- Business
  - IT Strategy
  - Service marketing and sales
  - Service requirements management
  - Service creation
  - Service request management
  - Service Level Attainment
  - Client relationships
  - Portfolio management
  - Customer satisfaction management
  - Service pricing and contract administration
  - IT workforce management
  - Service continuity
  - Project management and service deployment
  - Solution globalization and accessibility
  - Data privacy

- Configuration
  - Change
  - Asset
  - Software distribution and license management
  - Electronic inventory

ITSC Components – Services Topics

- Service Improvement
  - Incident
  - Problem
  - User contact
  - Product release
  - Risk management
  - Process improvement
  - IT solution test
  - IT service acceptance
  - IT Knowledge Management
  - Capacity Management
- On demand IT services
  - IT resource metering
  - Consumption based billing
  - Autonomic IT infrastructure
- Advanced
  - Service Oriented Architecture
  - Services integration
  - Security
  - Disaster or business recovery and resiliency
  - Data management
  - IT service research
  - IT service reporting
  - IT infrastructure consolidation
  - IT infrastructure virtualization
  - Business process management
  - Policy based autonomic computing



Sample Curriculum Topics – IT Security Services

Bachelor or Master of Science in IT Security Services

- Internet security
- Ethical hacking
- Secure systems
- Smart cards
- Sensors & vulnerability analysis
- Secure payment systems
- Antivirus
- Privacy technology
- Biometrics
- Multiparty protocols
- Firewall Management
- Physical and Logical Aspects
- Virus Services
- Trust policies
- Cryptographic hardware and software
- Digital watermarking
- XML security
- Intrusion detection and prevention
- Incident management
- Vulnerability scanning and assessment
- Compliance management
- Intelligence
- Email security management
- Forensic analysis
- Security Monitoring
- ID Management
- Risk Management

Curriculum Course Plan – Service Oriented Architecture

Master of Science in Service Oriented Architecture

- SOA Overview (Topics include: CBM, SOA Standards (BPEL, ESB, WSDL), SOA Tools, SOA Lifecycle, SOA Reference Architecture, Web Services and XML)
- Developing an SOA Solution I
- Service Oriented Modeling
- SOA Programming Model to (Topics include: SOA Tools, Service Component Architecture SOA Standards, Web Services and XML)
- Design an SOA Solution 2 - (Topics include: BPEL, ESB, WSDL, SOA Ref. Architecture)
- SOA Governance
- SOA Security
- SOA Assessments, Adoption & Transformation and Maturity (Topics include SIMM (Service integration Maturity model - adoption, maturity, and assessments) and OSIMM)

Sample Curriculum Topics – Autonomic Computing

Master of Science in Autonomic Computing

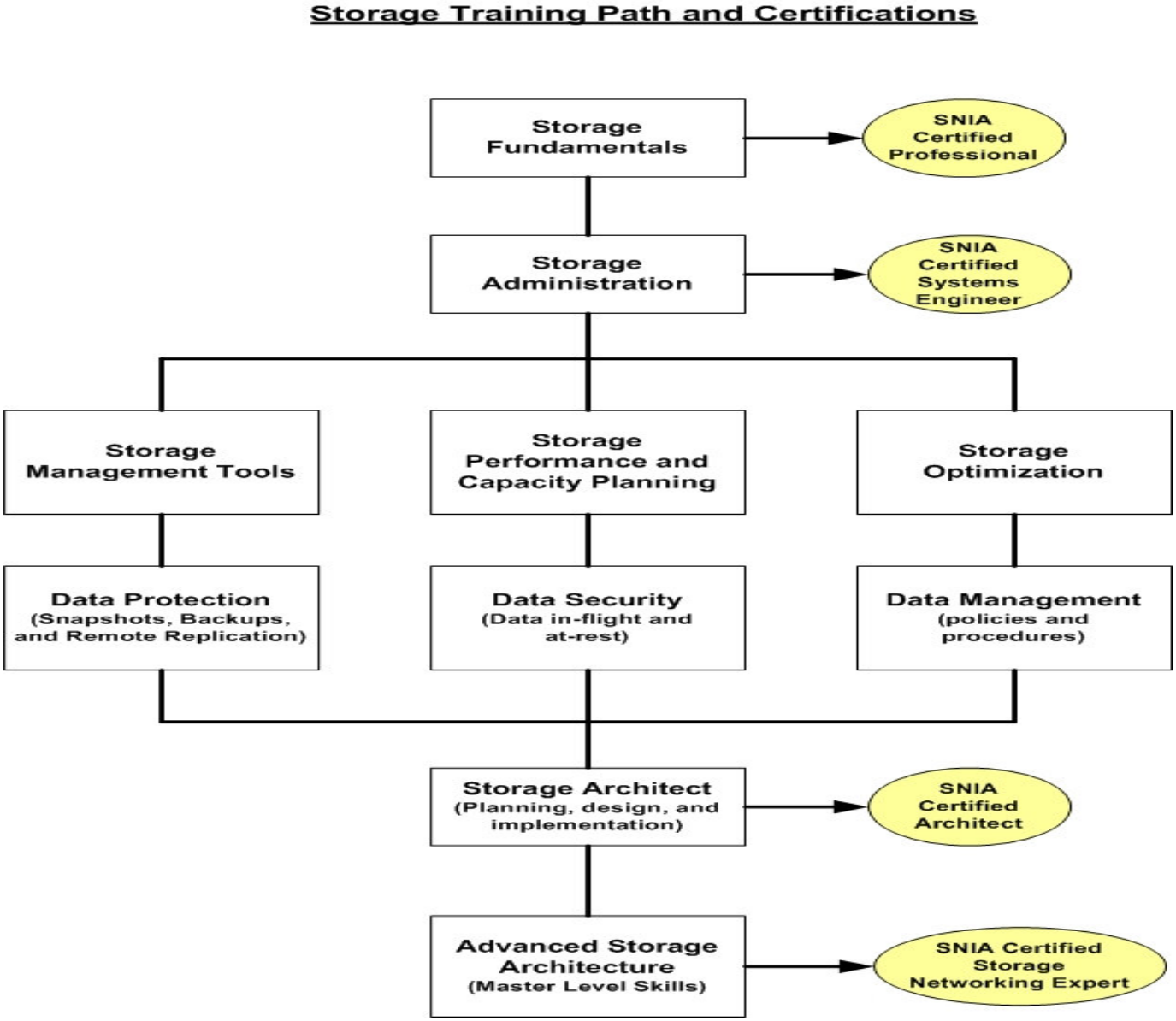
- Infrastructure Provisioning
- Business Process Management
- Resource Management
- Workflow Management and Orchestration
- Autonomic Computing Engineering
- Autonomic Software Mechanisms
- Business Rules Modeling and Processing
- Autonomic Computing and Process Control
- Analytics and Behavior Forecasting

IT Services for Software Development

Master of Science in Software Development Services

- Software Deployment Management (Descriptors, other topics...)
- Software Test Management I (Planning, Functional testing, Unit testing)
- Software Test Management II (Load testing, Performance testing)
- Security in Application Development
- Software Development Architecture (Processes)
- Enterprise Integration
- Software Development Configuration Management (Artifact management, documentation, policy management, etc.)
- Software Development Platform (Logical Partitions (VMWare, lpars), supporting computing systems, programming languages (Java), applications, storage, and network)

Curriculum Course Plan – Storage Management



Implementation – Recommended Core Courses

- Foundations in IT Services I and II
- Business Systems Management I and II
- IT Architecture/Consultancy
- IT Project Management
- SOA Overview
- IT and the Service Economy
- IT Service Programming
- Emerging Technologies and IT Services

Implementation – Required Pedagogical Material

- **Course content**
- **TTT Material (Lecture notes)**
- **Supporting material including hw, exams, case studies, labs, additional references, etc.**

For More Information

- **ITSC home page**
  https://www14.software.ibm.com/webapp/devtool/scholar/web/coursewarePickPage.do?source=ai-course-itservices

- **IBM Academic Initiative**
  www.ibm.com/university

- **SSME (Service Science Management and Engineering)**
  http://www-304.ibm.com/jct09002c/university/scholars/skills/ssme/index.html

- **IBM University Relations**
  http://www-304.ibm.com/jct09002c/university/scholars/ur/index.html

- **AIS SIGSVC (Special Interest Group on Services)**
  http://www.sconger.com/svc/index.html

- **ITSC contacts**
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ITSC Value

Universities

- Aid curricula evolution to reflect the role of services in the IT industry
- Attract students to CIS and CS programs by matching outcomes to workforce demands
- Universities are shifting to a services orientation – ITSC is a fundamental aspect of services

Students

- The IT Services curriculum will prepare students for today's and future information technology and technically oriented business management job opportunities
- Students would be in a position to bring significant and innovative change to IT services
- Graduates with ITSC knowledge could obtain several product and industry certifications
- Paired with systems management tools, ITSC provides practical hands on experience for greater job prospects

Industry

- Accelerated readiness of the workforce will help alleviate skills availability issues
- Bridge the communication gap between IT functional jobs and business leader vision
- Significantly reduce transitional or "ramp up" costs for college graduates entering the workforce

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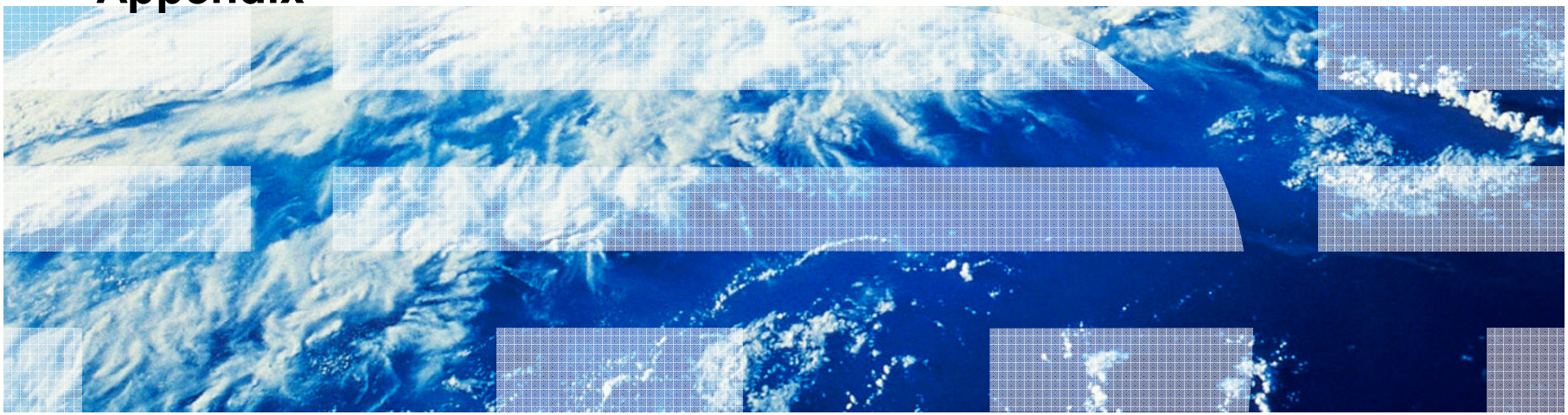
Appendix



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AI, UR, ITSC, SSME, CAS

- **Academic Initiatives provides courses and IBM products for universities free of charge**
- **SSME is a theoretical idea to incorporate arts, science, and engineering as a new methodology for higher education**
- **ITSC introduces a new field of study in IT infrastructure and service managements**
- **CAS creates the connections between universities and industry to develop research of common interest**

Participating ITSC University List - AP

- Dankook – South Korea
- NID - Bangalore - India
- RBAC University – Thailand
- Zhongnan University - China
- Peking University - China
- Mahanakorn University of Technology (MUT) – Thailand
- Harbin Instiute of Technology – China
- Silpakorn Unversity - Computing Department, Faculty of Science - Thailand
- Singapore Management University
- Osmania University - Hyderabad, India
- Software School Fudan University - China
- Beijing University of Posts and Telecommunications - China
- Donghua University - China
- Dalian Jiaotong University – China
- Xi'an Jiaotong University – China
- Assumption University - Thailand
- National Taiwan University – Taiwan
- Renmin University of China
- Rnagsit University - Thailand
- Narescuan University – Thailand
- Beijing Univ. of Posts and Telecom - China
- School of Software Sun Yat-sen University – China
- Yunnan University – China
- National Chengchi University - China
- Ganpat University – India
- Beijing Normal University - China
- Northwest Poly Technology University - China
- Temasek Polytechnic – Singapore
- Institute of Management Technology,Ghaziabad - India
- National Unviersity of Singapore
- IIT Kanpur - India
- Northeastern University Software College – China
- Deakin University School of Engineering and IT - Australia
- BOND University – Australia
- Asia Pacific College - Philippines
- National Univeristy of Singapore
- Shanghai Jiaotong University – China
- Universiti Teknologi Malaysia
- APIIT/UCTI - Malaysia
- Indian Institute of Technology Madras - India

Participating ITSC University List - EMEA

- University of Crete - Greece
- Universitat de València – Spain
- University of Sofia – Bulgaria
- Universita Degli Studi di Trento – Italy
- Tampere University of Technology - Finland
- Universita' degli Studi di Roma – Italy
- Nort Karelia Univ. of Applied Sciences - Finland
- University of Sofia – Bulgaria
- Brno University of Technology - Czech Republic
- University of West Hungary – Hungary
- University of Economics Prague (VSE) - Czech Republic
- St.Petersburg State University – Russia
- Bahcesehir University - Turkey
- GKA Maimonid Academy - Russia
- Politecnico di Milano – Italy
- RWTH Aachen University – Germany
- Universiteit Hasselt - Belgium
- IMISP - Russia
- University of Economics Prague - Czech Republic
- Faculty of Engineering of University of Porto(FEUP) – Portugal
- University of Stuttgart – Germany
- HTW-Aalen – Germany
- Hellenic American University
- Fontys hogeschool Eindhoven; Erasmus university; University of Groningen; University of Amsterdam Open University (Same Professor)
- Barcelona School of Informatics - Spain
- Universitat de València - Spain
- Instituto Superior Tecnico – Portugal
- Transilvania University of Brasov – Romania
- Westfälische Wilhelms-Universität Münster - Germany
- University of Naples - Italy

Participating ITSC University List - Americas

- Universidad Nacional - Mexico
- ESPOL – Ecuador
- University of Bridgeport
- BYU - Hawaii
- University of Nevada Las Vegas
- University of Southern California
- UFC – Brazil
- Colorado State University
- Tecnológico de Monterrey, campus Guadalajara Mexico
- Neumont University
- Missouri State University
- University of Texas at Austin
- Temple University
- Garcilazo Private University – Peru
- George Mason University
- Tecnológico de Monterrey Campus Toluca – Mexico
- Manchester Community College | Dept. of Continuing Education – US
- Carnegie Mellon University
- Florida State University - College of Business
- British Columbia Institute of Technology - Canada
- University of Dallas
- Universidad Tecnológica del Centro – Venezuela
- University of South Carolina-Columbia
- Appalachian State University
- Rockford Business College
- UMBC (Maryland – Baltimore County)
- Baylor University
- Southern University – Louisiana
- Baylor University - Hankamer School of Business
- Harvard University
- Boston University MET College Computer Science
- University of Alaska Anchorage
- McKendree University – Illinois
- North Carolina State University