ASCUE

ASSOCIATION SUPPORTING COMPUTER USERS IN EDUCATION

"Continuing a Second Quarter Century of Service"

Proceedings of the 2015 ASCUE Summer Conference

48th Annual Conference
June 14-18, 2015

North Myrtle Beach, South Carolina

Edited by Peter Smith
Saint Mary's College
Notre Dame, Indiana

Association Supporting Computer Users in Education
"Our Second Quarter Century of Resource Sharing"

Proceedings of the 2015 ASCUE Summer Conference
48th Annual Conference
June 14 – 18, 2015
Myrtle Beach, South Carolina
Web: http://www.ascue.org

ABOUT ASCUE

ASCUE, the Association Supporting Computer Users in Education, is a group of people interested in small college computing issues. It is a blend of people from all over the country who use computers in their teaching, academic support, and administrative support functions. Begun in 1968 as CUETUG, the College and University Eleven-Thirty Users' Group, with an initial membership requirement of sharing at least one piece of software each year with other members, ASCUE has a strong tradition of bringing its members together to pool their resources to help each other. It no longer requires its members to share homegrown software, nor does it have ties to a particular hardware platform. However, ASCUE continues the tradition of sharing through its national conference held every year in June, its conference proceedings, and its newsletter. ASCUE proudly affirms this tradition in its motto: "Our Second Quarter Century of Resource Sharing"

ASCUE's LISTSERVE

Subscribe by visiting the site http://groups.google.com/a/ascue.org/group/members and follow the directions. To send an e-mail message to the Listserve, contact: members@ascue.org Please note that you must be a subscriber/member in order to send messages to the listserve.

NEED MORE INFORMATION

Direct questions about the contents of the 2015 Conference to Terri Austin, Program Chair, ASCUE 15, Roanoke College, 221 College Lane, Salem, VA 24153, 540-375-2395 austin@roanoke.edu, Web: http://www.ascue.org

Association of Small Computer Users in Education
ASCUE 2014-2015 Board Members
(years remaining in office including current year)

Table of Contents

Keynote Speaker

Jim Groom is the director of the Division of Teaching and Learning Technologies and adjunct professor at the University of Mary Washington in Fredericksburg, Virginia. He has been working for over fifteen years in education with a consistent focus on the development of teaching and learning in higher education. In addition to his extensive experience teaching at the college level, for the past nine years he has worked primarily in the field of instructional technology (see work experience)."
(source: http://jimgroom.net/about/)

Conference Workshops

These will be held in the late afternoon for 90 minutes during the conference.

Workshop 1
Google Analytics: Using Big Data to Make Big Decisions

Date: Wednesday, June 17, Water Oaks II
Time: 3:30pm - 5:00pm
Instructor: . Tom Marcais, Washington & Lee University

Google Analytics is a powerful tool for measuring a website's traffic and metrics. By analyzing key insights, you can learn about your audience and their interests. This workshop will provide an overview of Google Analytics, including how to: understand your audience's demographics and behavior, examine your sources of acquisition, and set up goals and conversions you can work toward achieving. Come learn what Google Analytics can show you about your website and audience!

About the Presenter

Tom Marcais is the Technology Integration Specialist at Washington and Lee University. He facilitates the use of technology for university staff and faculty with a focus on support for the sciences.

Workshop 2
Using Badges to increase workshop attendance
Date: Tuesday, June 16, Water Oaks II
Time: 3:00pm - 4:30pm
Instructor: Valerie Green, Arcadia University

Do you offer workshops and have only a few faculty or staff that attend? This workshop will focus on how to present content in workshops to engage learners. We will also discuss how to incorporate hand on learning in all workshops. The final step of building and presenting an exciting series of workshops is giving a badge at the end.

About the Presenter

Valerie Green has been working with online education since 2007. After receiving her BA, Valerie was driven to teach online. She has taught online and currently is responsible for building online courses in her day job.

Organization for the Proceedings

ASCUE initiated a refereed track for paper submissions to the conference in 2008. In fact, at the 2008 business meeting, the membership approved three different presentation tracks: refereed with 3 blind reviews for each paper, session with paper where the author submits a paper but it is not reviewed, and session without paper where no paper is submitted and only the abstract is included in the proceedings. To reflect this division, we will divide the proceedings into three sections. The first section, up to page 34, will contain the refereed papers, the second section, from 35 to 94, will hold the papers from the sessions with paper, and the last section will list the abstracts for the other sessions.

ASCUE BOARD OF DIRECTORS FROM 1967 to 2015

At this conference we celebrate the 47th anniversary of the founding of ASCUE at a meeting in July, 1968, at Tarkio College in Missouri of representatives from schools which had received IBM 1130 computers to help them automate their business functions and teach students how to use computers. They decided to form a continuing organization and name it CUETUG, which stood for College and University Eleven-Thirty Users Group. By 1975, many of the member schools were no longer using the IBM 1130, and were requesting to be dropped from the membership lists. At the same time, other small schools were looking for an organization that could allow them to share knowledge and expertise with others in similar situations. The name was changed from CUETUG to ASCUE at the 1975 business meeting and we opened membership to all institutions that agreed with our statement of purpose. Our historian, Jack Cundiff, has collected the names and schools of the officers for ASCUE and its predecessor CUETUG for the last forty-five years and we have printed these names on the following pages.

ASCUE BOARD OF DIRCTORS FROM 1967 to 1972

	1967-68	1969-70	1970-71	1971-72
President	Ken Zawodny St. Joseph's College	Howard Buer Principia College	Jack Cundiff Muskingum College	Wally Roth Taylor University.
Program Chair	Wally Roth Taylor University	Jack Cundiff Muskingum College	Wally Roth Taylor University	James McDonald Morningside College
Past President	Al Malveaux Xavier, New Orleans	Ken Zawodny St. Joseph's College	Howard Buer Principia College	Jack Cundiff Muskingum College
Treasurer	Howard Buer Principia College	Al Malveaux Xavier University	Al Malveaux Xavier University	Al Malveaux Xavier University
Secretary	John Robinson	Dorothy Brown South Carolina State	Dorothy Brown South Carolina State	Dick Wood Gettysburg College
Board Members	James Folt Dennison University	James Folt Dennison University	James Foit Dennison University	John Orahood U. of Arkansas, LR
At Large	Don Glaser Christian Brothers C.	Don Glaser Christian Brothers	Don Glaser Christian Brothers	N. Vosburg Principia College
Public Relations				Dan Kinnard Arizona Western
Librarian				Jack Cundiff Muskingum College
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	Tarkio College	Principia College	Muskingum College	Christian Brothers

ASCUE BOARD OF DIRCTORS FROM 1972 to 1976

	1972-73	1973-74	1974-75	1975-76
President	James McDonald Morningside College	Dan Kinnard Arizona Western	T. Ray Nanney Furman University	Larry Henson Berea College
Program Chair	Dan Kinnard Arizona Western	T. Ray Nanney Furman University	Larry Henson Berea College	Jack McElroy Oklahoma Christian
Past President	Wally Roth Taylor University	James McDonald Morningside College	Dan Kinnard Arizona Western	T. Ray Nanney Furman University
Treasurer	J. Westmoreland U. Tenn Martin	J. Westmoreland U. Tenn Martin	Jim Brandl Central College	Jim Brandl Central College
Secretary	Ron Anton Swathmore College	Ron Anton Swathmore College	Harry Humphries Albright College	Harry Humphries Albright College
Board Members	John Orahood U. of Arkansas, LR	Al Malveaux Xavier, New Orleans	Sister Keller Clarke College	Sister Keller Clarke College
At Large	N. Vosburg Principia College	Wally Roth Taylor University	Wally Roth Taylor University	Mike O'Heeron
Public Relations	Dan Kinnard Arizona Western	Dan Kinnard Arizona Western	Dan Kinnard Arizona Western	Dan Kinnard Arizona Western
Librarian	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	Georgia Tech	Morningside	Furman	Berea

ASCUE BOARD OF DIRCTORS FROM 1976 to 1980

	1976-77	1977-78	1978-79	1979-80
President				
	Jack McElroy	Harry Humphries	Fred Wenn	Doug Hughes
	Oklahoma Christian	Albright College	Caspar College	Dennison University
Program Chair				
	Harry Humphries	Fred Wenn	Doug Hughes	J. Westmoreland
	Albright College	Caspar College	Dennison University	U. Tenn Martin
Past President				
	Larry Henson	Jack McElroy	Harry Humphries	Fred Wenn
	Berea College	Oklahoma Christian	Albright College	Caspar College
Treasurer				
	William Roeske	William Roeske	James Foit	James Foit
	Houghton College	Houghton College	Central Ohio Tech	Central Ohio Tech
Secretary				
	Doug Hughes	Doug Hughes	Dave Dayton	John Jackobs
	Dennison University	Dennison University	Grove City College	Coe College
Board Members				
	Dave Dayton	Dave Dayton	Jan C. King	Wally Roth
	Grove City College	Grove City College	Chatham College	Taylor University
At Large				
	Fred Wenn	John Jackobs	John Jackobs	Jan C. King
	Casper College	Coe College	Coe College	Chatham College
Public Relations				
	Dan Kinnard	Sister Keller	Sister Keller	Sister Keller
	Arizona Western	Clarke College	Clarke College	Clarke College
Librarian				
	Jack Cundiff	Jack Cundiff	Jack Cundiff	Jack Cundiff
	Muskingum College	Muskingum College	Muskingum College	Muskingum College
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	OK Christian	Albright College	Casper College	Dennison University

ASCUE BOARD OF DIRCTORS FROM 1980 to 1984

	1980-81	1981-82	1982-83	1983-84
President	J. Westmoreland U. Tenn Martin	John Jackobs Coe College	Jan Carver Chatham College	Wally Roth Taylor University
Program Chair	John Jackobs Coe College	Jan Carver Chatham College	Wally Roth Taylor University	Dudley Bryant Western Kentucky
Past President	Doug Hughes Dennison University	J. Westmoreland U. Tenn Martin	John Jackobs Coe College	Jan Carver Chatham College
Treasurer	Ron Klausewitz W. Virginia Weslyan	Ron Klausewitz W. Virginia Weslyan	Harry Lykens Mary Institute, St L.	Harry Lykens Mary Institute, St. L.
Secretary	Jan Carver Chatham College	Ken Mendenhall Hutchinson CC, KS	Ken Mendenhall Hutchinson CC, KS	John Jackobs Coe College
Board Members	Dudley Bryant Western Kentucky	Dudley Bryant Western Kentucky	William Roeske Houghton University	William Roeske Houghton University
At Large	Wally Roth Taylor University	Chuck Mcintyre Berea College	Chuck Mcintyre Berea College	Bob Renners Kenyon College
Public Relations	Sister Keller Clarke College	Sister Keller Clarke College	Sister Keller Clarke College	Sister Keller Clarke College
Librarian	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	U. Tenn Martin	Coe College	Chatham College	Taylor University

ASCUE BOARD OF DIRCTORS FROM 1984 to 1988

	1984-85	1985-86	1986-87	1987-88
President	Dudley Bryant Western Kentucky	Paul Pascoe Vincennes University	Jack Cundiff Horry-Georgetown	Keith Pothoven Central College
Program Chair	Paul Pascoe Vincennes University	Jack Cundiff Horry-Georgetown	Keith Pothoven Central College	David Cossey Union College
Past President	Wally Roth Taylor University	Dudley Bryant Western Kentucky	Paul Pascoe Vincennes University	Jack Cundiff Horry-Georgetown
Treasurer	Harry Lykens Mary Institute, St. L	Harry Lykens Mary Institute, St. L	Maureen Eddins Hadley School Blind	Maureen Eddins Hadley School Blind
Secretary	John Jackobs Coe College	John Jackobs Coe College	John Jackobs Coe College	Dudley Bryant Western Kentucky
Board Members	Keith Pothoven Central College	Keith Pothoven Central College	Robert Hodge Taylor University	Robert Hodge Taylor University
At Large	Bob Renners Kenyon College	Carol Paris Goshen College	Carol Paris Goshen College	Ann Roskow Ister CC
Public Relations	Dough Hughes Dennison University	Wally Roth Taylor University	Wally Roth Taylor University	Wally Roth Taylor University
Librarian	Jack Cundiff Muskingum College	Jack Cundiff Muskingum College	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator				
Web Coordinator				
Location:	W. Kentucky	Vincennet	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 1988 to 1992

	1988-89	1989-90	1990-91	1991-92
President				
	David Cossey Union College	Tom Warger Bryn Mawr College	David Redlawsk Rudgers University	Bill Wilson Gettysburg College
Program Chair				
	Tom Warger Bryn Mawr College	David Redlawsk Rudgers University	Bill Wilson Gettysburg College	Carl Singer DePauw University
Past President				
	Keith Pothoven Central College	David Cossey Union College	Tom Warger Bryn Mawr College	David Redlawsk Rudgers University
Treasurer				
	Maureen Eddins Hadley School Blind	Maureen Eddins Hadley School Blind	Tom Pollack Duquesne University	Tom Pollack Duquesne University
Secretary				
	Dudley Bryant Western Kentucky	Kathy Decker Clarke College	Kathy Decker Clarke College	Dagrun Bennett Franklin College
Board Members				
	Kathy Decker Clarke College	Dagrun Bennett Franklin College	Dagrun Bennett Franklin College	Mary Connolly Saint Mary's College
At Large				
	Ann Roskow Ister CC	Rick Huston South Caolina/Aiken	Rick Huston South Caolina/Aiken	Rick Huston South Caolina/Aiken
Public Relations				
	Wally Roth Taylor University	Wally Roth Taylor University	Wally Roth Taylor University	Wally Roth Taylor University
Librarian				
	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 1992 to 1996

	1992-93	1993-94	1994-95	1995-96
President	Carl Singer DePauw University	Rick Huston South Carolina/Aiken	Mary Connolly Saint Mary's College	Paul Tabor Clarke College
Program Chair	Rick Huston South Carolina/Aiken	Mary Connolly Saint Mary's College	Paul Tabor Clarke College	Carl Singer DePauw University
Past President	Bill Wilson Gettysburg College	Carl Singer DePauw University	Rick Huston South Carolina/Aiken	Mary Connolly Saint Mary's College
Treasurer	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University
Secretary	Dagrun Bennett Franklin College	Dagrun Bennett Franklin College	Dagrun Bennett Franklin College	Dagrun Bennett Franklin College
Board Members	Mary Connolly Saint Mary's College	Gerald Ball Mars Hill College	Gerald Ball Mars Hill College	Rick Huston South Carolina/Aiken
At Large	Tom Gusler Clarion University	Tom Gusler Clarion University	Tom Gusler Clarion University	Tom Gusler Clarion University
Public Relations	Don Armel Eastern Illinois U.	Don Armel Eastern Illinois U.	Don Armel Eastern Illinois U.	Peter Smith Saint Mary's College
Librarian	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator				
Web Coordinator				
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 1996 to 2000

	1996-97	1997-98	1998-99	1999-2000
President	Carl Singer DePauw University	Carl Singer(acting) DePauw University	Bill Wilson Gettysburg College	Dagrun Bennett Franklin College
Program Chair	Chris Schwartz Ursuline College	Bill Wilson Gettysburg College	Dagrun Bennett Franklin College	Carol Smith DePauw University
Past President	Mary Connolly Saint Mary's College	Mary Connolly Saint Mary's College	Carl Singer DePauw University	Bill Wilson Gettysburg College
Treasurer	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University
Secretary	Dagrun Bennett Franklin College	Dagrun Bennett Franklin college	Tom Gusler Clarion University	Nancy Thibeault Sinclair CC
Board Members	Richard Stewart Lutheran Theological	Richard Stewart Lutheran Theological	Nancy Thibeault Sinclair CC	Fred Jenny Grove City College
At Large	Rick Huston South Carolina/Aiken	Rick Rodger Horry-Georgetown	Rick Rodger Horry-Georgetown	George Pyo Saint Francis College
Public Relations	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College
Librarian	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator				Rick Huston South Carolina/Aiken
Web Coordinator				
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 2000 to 2004

	2000-01	2001-02	2002-03	2003-04
President				
	Carol Smith	Fred Jenny	Nancy Thibeault	Barry Smith
	DePauw University	Grove City College	Sinclair CC	Baptist Bible College
Program Chair				
	Fred Jenny	Nancy Thibeault	Barry Smith	George Pyo
	Grove City College	Sinclair CC	Baptist Bible College	Saint Francis College
Past President				
	Dagrun Bennett	Carol Smith	Fred Jenny	Nancy Thibeault
	Franklin College	DePauw University	Grove City College	Sinclair CC
Treasurer				
	Tom Pollack	Tom Pollack	Tom Pollack	Tom Pollack
	Duquesne University	Duquesne University	Duquesne University	Duquesne University
Secretary				
	Nancy Thibeault	Kim Breighner	Kim Breighner	Kim Breighner
	Sinclair CC	Gettysburg College	Gettysburg College	Gettysburg College
Board Members				
	Barry Smith	Barry Smith	David Frace	David Frace
	Baptist Bible College	Baptist Bible College	CC Baltimore County	CC Baltimore County
At Large				
	George Pyo	George Pyo	George Pyo	Jim Workman
	Saint Francis College	Saint Francis College	Saint Francis College	Pikeville College
Public Relations				
	Peter Smith	Peter Smith	Peter Smith	Peter Smith
	Saint Mary's College	Saint Mary's College	Saint Mary's College	Saint Mary's College
Librarian				
	Jack Cundiff	Jack Cundiff	Jack Cundiff	Jack Cundiff
	Horry-Georgetown	Horry-Georgetown	Horry-Georgetown	Horry-Georgetown
Equip. Coordinator				
	Rick Huston	Hollis Townsend	Hollis Townsend	Hollis Townsend
	South Carolina/Aiken	Young Harris College	Young Harris College	Young Harris College
Web Coordinator				
	Carol Smith	Carol Smith		
	DePauw University	DePauw University		
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 2004 to 2008

	2004-05	2005-06	2006-07	2007-08
President	George Pyo Saint Francis College	Jim Workman Pikeville College	Lisa Fears Franklin College	George Pyo Saint Francis College
Program Chair	Jim Workman Pikeville College	Lisa Fears Franklin College	George Pyo Saint Francis College	Fred Jenny Grove City College
Past President	Barry Smith Baptist Bible College	George Pyo Saint Francis College	Jim Workman Pikeville College	Lisa Fears Franklin College
Treasurer	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Tom Pollack Duquesne University
Secretary	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College
Board Members	Lisa Fears Franklin College	Blair Benjamin Philadelphia Bible	Blair Benjamin Philadelphia Bible	Janet Hurn Miami U. Middleton
At Large	David Frace CC Baltimore County	David Frace CC Baltimore County	David Fusco Juniata College	David Fusco Juniata College
Public Relations	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College
Librarian	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator	Hollis Townsend Young Harris	Hollis Townsend Young Harris	Hollis Townsend Young Harris	Hollis Townsend Young Harris
Web Coordinator	Carol Smith DePauw University	David Diedreich DePauw University	David Diedriech DePauw University	Blair Benjamin Philadelphia Bible
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 2008 to 2012

	2008-09	2009-10	2010-2011	2011-2012
President				
	Fred Jenny Grove City College	Janet Hurn Miami U Middleton	Janet Hurn Miami U Middleton	Andrea Han U of British Columbia
Program Chair				
	Janet Hurn Miami U Middleton	Dave Fusco Juniata College	Andrea Han U of British Columbia	Tom Marcais Sweet Briar College
Past President				
	George Pyo Saint Francis College	Fred Jenny Grove City College	Fred Jenny Grove City College	Janet Hurn Miami U Middleton
Treasurer				
	Tom Pollack Duquesne University	Tom Pollack Duquesne University	Dave Fusco Juniata College	Dave Fusco Juniata College
Secretary				
	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College
Board Members				
	Dave Fusco Juniata College	Thomas Marcais Lee University	Thomas Marcais Lee University	Jeffery LeBlanc U of NW Ohio
At Large				
	Andrea Han Miami U Middleton	Andrea Han Miami U Middleton	Mark Poore Roanoke College	Mark Poore Roanoke College
Public Relations				
	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College
Librarian				
	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown
Equip. Coordinator				
	Hollis Townsend Young Harris	Hollis Townsend Young Harris	Hollis Townsend Young Harris	Hollis Townsend Young Harris
Web Coordinator				
	Steve Weir	Steve Weir	Steve Weir	Steve Weir
Sponsor Relations Coordinator				
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	Myrtle Beach

ASCUE BOARD OF DIRCTORS FROM 2012 to 2016

	2012-13	2013-14	2014-2015	2015-2016
President				
	Tom Marcais Sweet Briar College	George Pyo Saint Francis College	Jeffrey LeBlanc U of NW Ohio	
Program Chair				
	George Pyo Saint Francis College	Jeffrey LeBlanc U of NW Ohio	Terri Austin Roanoke College	
Past President				
	Andea Han U of British Columbia	Tom Marcais Sweet Briar College	George Pyo Saint Francis College	
Treasurer				
	Dave Fusco Juniata College	Dave Fusco University of Colorado	Mark Poore Roanoke College	
Secretary				
	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College	Kim Breighner Gettysburg College
Board Members				
	Jeffery LeBlanc U of NW Ohio	Luke VanWingerden USC Upstate	Bruce White The Apprentice School	
At Large				
	Mike Lehrfeld E. Tenn. State Univ.	Mike Lehrfeld E. Tenn. State Univ.	Mike Lehrfeld E. Tenn. State Univ.	
Public Relations				
	Peter Smith Saint Mary's College	Peter Smith Saint Mary's College	Tom Marcais Sweet Briar College	
Librarian				
	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	Jack Cundiff Horry-Georgetown	
Equip. Coordinator				
	Hollis Townsend Young Harris	Hollis Townsend Young Harris	Hollis Townsend Young Harris	
Web Coordinator				
	Steve Weir	Steve Weir	Steve Weir	
Sponsor Relations Coordinator				
	Mark Poore Roanoke College	Mark Poore Roanoke College	Berte Thompson Messiah College	
Location:	Myrtle Beach	Myrtle Beach	Myrtle Beach	

Creating Games to Get Students!

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Abstract

The Computer Information and Technology Department (CIT) program of Purdue University is offered at our regional campus in Columbus, Indiana. Like many programs throughout the country, we face issues in recruiting new students. Over the last seven to eight years, we have faced declining enrollment, even as our main campus at West Lafayette saw strong gains. The cause could be a variety of issues, such as cost of college, continued fear of outsourcing in entry level jobs, belief that students can just get certifications to get jobs, increased competition from online programs, to name a few. At our site in Columbus, we face those challenges as well as additional challenges specific to our campus that will be addressed in this paper. In an effort to reverse the enrollment trends and build up awareness of Purdue in the area and CIT in particular, we have developed several exciting camps. One camp is an Animation Camp discussed in a previous conference submission. However, we have changed the focus of that camp slightly and added a new camp for high school students on game development. In this paper we will discuss the ideas behind the development of the camps and specifically focus on the efforts to create a game development camp.

Introduction

Last summer for the first time at the Purdue University campus in Columbus, Indiana, we offered two exciting summer camps for local middle school and high school students. The high school camp was new and the middle school camp was revised to focus strictly on middle school students. Both of these camps were developed by faculty from the Computer and Information Technology (CIT) department of Purdue University at our Columbus site. Middle school children were able to create animated videos while attending a four-day computer animation camp, and the high school students were able to create computer games in a five-day game development camp. The goal of these camps and other activities is to raise awareness about our CIT program in Columbus and, in the long run, hopefully add new students to our CIT program. In this paper we are going to give you background on why we developed

the camps, on how the camps, especially the new game development camp, were developed, and, finally, about our future plans for the camps.

Background

First, a little background on Purdue's College of Technology and our program in Columbus. Purdue University College of Technology (COT) has a statewide system that has programs throughout the state of Indiana. One of the goals is to make technology programs available throughout the state of Indiana. In Columbus we have the Organizational Leadership and Supervision (OLS), Industrial Technology (IT), Mechanical Engineering and Technology (MET) and Computer and Information Technology (CIT). At each statewide site the College of Technology partners with a local college to provide non-major related classes such as Mathematics, Science, English, etc. In Columbus the partner is Indiana University Purdue University Columbus (IUPUC). The Purdue in the name is NOT the College of Technology but instead Science programs from IUPUC's main campus in Indianapolis. This causes great confusion in the community and even with students on campus. Purdue College of Technology has its' own admissions, programs and recruiting activities in the community. This constant "identity crisis" is problematic in recruiting new students. Besides the identity issue we have also seen increasing competition in recruiting students from other universities in southeast Indiana and online programs as well. Our program has seen decreasing number of students over the last twelve to fourteen years. For the early to mid-2000s our program was like many other computer science and computer technology programs that saw significant drops in enrollment with the bursting of the dot-com bubble and out-sourcing fears. The Columbus CIT enrollment seemed to stabilize but since 2010 the enrollment has dropped by approximately 65%. This is not just an issue for our site in fact our CIT site in Anderson, Indiana closed because of low enrollments. What is interesting over that same time period our CIT program at our main campus has seen total enrollment increase 50%.

CIT Recruitment Efforts

Summer Camps

Over the years we have tried recruiting as many universities do, with multiple approaches advertising in local and school newspapers, magazines, billboards and included many face to face activities for parents and students. Many of the activities focused on high school juniors and seniors. In 2010 while brainstorming ideas for CIT recruiting we came up with the idea of offering a computer camp based among other things a successful summer camp Mechanical Engineering Technology was doing with LEGOs. In 2011 we had a sold out Computer Animation Camp that had students from middle school to high school attending. In ensuing years the camp continued to be well attended and had a good percentage of girls attending. Generally 30-40% of the campers were female, which was much higher than the comparable LEGO camp. Recruiting women in our program like many other computer related programs is always a struggle so the camp definitely had promise.

Strategy

A problem we had with the Computer Animation camp was that the age range at times was wide. One year we had 4th to 10th graders participating, even though the age range was specifically stated on the registration site. As one might imagine, it was difficult to make the camp challenging, exciting and fun

for such a large age range. A second issue was actually based on the success of the camp. We had parents and campers asking for an advanced camp to follow up.

What we decided to do, instead of having a second computer animation camp, was to create a game development camp and have the animation camp focus on incoming 6th – 8th graders and have the game development camp focus on 9th grade on up. This would give our CIT program a chance to build a relationship with local students over several years and give students a chance to try out different activities. Another goal was to market this as a Purdue camp and differentiate ourselves from IUPUC. The camps would be developed and marketed by Purdue and registration would take place through the Purdue University website.

Computer Animation Camp

The Columbus Computer Animation camp started in 2011 and has been at or near capacity each year of its existence. The capacity is generally set at 24, which is the size of the computer lab utilized for the camp. The format of the camp was a 4-day camp that ran 3 hours a day. Over the four days students learned how to create animations using Alice, a piece of software developed at Carnegie Mellon. According to the Alice website (2015), "Alice is an innovative 3D programming environment that makes it easy to create an animation for telling a story, playing an interactive game, or a video to share on the web. Alice is a teaching tool for introductory computing." One of the great things about Alice is that it has several versions and has been used from elementary to college level students. Another advantage to using Alice is, the software is free, so campers could easily go home and download the software, which is what many of the campers did. Finally, the Alice website had an abundance of free teaching materials, demonstrations and sample programs. Besides t-shirts, snacks and prizes, the camp culminates with a contest attended by campers, parents and staff to create an animated commercial, fully designed and developed by the campers with prizes awarded to all participants.

With the addition of the game development camp, the target audience narrowed to incoming 6th9th graders. Not a lot of changes were required, and the big benefit was that the campers were much closer aligned in ages than in previous versions of the camp.

Game Development Camp

Introduction to Game Development Camp

The new Columbus Game Development Camp is for incoming 10th through 12th graders. Students of all skill levels are welcome. The campers use Unity and Autodesk Maya software to learn game development skills to create a 3D virtual world and implement movement and actions of a player character. Unity is a popular game engine developed by Unity Technologies, and Autodesk Maya is a tool for 3D modeling and animation providing a seamless workflow transition to Unity. (We will discuss the software tools aspect of the camp in more detail later in the paper.) Included in the registration cost are t-shirts, daily snacks, and prizes for all attendees. This is a 5-day camp that ran 4 hours a day. In the camp proposal, the following objectives were set forth.

Upon completion of the camp, the students should be able to:

1. Develop a game concept

2. Create simple 3D objects and animations using Autodesk Maya
3. Import a simple animated character into Unity
4. Create a simple game level with terrain and prefabricated objects using Unity
5. Implement basic movement and simple actions of a player character in the 3D virtual world

In order to help the students achieve those goals, the following topics were covered over the course of the first four days of the camp.

1. Basics of Game Design
2. Introduction to 3D Graphic Art and Animation in Autodesk Maya
3. Import of 3D Graphic Art and Animation into Unity
4. Introduction to Level Design: Terrain
5. Introduction to Game Programming

Development of Camp

The camp development began with putting together a Unity demo, in which a player character (PC) represented by a first-person character controller demonstrates ability to throw destructible fireballs in a simple level containing a terrain, an object, and a skybox. A screenshot of the fireball demo is shown in Figure 1.

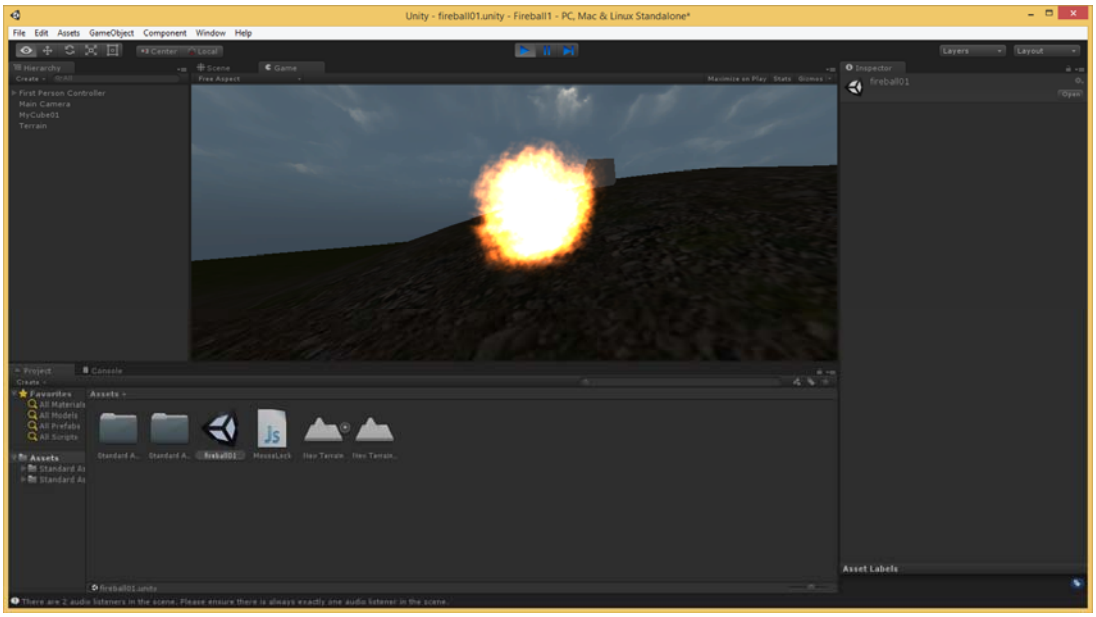

Figure 1. The fireball demo: A PC is about to throw a destructible fireball at an object

The subsequent development of the camp materials on Unity and Autodesk Maya was done primarily using the textbooks by Geig (2014) and Roy (2014), respectively. The part on the basics of game design was based mainly on the authoritative textbook by Adams (2014).

The following promotional statement was developed to advertise the new camp to the potential attendees and their parents.

Go past game playing to learn the fundamentals of how video games are made. Formulate a game concept, create 3D objects and animations using Autodesk Maya, and import them into Unity, a popular game engine. In Unity, develop a game level and import an animated character into it. Implement basic movement and simple actions of the player character. Let's throw some fireballs and ice bolts! (Warning: Don't try this at home.)

Camp Material

Each camper had access to a lab workstation running Windows 7 with Unity 4.5 and Autodesk Maya 2013 installed.

We issued each camper a 2GB flash drive temporarily, for storage of the work done in the camp. The flash drives were collected at the end of each day's session and, ultimately, at the end of the camp.
Each camper was provided with a collection of free Maya rigs, including

- Stewart and Squirrels by Animation Mentor (2015)
- Simple Bot by Drbal (2015)
- MooM v. 4.0.3 by Ramtin 4.0.0 (2015)
- FishBoy v. 1 by FishBoyProject (2014)
- Morpheus Rig Pack v. 1.0 by Burton (2010)

Finally, a 12-page hardcopy handout entitled "Game Development Camp" was distributed, complete with screenshots and step-by-step instructions, covering the following topics.

1. Tasks (a list)
2. Game (a definition)
3. Game Concept
4. Game Engine
5. Modeling and Animation Software
6. Game Genres, based on Sheldon (2014)
    a. Game genre classification
    b. Traditional genres most often made into games
7. 3D Coordinates
8. World Space and Local Space
9. Vectors
10. Cameras
11. Maya and Unity Resources
12. Maya: Creation and Import of 3D Models
13. Unity Topics
    a. Game Objects and Components
    b. The Project Dialog
    c. Layouts
    d. Assets
    e. Scenes
    f. Scene Navigation
    g. Transforms and Transform Tools
    h. Importing Models

i. Textures, Shaders, and Materials
j. Terrain
k. Placing Trees and Grass on a Terrain
l. Skyboxes

Software Needed

Purdue University owned an enterprise license of Autodesk Maya 2013. In addition to that, 25 Unity Pro 4.x licenses were acquired at the cost of $14,975 ($599 per license) in March of 2014, with the free upgrade to Unity 5. (Unity 5 was released on March 3, 2015.) These licenses are currently (Spring 2015) used to teach CNIT 399 Introduction to Game Development, a pilot undergraduate course.

Camp Implementation

The camp was held in a lab with 24 workstations and one teaching station connected to a projector. The students and the instructor met from 9 a.m. to 1 p.m., with a short snack break in the middle of each session. One middle school student was allowed to take part in the game development camp, based on her performance in the animation camp. The other campers were high school students, two of them seniors.

Day 1

On the first day of the camp, after the students and the instructor introduced themselves, the campers were told about the 8 tasks that they were about to complete in 5 days in order to make a playable game demo. These tasks corresponded to Topic 1 of the hardcopy handout. Topics 2-6 were then covered in a mixed lecture-discussion format. In particular, we learned about each student's favorite game genre(s). With this student input in mind, the 9 campers were divided into 4 teams, each of which was given the task to formulate a game concept in a Word document. The middle school student was placed on Team 4, the only team that had three members.

Later that day, the teams presented their respective game concepts entitled *Xanthion*, *Flesh and Bones*, *Nassau Island*, and *Leaf Ninjas*. They fielded questions from the fellow campers and the instructor. Some team members began to work on the graphic art for the games. A leaf ninja character design is shown in Figure 2.

Day 2

The second day of the camp saw Topics 7-12 covered and discussed. Students viewed Maya tutorial videos and played with free Maya rigs. The instructor demonstrated Maya ball animation to illustrate the important concepts of squash, stretch, and anticipation. Students began to work on 3D models for their game projects. Figure 3 shows the Morpheus rig transformed into a Leaf Ninja.

Day 3

The instructor began Day 3 by showing Angry Bots, a demo that came with Unity, and let the students play to get the taste of this mini-game and appreciate the game engine's capabilities. The Unity topics

were then covered, including import of models from Maya and the Unity asset store, so that the students could begin to work on level design for their games. So they did. The instructor fielded questions and demonstrated import of yesterday's ball animation into Unity.

Figure 2. Sample concept art: Leaf ninja character design by Masha Guseva (Team 4).

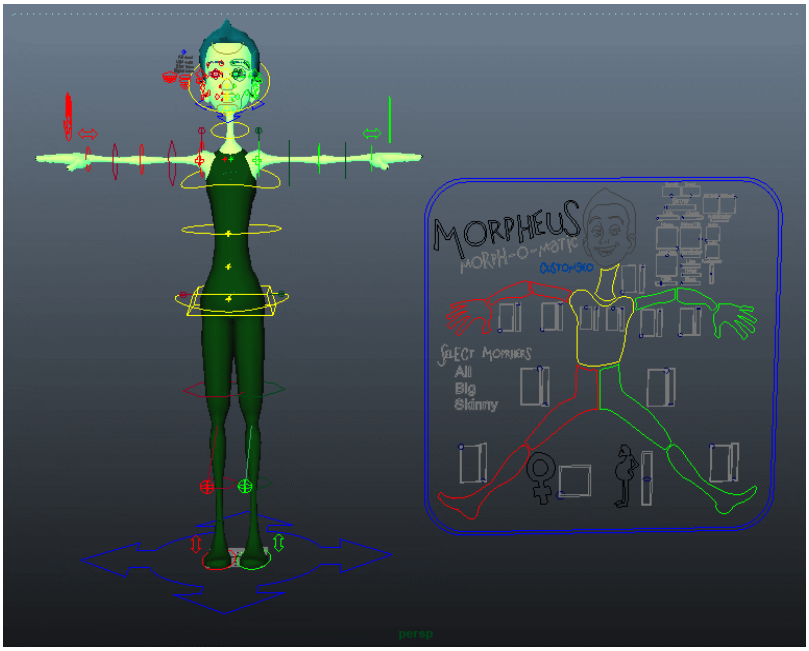

Figure 3. Morpheus rig for Maya transformed into the leaf ninja character by Masha Guseva.

Day 4

The campers learned basic Unity scripting from the fireball demo. Two of the teams also benefited from the gun shot tutorial by Ray (2010), due to the first-person shooter (FPS) nature of the games they had decided to make. Students worked actively on game scripting for their games. One of the teams experimented with the third-person character controller.

Day 5

The first half of the last day of the camp allowed all four teams to complete their playable game demos. Two campers out of 9 did not attend the camp on Day 5, due to an illness and a prior arrangement to go to another event. As a result, two campers finished their teams' projects alone. Team 4 changed the game concept and developed a demo for a 'nutty' game named *Squirrel*, instead of *Leaf Ninjas*. All four game demos used the first-person character controller.

After the snack break, the teams showed their playable game demos to the jdges of 7 faculty and staff members of Purdue University College of Technology Columbus. (The authors of the paper did not judge.) The judges were instructed to use the following game evaluation criteria:

1. Game concept
2. Level design
3. Character design and animation
4. Game programming/scripting
5. Presentation quality
6. Teamwork
7. Overall fun

The judges decided to adapt the multi-criterial scoring system used in the LEGO Robotics camp. Figures 4, 5, and 6 show screenshots from *Xanthion* (1st place), *Nassau Island* (3rd place), and *Flesh and Bones* (4th place). The winning team was formed by the two seniors.

Figure 4. Screenshot from *Xanthion* (Team 2): Will the troll spot me? (He will.)

Figure 5. Screenshot from *Nassau Island* (Team 1): Roaming the beach with a gun that shoots.

Figure 6. Screenshot from Flesh and Bones (Team 3): Zombies attack! The gun won't shoot.

Evaluation of Camps Success

Beginning with the first camp delivered in 2011 and detailed at the 2012 ASCUE conference we have three criteria that we would like to use to evaluate the camp's success. We still think the criteria is appropriate. First, did the campers have a good time and learn something in their time at Purdue? Second, are we able to get people to realize that Purdue is in their community? Third, will this camp help in recruiting students?

In terms of the first criteria, did the campers have a good time and learn something in their time at Purdue? The answer is yes. Evaluations of the Computer Animation Camp given to parents each year seem to bear this out. Parents and campers seem very pleased and the camp is at or near capacity each year it has been offered. The Game Development Camp for the first session drew nine campers. The overall reaction to the camp by parents and campers was favorable. The lower numbers could be attributed to the fact that this was the first year Purdue University handled advertising and registration (previously it was handled by the Columbus Center for Teaching and Learning (CTL)) and there were a few glitches in the new system. With this being the initial offering the Game Development Camp it did not have the word of mouth advertising that the Computer Animation Camp did.
In terms of the second criteria, making people in the Columbus area aware that Purdue University is there. This is hard to determine. Parents have heard of the animation camp and now hopefully with the game development camp but the question is do they realize that this is THE Purdue University and not IUPUC. Like recruiting, there is not just one thing that will get results, so we hope it will make a difference and keep trying. Last year was the first year the camps were run strictly by Purdue and through the Purdue website. If the bugs can get ironed out that can only help.

The third criteria, recruiting new students is probably still too early to tell. The oldest of the animation campers are in high school now. It will take a few years with the new strategy of animation and game development camps to see if we can make a difference.

Future Plans

We plan to do a second offering of both camps this summer. The main goals for this summer is to make sure that both camps are well publicized so we can reach full or near full capacity for both camps. We hope to have more advertising in the local paper. One of the original goals of the animation camp was to attract more females into our program and in the past we have had good female representation. For this year we plan to promote that even more. Each local middle school and high school will be given one free seat in the camp to be awarded to a female at that school.

Conclusions

We plan to have a second offering of both camps this summer. We hope the camps will continue to grow in students and publicity in the Columbus area. Based on the success of the Computer Animation Camp we feel like it offers an excellent recruiting tool for years to come.

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Net Neutrality: The Great Debate

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Abstract

FCC Chairman Tom Wheeler, speaking at the International Consumer Electronics Show in January, called for an open Internet which would make sure that ISPs had economic incentives to build better networks while still protecting consumers and innovators. His specific recommendations were shared with the other members of the FCC in February. One of the big issues is the appropriate role of the FCC based on Title II of the Telecommunications Act. Two important court cases (Comcast vrs. FCC, Verizon vrs. FCC) have limited the role of the FCC, leading it to develop a new policy after soliciting roughly 4 million comments last fall.

This paper will present a brief historic background, the issues involved in the court cases, the more general issues raised by the public, the current status of the FCC rules, and any new challenges by telecom companies.

Introduction

Should service providers be able to charge companies for better access to their networks when those companies use large amounts of available bandwidth? On the other hand, should such companies have to pay for the network if the network doesn't pay for the content? Should everyone have the same fast, free, and open experience using the Internet? Should there be incentives for broadband operators to invest in their networks? Should service providers be allowed to block or slow down some content? Is there a common understanding of what net neutrality means?

Not too long ago it would have been hard to imagine such questions. A brief look back might help focus the current debate. When we consider the early beginnings of the Internet (ARPAnet – 1968, CSNET – 1981, NSFNET – 1986) it is unlikely that those working on connecting supercomputer centers and research universities would imagine the questions being asked today. In 1985 there was no World Wide Web, no freely available web browser, and only about 2000 Internet connected computers. In 1989 Tim Burners-Lee created HTML, and the World Wide Web was launched in 1991 by Berners-Lee and colleagues at CERN. In 1991 the government lifted the restriction on the use of the Internet for commercial use. Perhaps then it was only a matter of time before the current controversy over net neutrality surfaced.

In some sense the Federal Communications Commission has had an almost impossible task – trying to determine appropriate rules consistent with its role while the technology changes rapidly and Congress

passes legislation which also becomes outdated. Going back to 2005, The FCC issued a rule entitled "Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities." [1]

The Communication Acts (1934 and 1996) did not directly address how broadband Internet access should be classified or regulated. Although some rules were in place at the time, in 2002 the FCC issued what is called a "Notice or Proposed Rulemaking" seeking comments on an appropriate regulatory framework. At this point the FCC was concerned with services that used existing or future wireline facilities of the telephone network to provide subscribers with Internet access. The important difference in thinking between the 2005 rule and previous rules was the recognition that Internet service now intertwines information processing capabilities with data transmission, i.e. the two should not be separated. The document often made comparisons with cable modem service (a sign of the times in 2005). The rule pointed out that what matters is the finished product made available through a service rather than the facilities used to produce it. The 1996 Communications Act introduced the terms "information service" and "telecommunications service." The 2005 document pointed out that the previous rules were developed before separate and different broadband technologies began to emerge and compete for the same customers. The technology used to build networks and the purposes for which they were built was fundamentally changing in 2005. It was not so easy to separate one network from another, and cable, mobile wireless providers, and satellite provides were entering the market. The FCC, mindful that its most critical function was to adapt regulation to changing technology, determined that it was time for a change. Those submitting comments had argued for a focus on the core nondiscriminatory access obligation. The 2005 rule essentially established that wireline broadband Internet access service was an information service and that the transmission component should not be separated out. After a transition period ISPs were permitted to offer Internet access series on a common carrier basis, and the broadband transmissions component was not to be considered a telecommunication service as defined by the Communications Act. The framework was designed to encourage ubiquitous availability of broadband to all Americans.

Both the ubiquitous use of the Internet and the technology involved continued to evolve after the 2005 framework. The FCC felt that the openness of the Internet faced real threats, and that some blocking or degrading content and applications without informing end users was taking place. Hence four years later the FCC launched a public process to determine whether (and what) actions might be needed both to preserve the characteristics of the Internet at that time and to foster continued investment in the necessary physical networks. Roughly 100,000 written comments were received. Those commenting disagreed about whether there was a need to take action, although all agreed that an open Internet was an important platform. Those who wanted no action were concerned about the costs that might occur if new rules were imposed.

The FCC issued its Open Internet Order in December, 2010.[2] Two of the five commissioners supported the document; a third approved in part. The other two commissioners dissented and issued separate statements. There were four basic rules in this order.

Transparency. Fixed and mobile broadband providers must disclose their network management practices and the terms and conditions of their broadband services. They are also required to disclose

their performance characteristics. End users should be able to make informed choices regarding broadband services.

No blocking. Fixed broadband providers may not block lawful content, applications, or services. This requirement is subject to reasonable network management. Mobile broadband providers also may not block lawful websites or applications which compete with their voice or video telephony services.

No unreasonable discrimination. Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic. Again, reasonable network management is allowed.

Reasonable network management. The network management is reasonable if it is appropriate and tailored to achieving a legitimate purpose. This takes into account the network architecture and the technology of the broadband Internet access service. In this area the FCC attempted to balance clarity with flexibility.

The stated goal of these new regulations was to empower and protect consumers and innovators while encouraging continued innovations and private investment in the network. The document suggested many possible dangers to Internet openness, and cited some cases, including a case involving Comcast (details to follow).

In 2008 the FCC imposed a sanction against Comcast for violating the agency's open Internet guidelines. The FCC found that Comcast had improperly slowed traffic to the BitTorrent file-sharing site, a popular file-sharing site. The FCC urged Comcast to halt the practice but imposed no fine. At the time Comcast was trying to get agency approval of its proposed $30 billion merger with NBC Universal. Comcast was anxious to clear its name and appealed the sanction. Comcast argued that it needed to be able to limit some activities, such as downloading massive movie files. In a unanimous decision in April, 2010, the U.S. Court of Appeals for the D.C. Circuit agreed with Comcast. The Court said that the FCC relied on laws that give it some jurisdiction over broadband services but not enough to make this action permissible. The Court felt that the FCC did not have the authority over Comcast's network management practices. The Court granted Comcast's petition for review and vacated the challenged order. The merger with NBC Universal went through. [3]

On September 30, 2011, Verizon filed a petition the the U.S.Court of Appeals for the D.C. Circuit challenging the transparency, no blocking and no unreasonable discrimination rules of the Open Internet Order. [4] Verizon cited five grounds for its petition:

1. FCC lacked the statutory authority to issue such rules.
2. The rules were unlawfully arbitrary and capricious.
3. The rules violated those sections of the Communications Act which prohibited the FCC from regulating broadband providers as "common carriers."
4. Verizon's First Amendment rights were being violated.
5. Verizon's Fifth Amendment rights were being violated since the rules constituted an uncompensated taking.

The Court's decision was handed down on January 14, 2014. The Court upheld the transparency rule but not the antiblocking and antidiscrimination rules. The Court agreed that the FCC has the statutory authority to enact rules but that it had regulated broadband providers as "common carriers" despite declining to classify them as such, in violation of the Communications Act. Note that the recognition that the FCC did have statutory authority left the FCC room to come back with new rules that might pass the judicial test. The Court rejected Verizon's claim that the rules were arbitrary and capricious. Verizon had not argued that the transparency rule violated the First or Fifth Amendments. Note that the Court was not assessing the wisdom of the Open Internet Order regulations, but simply determining if the regulations fell within the statutory grant of authority. This seemed to leave the FCC with room to adopt new Open Internet rules.

Not unlike the situation prior to the 2005 framework and the 2010 Open Internet Order, once again the FCC called for public comments on proposed net neutrality rules in 2015, with a September 15, 2014 deadline. Over 4 million comments were received. It should be noted that a number of the more recent comments used a form letter from a net neutrality group. On the other side, more than 800,000 signatures were on a petition calling on the FCC to not classify broadband as a public utility. [5] During the period from mid-September to February, 2015, when FCC Chairman Tom Wheeler would put forth a proposal to be voted on later in February, discussion on the Internet was filled with all kinds of speculation. Tom Wheeler gave some indication of his thinking when speaking in January, 2015 at International Consumer Electronics Association in Las Vegas. He called for an open Internet that protects both innovators and consumers. He also wanted to be sure that ISPs had economic incentives to continue building better networks. [6]

The big day came on February 26, 2015 when the FCC, in a vote of 3-2, classified broadband Internet service as a public utility. The Open Internet Order begins by citing the importance of the open Internet and its benefits. [7] The document claims that in the four years since the FCC adopted open Internet rules significant investment and innovation has taken place in the broadband marketplace. The rules adopted in this new order are carefully-tailored and grounded in both the Telecommunications Act and Title II of the Communications Act, according to the document. Three specific practices are banned, with the ban applying to both fixed and mobile broadband Internet access service.

1. No Blocking. Lawful content, applications, and services cannot be blocked, subject to reasonable network management.
2. No Throttling. A provider of broadband Internet access service cannot impair or degrade lawful Internet traffic on the basis of its content, application, or service.
3. No Paid Prioritization.

Other provisions include the rule that there is to be no unreasonable interference or disadvantage to consumers or edge providers, i.e. providers cannot act as gatekeepers who block access or target competitors. As in the 2010 document, reasonable network management is not a violation of these rules. The Court upheld the 2010 transparency rule, so that remains in effect. Note that the huge difference between these rules and the 2010 rules is the statutory basis.

The two FCC commissioners who voted against the Open Internet Order issued separate statements. It is no surprise that court challenges have already begun. On March 23, 2015 U.S.Telecom (a trade group including AT &T and Verizon) sued the FCC in the same U.S. Court of Appeals. The suit claims the rules are arbitrary and an abuse of FCC's discretion.[8] The focus of the appeal is on the

decision of the FCC to reclassify broadband Internet access service as a public utility. Alamo Broadband, a small provider in Texas, has also sued the FCC. This suit was filed in New Orleans federal court. Once again, it will surely take some time for these challenges to move through the courts. In the meantime, technology will continue to evolve making it hard to predict what the environment might look like in a few years.

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The Next Big Thing We Won't Be Able to Live Without? Fulbright's Half-Life Theory Gives Us Some Ideas

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Abstract

My great-grandparents lived one-half of their lives without electricity. My grandparents lived one-half of their lives without a telephone. My parents lived one-half of their lives without a television. My sister has lived one-half of her life without a computer and I have lived one-half of my life without Google. Today, we could not imagine life without these must-have technologies. With the current college student being about 20 years old, we ask ourselves what must-have technology will this generation live one-half of their lives without? Whatever it is currently is in research labs, will probably be an early product in the 2020-2025 time frame, and become a life-changing technology in 2030-2040. It will change the way we live, work, recreate, and will make billions of dollars. But, it won't be anything we know and love and use today. What are some of the possibilities? This subject yields wonderful in-class discussion in any college-level course and gives students a different way to perceive their place in history.

Introduction

Since the beginning of the industrial revolution, each generation has witnessed the advent and mass adoption of technologies we now view as indispensable to our daily lives. At some point in their lives the "must-have" technology was not available. The technology then became available as early, primitive, products and then some time later became adopted by most people with everyone using it since. For every must-have technology we use today we can identify a generation that lived roughly half of their lives without it. For this discussion, we assume a person lives 80 years making the midpoint of one's life around age 40. Current college students are about 20 years in age, so have about 20 years to go before reaching their "half-life" point. Can we imagine what technology is likely to be the hot, in-demand thing 20 years from now and make some predictions about what the next must-have thing is going to be?

This line of thinking evolved from an off-hand comment made during the teaching of a systematic innovation class when the author realized none of the students in the class had ever lived without a cell phone. After expanding on the idea, the topic has been a routine lecture topic in several different courses and the subject of more than one workshop-style discussions at conferences and other meetings. The subject has proven interesting to students and motivates in-class discussion and fits in any college-level class.

The Technological Lifecycle

All technologies go through a lifecycle. At some point they are just ideas or new scientific discoveries, then research projects, then new products, then mainstream products. The lifecycle of a technology is commonly represented by the classic S-curve. The consulting firm Gartner has produced a number of S-curve models for different domains called "Hype Cycles." [1]. The Gartner Technology Hype Cycle is shown in Figure 1. Note especially the "ramp up" period of time required to go from technology trigger to the peak.

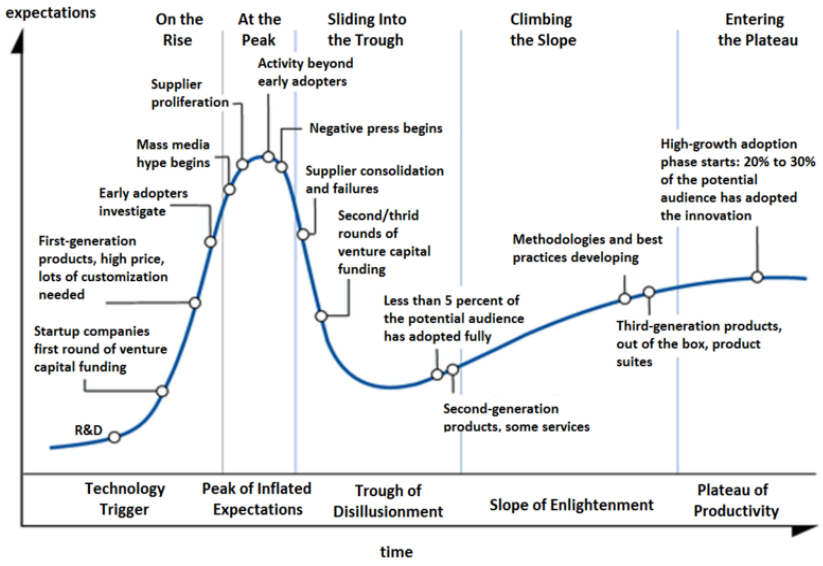

Figure 1 The Gartner Technology Hype Cycle

Rate of Technology Adoption

Technology is being adopted faster over the last 100 years as shown in Figure 2. Since the 1950s, 20-30 years are required from scientific discoveries to reach must-have technology status. There are two major reasons for the lag. First, new discoveries are made with, and in, lab-scale equipment and environments and time is required to mature the technology. Second, technological advances seldom thrive in isolation. Instead, an entire ecosystem of supporting and complementary technologies must emerge to make the "new" technology a game changer. For example, Facebook, originated in 2004, could not happen until Web technologies (Web pages) had been created over ten years earlier. Web technologies required the Internet, invented 25 years prior. None of the above would be as important as they are without personal computers arising 20-25 years before Facebook.

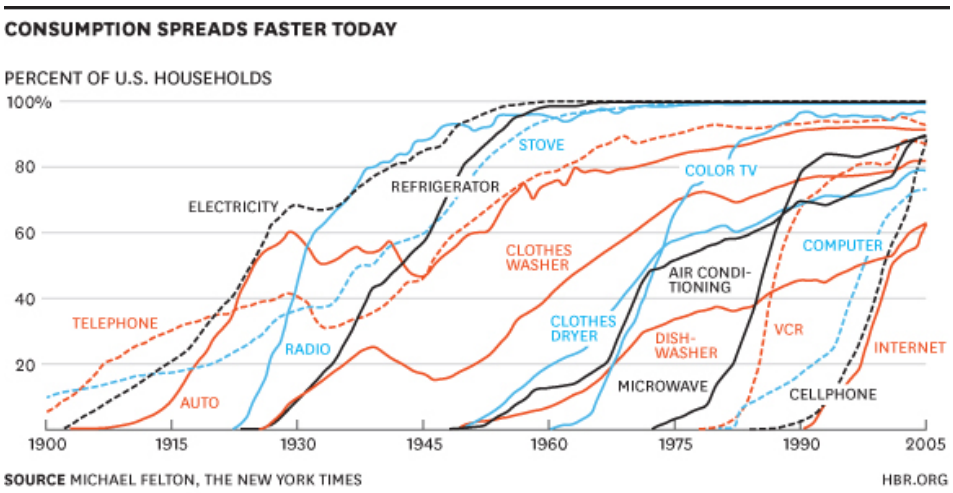

Figure 2 – Adoption Rates of Key Technologies of the 20th Century

Half-Life Theory

Typical college-age students have about 20 years to go to reach their half-life point and it takes at least 20 years for must-have technologies to reach mass-market status. So "the next big thing" is just a research topic currently. This means nothing we are currently familiar with, including Facebook, Google, YouTube, Wikipedia, smartphones, and the Internet will be "the next big thing" (though they will likely play a part). Listed are a few emerging technologies that might generate the must-have technology for the college-age generation.

Personalized medicine and healthcare
In 20 years, we may hardly ever physically go to a doctor's office and we will receive medication and treatments personally designed for us and our specific ailment. The bodies of subsequent generations will be continuously monitored and illness diagnosed and treated even before symptoms appear.

Cognitive augmentation/Big Data
IBM Watson won Jeopardy 4 years ago and is growing up. Future generations will never know a life without deep-reasoning knowledge-processing apps, systems, and appliances augmenting everyday life.

3D printing
3D printers exist now, but they are primitive compared to what they will be in the must-have stage. 3D printing will evolve to be more like the replicators in Star Trek.

Telepresence, holograms, VR glasses
Pictures are worth a thousand words and a video is worth a million pictures. Immersive 3D virtual and augmented reality is worth the future. Imagine a billion people "attending" the World Cup final by putting on a future version of Oculus Rift gear and feeling as though they are right there in the stadium.

Flexible electronics/plastic electronics
Carrying our electronics around in bulky, hard cases will one day look like the hook-and-cradle telephone of the

1920s. Think flexible, credit card sized phones and computers expandable to full-size by stretching and combining with other units while costing only pennies. Computing will become embedded into life.

Artificial body parts
Artificial feet, legs, arms, and hearts are progressing today and will continue to evolve but soon will be joined by artificial organs such as: pancreas, liver, lungs, kidneys, stomach, ears and eyes. Future generations will think of us as living in the Stone Age because we die of failed organs they just get replaced.

"Doclets"
Related to "plastic electronics" above, imagine paper-sheet-sized displays/tablets you can place across your desk to handle multiple documents by *actually physically handling the document.*

UAVs
The near future will see the pervasive use of unmanned aerial vehicles for monitoring, sensing, police work, delivery, etc. Today's drones are like horse drawn wagons in comparison.

Automated vehicles
Driverless vehicles for freight, public transportation and new age, intelligent, "cruise control" for personal vehicles. Future generations will wonder why we wanted to actually drive a vehicle ourselves.

Digital friends, assistants, counselors
People will develop relationships with artificial cognitive entities (call them "cogs") possessing rich and varied personalities and deep-reasoning skills.

Device-less communication
Just talk, ambient computing technology delivers the message –no devices needed.

Quantum computing
Computers solving currently intractable problems, millions of times faster will lead to new kinds of Big Data analysis and redefine what is computable.

Nanotechnology
Molecular-sized engineering will affect nearly every area of technology including several listed here.

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[1] "Research Methodologies: Gartner Hype Cycle," Gartner Internet Web site located at http://www.gartner.com/technology/research/methodologies/hype-cycle.jsp and last accessed February 2015.

Benefits of Synchronous Online Courses

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Abstract

Most online courses are offered as "asynchronous" courses and have no real-time contact with students. The Synchronous online alternative provides normal scheduled class time and allows students to login to a virtual online classroom with the instructor. We provide an overview of two different platforms for hosting synchronous classes online and look at the benefits of the synchronous option and some of our developed best practices. We also look at comparisons of synchronous online courses with courses in a physical classroom. The use of synchronous online courses for teaching programming classes will be a special emphasis.

Online Course Overview

The majority of courses being offered as “online” courses use the asynchronous format. The normal process is for the student to log into a course management system and follow a progression of assignments on their own. Typically there is no real time interaction with a professor. If they have questions they are usually handled using e-mail.

This, in essence, is the modern day equivalent of the old correspondence course. The primary difference being that instead of sending in assignments via the Post Office, they are submitted via e-mail or directly in the course management system. The old correspondence courses were given little academic credibility other than the knowledge gained and demonstrated on the job by the student after the fact. However, the modern day online course is given the full credibility of the institution issuing the degree, usually with no distinction as to whether the student was ever observed by the faculty.

The online alternative to asynchronous courses is the synchronous online course (SOL). In this format the student logs into a virtual classroom, at a regularly scheduled class time and interacts with the professor and other students. With the distinction that there is no physical presence, this format provides the same real time interaction as a physical classroom experience.

Synchronous Online Courses

The synchronous online course provides actual interaction between the faculty member and the students. This provides for a much better evaluation of performance. It also provides more input to the professor other than just the submission of assignments. There has been much discussion about the legitimacy of such assignments in an asynchronous format given that there is no way to determine who actually did the work that was submitted. This being the biggest reason that the old correspondence courses had little credibility.

While it is only marginally useful to compare SOL courses to asynchronous online courses, the more useful comparison is between SOL courses and physical classroom based courses. Other than the distance aspect the two formats a very much identical.

The SOL course allows attendance from any location where there is a connection to the Internet. There is still a classroom it is just a virtual, or non-physical classroom. As we will discuss, some students may be hundreds of miles away while others may be just down the hall. The class still meets at a specified time. There is still live interaction with the professor. Lecture can be done. Feedback can be received. The class continues as it normally does in a physical classroom.

Another benefit of the virtual classroom is that it frees up physical classroom space. Scheduling classes in a limited number of available classrooms has become a large issue at many institutions. Another space related issue for many is the use of remote campuses with courses being offered at multiple locations in order to more adequately serve a more distributed student population. The need to meet minimum enrollment numbers to allow a course to run has been a real issue in such situations. If the course is offered at three locations and none of them have enough enrollment individually, but grouped together there is adequate enrollment, then the virtual classroom allows the course to be offered.

Scott started teaching SOL courses at Capitol College three years ago as an adjunct using the Adobe Connect platform. Phil began teaching SOL courses during the summer semester in 2014 at Tri-County Technical College using the Zoom platform. The following sections discuss those efforts.

Connect at Capitol College (now Capitol Technology University)

Capitol has offered SOL courses for over ten years. All of their graduate courses are offered only in this format. Many undergraduate courses are offered in this format in addition to traditional physical classroom based courses. They currently use the Connect platform from Adobe.

Connect provides a permanent virtual classroom for every course. This classroom is always live and any student can enter the classroom at any time. The Connect classroom can be entered with a direct URL, but more commonly it is entered through the course management system using a link in the course page. Classroom sessions are all recorded (a Capitol requirement) and links to these recordings are provided on the same page with the classroom link in the course management system.

The primary Connect screen provides an attendance list showing all participants in the room. This can be used for attendance checking, if desired, rather than doing an actual roll call. The primary screen also provides a chat box area for discussion. This facilitates impromptu student interaction without the

delay of hand raising and acknowledgement, which is also available. Whenever someone begins typing in the chat area a message to that effect appears so that the professor can wait for the question before continuing. The student can have a private chat area with the professor or can select the "Everybody" tab so that all participants can see the discussion.

The central portion of the Connect screen provides the ability to load files for display, or use a white board for drawing diagrams. There is also the ability to share the entire desktop so that various application programs can be demonstrated. This capability is especially beneficial for programming courses.
Typical approach for a class session in a programming course is to open the class with a PowerPoint slide presentation of the material. After this, pulling up Visual Studio and writing code, real time. Code is not pre-prepared so that the students can watch the actual development process as it takes place. This is consistently one of the most positive areas of feedback received for these courses.

Zoom at Tri-County Technical College

Zoom is a virtual meeting platform created by former Cisco employees who worked on the telepresence platform at Cisco. The Zoom software system is available via both free and commercial accounts. The only difference between the two variants is that a commercial account can host meetings of indefinite length; free account meetings are limited in duration to 45 minutes.

The core of the Zoom system is the concept of a virtual room, which bears a unique room identification number (RID). Each Zoom account is granted one permanent RID as well as the ability to create any number of 'ad hoc' meeting/rooms, which are created with a randomly generated RID.
Once created, this meeting room can be entered by students and faculty at any time. Upon entry to a virtual space, participants have the option to share audio, video and desktop views with all other participants. The room owner/host has additional capabilities relating to participant management and meeting control.

A normal Zoom class begins much like any traditional class with the roll call. Roll call is done just as you would in a traditional class with a verbal calling of the roll and each student activating their audio feed and responding with an affirmative. At this time, the host may opt to share a video feed with participants as well. Upon completion of the roll call, the traditional delivery mechanisms for classroom instruction begin. Normally, this entails the instructor/room host sharing a computer window/screen with participants and beginning a lecture/discussion. During the presentation, students may interact with the instructor via a variety of methods as determined by the room host:

- activate their microphone and simply speak
- signal the instructor they wish to speak via a virtual raised hand
- using a room chat box to type questions and comments to the instructor
- highlighting/annotating any shared desktop

Audio feeds and shared screen annotations are seen by all room participants, raised hand signals and chat texts are only visible to the instructor. If activated, participant video feeds are also visible to all room participants at all times, allowing full 'face to face' communication at any time.

The room host may activate video recording at any time during the meeting. If active, all shared screens, video feeds, and participant interactions are recorded for later editing and/or distribution.

Best Practices for the conduct of Synchronous Online Courses

Provide a welcome message that is displayed approximately 15 minutes before class.

Since a virtual classroom exists at all times, it is conceivable that students may wander into the wrong virtual space just as they often enter the wrong classroom on campus. By providing a welcome screen, students may quickly determine the class that is about to begin and remove themselves if they are in the wrong area.

Notify Class of your presence and encourage equipment checks.

In order to smoothly facilitate meeting beginnings, notify the students when you are actively participating in the room, and encourage them to test their audio and/or video capabilities before the actual roll call. This will insure that all students are able to fully participate in the classroom experience when it begins.

Provide easily accessed methods to connect/enter the virtual classroom

Meeting participants must know the RID in order to join the meeting. This information can be disseminated via email, text message, URL, or a meeting invitation calendar event. Meetings based on a permanent RID will always use the same URL. Placing this link within an existing classroom management system (CMS) such as Blackboard or Moodle will provide a persistent, readily available means for students to easily enter the correct virtual space.

Record class meetings.

One of the major advantages to a virtual classroom is the ease with which all classroom activity can be recorded. Recorded sessions may be edited via third party software such as Camtasia to clean up any audio/video glitches, or to enable additional content insertion. Longer class sessions may also be edited/split into shorter, content specific segments to facilitate posting and viewing. Final classroom recordings may then be posted via a CMS, on an instructor's web page, or via YouTube. [Note that some care must be given to limiting access to recorded content to avoid any possible FERPA violations.]

Discourage unnecessary use of video sharing.

Since ALL video feeds become part of the course recording, it is recommended that students be instructed to disable their video feed unless instructed otherwise by the professor. This provides a safeguard against inadvertent video content being introduced into the classroom record which may lead to violation of FERPA guidelines when the recording is disseminated. Additionally, unnecessary video (and audio) feeds may become a distraction for other classroom participants. Last, video streaming consumes more bandwidth than any other shared content; students who are connecting to the classroom via a slow internet connection may suffer poor connectivity due to the intense load of numerous video streams.

Maintain virtual office hours.

Just as traditional students may wish to interact with an instructor outside of the classroom in a more personal way during office hours, students participating in virtual classrooms may also desire additional contact. Such contact should be available via the same means as the class itself or all accessibility benefits of this format may be diminished. Instructors should connect to the virtual space when holding office hours to enable a distance education student the same level of access as a traditional student. During this time, provide a welcome message indicating your availability just as you do when indicating what class session is beginning/in process. Virtual office hours do require a little additional room management when the instructor wishes to 'close the door' to meet with a specific student/group.

Pre-load software that will be used during class presentation.

Prior to the start of a virtual class session, instructors should load any application(s) that will be used during the upcoming session. Having these applications open facilitates the moving of an application window to/from student displays. Opening the application in advance will allow the instructor to deal with window sizing, application interaction, and audio/video impact.

If possible have more than one monitor/display

In a virtual classroom, desktop/application sharing replaces the normal whiteboard/projector interface. With proper planning and practice, application sharing can provide many advantages over the projector modality. One limitation of the classroom projector approach is the limitation on instructor staging since the entire instructor desktop is usually projected. In a virtual setting, only specific application windows may be shared, or if an instructor has multiple desktops, one can be shared, and other desktops may be used to prepare content or stage upcoming content. Using one entire monitor for staging content allows for smooth transition from application to application, instead of closing and opening applications as necessary on a single monitor. This becomes especially important when the session is being recorded as the activity on the staging monitor is not captured.

Equip your teaching/production facility with various video options.

Just as the virtual space benefits from an instructor having additional production facilities such as multiple monitors, having additional content input facilities can also be useful. Specifically, having two or more video options can be very useful. A simple webcam is all that is required to provide the 'talking head' of a typical classroom lecture. A second camera in the form of a document camera is often useful to present printed materials, maps, and views of physical objects pertinent to the class topic.

Use electronic Textbooks and other reference materials.

By definition, students participating in an SOL course are not in the same physical space. This can make the sharing of handouts, syllabi and other classroom documents difficult. When possible ALL classroom materials should be distributed via electronic form. Classroom management systems (CMS)

usually provide an effective means for providing course materials. Many publishers provide textbooks in electronic format as well. One such provider is Course Smart, which interacts with multiple textbook publishers to provide electronic content. Having an electronic textbook for the instructor provides an easy mechanism to share content from the text with students for annotation and highlight.

Encourage (require?) students to participate in virtual study sessions/group meetings.

One weakness of the online modality is that of student isolation. In a traditional classroom, students often meet new students and form ad hoc bonds of friendship. Numerous studies have identified student peer influence and interactivity as a significant contributor to student success. Although students MAY easily interact verbally (and even visually) during a virtual class session, when the session terminates, the student is often isolated from his or her peers until the next session.

Creating opportunities for student interaction via the meeting software is an excellent method to imitate the ad hoc bonding that occurs during face to face classroom meetings. Having the students meet one on one or in small groups encourages student to student learning and provides the student with a sense of 'belonging' to a readily identifiable group/cohort. Additionally, these external meetings can be recorded and submitted to the instructor for review and grading of a student's contribution, attitude and effort.

Integrate additional software systems to augment the virtual classroom experience.

Students who self-select a virtual classroom experience are very likely to already be familiar with a variety of social networking and online information sharing platforms. Where possible, use Facebook groups, twitter feeds, and cloud storage mechanisms to support classroom efforts. This allows students to participate in the class experience while using a comfortable, well known access technique. This will encourage student participation and feelings of satisfaction from the course.

Use of cloud storage/sharing techniques will promote student to student content sharing and creation. Twitter is an excellent tool for quick updates and comments. Remind.com allows an instructor to use student cell phone SMS capabilities to securely send updates, reminders, and commentary on class assignments and events.

Mitigating Higher Ed Cyber Attacks

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Abstract:

In this presentation we will discuss the many and varied cyber attacks that have recently occurred in the higher ed community. We will discuss the perpetrators, the victims, the impact and how these institutions have evolved to meet this threat.

Mitigation techniques and defense strategies will be covered as will a discussion of effective security policies.

"Most major U.S. companies have been under siege from hackers over the last 18 months".[1] **- Former Homeland Security Secretary Janet Napolitano**

Introduction

Cyberattacks are conducted across the globe on a daily basis. An article in The New York Times reported there has been a 17-fold increase in computer attacks on American infrastructure between 2009 and 2011. In fact, the newspaper indicates there are millions of hacking attempts weekly. "The attacks are increasing exponentially, and so is the sophistication, and I think it's outpaced our ability to re-

1 Retrieved January 22, 2015. http://www.usatoday.com/story/tech/columnist/komando/2013/09/06/cyberattack-hackers-syrian-electronic-army/2757833/

spond," Rodney J. Petersen, head of the cybersecurity program at Educause, told the *Times*. Educause is a nonprofit alliance of schools and technology companies. [2]

Many of these attacks are finding their way into the institutions of higher education. Universities often become high targets for these attacks because they are involved with the research or development of new drugs, computer innovations and technology equipment. Gaining access to these secrets would turn valuable profits for outsider markets. This type of hacking is considered industrial espionage or cyber theft of trade secrets. Most universities acknowledge there are numerous breaches of information and report even when they do find out about the breach of security, it is often much later than the initial attack. Once detected, they often cannot tell what, if any information was compromised.

The cause for concern relates to the high number of attacks that go unnoticed until the damage has occurred. Industrial, government and private sectors are targets for this type of attack; however, colleges and universities have seen a major rise from cyberattacks. According to the news website, *United Press International,* many United States research universities have a history of receiving cyber-attacks that increase daily. These attacks are thought to come from China and are possibly linked to their military, who is their most frequent hacker.

According to Bill Mellon of the University of Wisconsin, "We get 90,000 to 100,000 attempts per day, from China alone, to penetrate our system"[3]. Two recent events of cyber-attacks occurred at the University of Delaware, and Stanford University. The University of Delaware cyber-attack resulted in a data breach of approximately 72,000 current and past employees, including student employees. The Stanford University cyber-attack damages are undetermined, but are still under investigation. The cyber-attacks at both universities occurred in July, 2013. The University of Delaware has provided information on their website regarding their incident. It details what occurred, how it happened, and actions to take if you were a victim of the breach. In addition, the University of Delaware is offering free credit monitoring services. In the case of Stanford University's breach, it is yet undetermined whether personal information was exposed. In addition, it has not determined the extent of the damages. In both cases, the universities provided information as quickly as possible. The responsible party for the cyber-attack on the University of Delaware has not yet been determined. In the case of Stanford University, a hacker with the handle "Ag3nt47" is claiming responsibility for the attack in the form of a tweet. His justification for the attack was simply to show the university their information was not

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2 Retrieved January 21, 2015. http://www.allgov.com/usa/ca/news/unusual-news/stanford-hit-by-hacker-who-claims-to-have-grabbed-entire-it-database-130726?news=850671

3 Retrieved January 21, 2015 http://www.upi.com/Top_News/US/2013/07/17/US-research-universities-increasingly-targeted-by-cyberattacks/26641374065244/

properly protected. He further expressed that instead of gouging the students for more money, they should concentrate more on protecting their information. [4] Stanford University has yet to confirm the extent of the intrusion. It appears that an information technology worker doing routine checks discovered the possibility of a problem. Stanford security officials believe the records were actually stolen a few days earlier. Stanford promptly notified the FBI and secured assistance from outside security consultants to help assess and mitigate the damage.

After the investigation, it appears the cause of the attack was an exploited web-based security flaw. Web-based types of attack are very difficult to defend, however, Shape Security announced on January 21, 2014 a new way to defend against web-based cyberattacks. Their product, ShapeShifter (https://www.shapesecurity.com) is a network security appliance that disables malware, bots and other scripted attacks trying to interact with your web applications. The ShapeShifter uses a new polymorphic code technique to defend against attacks. Malware has used this type of polymorphism for years to invade machines. Derek Smith, CEO of Shape Security stated, "The ShapeShifter focuses on deflection, not detection. Rather than guessing about traffic and trying to intercept specific attacks based on signatures or heuristics, we allow websites to simply disable the automation that makes these attacks possible."

The NY Times article, 'Universities Face a Rising Barrage of Cyberattacks', emphasized,

> "Information officers say they have also learned the hard way that when a software publisher like Oracle or Microsoft announces that it has discovered a security vulnerability and has developed a "patch" to correct it, systems need to apply the patch right away. As soon as such a hole is disclosed, hacker groups begin designing programs to take advantage of it, hoping to release new attacks before people and organizations get around to installing the patch"[5].

Kaspersky Lab[6], one of the fastest growing IT security vendors in the world believes nearly half of the cyberattacks in 2013 originated from the US and Russia. They have many times noted that locating the

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4 Retrieved January 21, 2015. http://www.allgov.com/usa/ca/news/unusual-news/stanford-hit-by-hacker-who-claims-to-have-grabbed-entire-it-database-130726?news=850671

5 Retrieved January 22. 2015. http://www.nytimes.com/2013/07/17/education/barrage-of-cyberattacks-challenges-campus-culture.html?pagewanted=all&_r=0

6 Retrieved January 21, 2015.

country of origin where the attacks originate is difficult since the hackers are finding new and innovative ways to move their initial attack launches to new locations. Both Cornel University, and the University of Wisconsin claim these types of attacks appear to be synonymous with having personal data or intellectual property stolen.

The speed at which information travels today also makes it difficult for IT professionals to keep personal information secure. This personal information includes data as diverse as social security numbers to marriage status to medical data. The basic structure of the Internet confuses things as well. The anonymity of the Internet makes it extremely difficult to ascertain where the attacks originate. Middle points such as Internet Service Providers or even homeowners whose routers are unknowingly used make it nearly impossible to effectively track perpetrators. Tracy B. Mitrano reflects, "while the largest number of attacks appeared to have originated in China, hackers have become adept at bouncing their work around the world. Officials do not know whether the hackers are private or governmental."[7] Of course, the Chinese government vehemently disagrees that the attacks have a Chinese origin. Overall, the increase of cyber-attacks on universities, government entities, and in the private sector, will continue to challenge our institutions in keeping information secure.[8] Even the notorious Edward Snowden agrees that cyberattacks occur regularly. Of course, he indicates it is U.S. hackers that attack Chinese universities.[9]

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http://www.allgov.com/usa/ca/news/unusual-news/stanford-hit-by-hacker-who-claims-to-have-grabbed-entire-it-database-130726?news=850671

7 Retrieved January 22, 2015. http://www.nytimes.com/2013/07/17/education/barrage-of-cyberattacks-challenges-campus-culture.html?pagewanted=all&_r=0

8 Retrieved January 22, 2015. http://www.nytimes.com/2013/07/17/education/barrage-of-cyberattacks-challenges-campus-culture.html?pagewanted=all&_r=0

9 Retrieved January 21, 2015. http://www.forbes.com/sites/kenrapoza/2013/06/22/u-s-hacked-china-universities-mobile-phones-snowden-tells-china-press/

It is an unfortunate reality that higher education institutions will continue to question how secure their networks are to possible attacks. After all, it is easier to attempt to detect cyberattacks than to defend. Attackers design and focus their attack at an apparent weak point, whereas universities must defend against a wide array of *possible* attacks. Administrators at many universities recognize the challenges of trying to keep information safe and secure while still allowing the free flow and sharing of information that make universities great. While businesses can tighten and restrict their networks to a high level, university networks needs to have their systems more open and accessible to students, faculty and staff. The additional need for the free flow of ideas among professors is critical for the advancement of new ideas. For these reasons, and a myriad of others, university systems and networks are more problematic to properly secure. Cyberattacks will most likely continue to rise until this delicate balance can be addressed.

One cyberattack incident in particular occurred not long ago against John Hopkins University's Applied Physics Laboratory (APL). The physics lab was working on classified research for the Department of Defense and NASA when they were attacked. The incident resulted in a leak of information. The lab immediately took its networks offline until the issue could be contained. These types of attacks are designed to skillfully target and obtain innovative technologies in infancy stages that could be developed by other interested and capable parties. Unfortunately, the hackers in this incident were not caught due to the university's concerns of further information being stolen. They made a rash decision to simply pull their networks offline instead of trying to identify the source. Parting words by APL spokeswoman Mary Worth noted, "*…the Web site had been victimized in the past by smaller attacks, but this recent one was the most significant incident to date."*[10]

To see the extent of the different types of attacks possible, one has only to review Dartmouth College. Dartmouth College is a private institution that was founded in 1769. It has a total undergraduate enrollment of 4,193. It is located in Hanover, N.H.[11] A devastating cyberattack occurred in 2004 at Dartmouth College. According to the Dartmouth Undergraduate Journal of Science[12], "Late on

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10 Retrieved January 22, 2015. http://weblogs.baltimoresun.com/news/technology/2009/06/johns_hopkins_applied_physics.html

11 January 22, 2015. http://colleges.usnews.rankingsandreviews.com/best-colleges/dartmouth-college-2573

12 Retrieved January 22, 2015. Dartmouth Undergraduate Journal of Science. http://dujs.dartmouth.edu/fall-2009/cyber-attacks-on-the-dartmouth-college-network#.UuAaX7TTmUk

Wednesday, July 24th, 2004, an attacker gained access to eight servers at Dartmouth College including machines storing sensitive information. Dartmouth IT staff discovered and corrected the breach within 48-hours, but not before the attacker was able to deploy file sharing software on to the compromised machines and possibly access the sensitive data... Adam Goldstein, IT Security Engineer for Dartmouth's Computer Services lists five things attackers typically want to do on our network: 1) run websites to host spam links or malware 2) access sensitive data 3) run spam engines 4) use machines as proxies for other attacks 5) obtain full system access for other purposes. To achieve these nefarious ends, attackers typically target systems with out-of-date patches or incorrect configurations or they attempt to "trick" users into running malicious code or revealing sensitive information. I" The article mentioned China hackers as the individuals to blame.

Another cyber-attack at Dartmouth was an SQL Password Cracking Attack. It appears an attacker targeted several MySQL servers on a single network in an apparent brute force password cracking attempt. A question arose as to how they became aware of the network attack. It has yet to be determined since the attacker was never captured. Then again, a simple tool such as Nmap could find the network and its configuration for him/her. Nmap, short for "Network Mapper", is a free and open source utility for network discovery and security auditing. It is common for systems and network administrators to utilize it for network inventory, managing service upgrade schedules, and monitoring host or service uptime. Nmap uses raw IP packets to discover what computers are present on a network, what services (application name and version) those systems are offering, what operating systems (and OS versions) they are running, what type of packet filters/firewalls are in use, and dozens of other attributes. It was designed to rapidly scan large networks, but works fine against single computers, whether servers or workstations. Nmap runs on all major computer operating systems, and official binary packages are available for Linux, Windows, and Mac OS X.[13] On Dartmouth's network, as many others, several servers were running an outdated version of MySQL. Updates to close known vulnerabilities of this software were not applied. Once an attacker used nmap to ascertain the application name and version, it was simple to determine whether the latest updates had been applied. Since they were not, this left the system vulnerable to attack. This is not actually an indictment against Dartmouth since it is nearly impossible for many IT departments to get all their work done and so "mundane" tasks such as applying updates rarely get done "later" or not at all. "Fighting daily fires", meaning addressing users' immediate cries for assistance, must take priority.

Over the years, a number of phishing attacks targeted Dartmouth. According to DUJS, [14] "In February 2008, a spammer sent a forged, fraudulent message "from" info@dartmouth.edu to 1,000 Dartmouth addresses requesting their network passwords. Twenty people replied to the email, and only some of those actually released their passwords." DJUS (2013) says the people who released their passwords

13 http://nmap.org/

14 Retrieved January 22, 2015. Dartmouth Undergraduate Journal of Science. http://dujs.dartmouth.edu/fall-2009/cyber-attacks-on-the-dartmouth-college-network#.UuAaX7TTmUk

were all teachers and other staff members. A possible mitigation for this problem is to provide effective training in this arena to both new and current employees. Many universities such as Columbia University, for example, conduct at least yearly clinics on password protection.[15]

Another type of attack making its way to campuses are those that originate from the inside. They are usually not attempts to compromise the stability of the systems, but rather they are attempts at stealing information stored within the computers. The attacks are not from professional sources, so the art of espionage is not at issue. Attackers of this type take down the systems with denial of service attacks, then hack, change or steal information from the main areas. Often times they are not noticed or detected for some time. As Cisco stated in their February 2013 report, 85% of the malware attacks go unnoticed for two or more weeks.[16] At the university level, a student or resident is often the culprit for enacting threats of this type usually for personal gain or bragging rights.

Most attackers are never apprehended, let alone identified. It is difficult, and in some cases impossible, to accurately identify the source of the attack and link it to a personal system or address with full certainty. There is also a severe shortage of laws to convict parties guilty of cyberattacks. It is rare to find a lawyer and jury that even understands the logistics of networks infrastructure and then comprehends the cyber-attacks at a prosecutable level.
Attacks like those mentioned above cause major concern with our country's ability to defend its own vital information. The fact hackers are gaining access to universities working on confidential research projects for government departments tasked with keeping the information secure, is disturbing and begs attention. There are files stored on servers all over the United States that contain sensitive information or gathered intelligence that could compromise lives. The rise in hacking on companies and educational institutions requires government focus to recognize and develop secure methods for regulating traffic on the Internet. Network security teams are finding it increasingly difficult to keep up with the evolving tactics used by savvy hackers today.

Oklahoma University is becoming an example of developing procedures to guard and protect against cyberattacks[17]. They have taken a very proactive approach to cybersecurity. Members of the staff at OU recognize the fact that multiple attacks occur daily and inevitably the possibility exists that any decent to large sized organization will probably be attacked at one point or another. It is clear that the university realizes these challenges and actively works to defend its sensitive material while still allow-

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15 Retrieved January 30, 2015 http://cuit.columbia.edu/cuit/security-awareness-training

16 Retrieved February 4, 2015 http://www.cisco.com/web/AP/asiapac/academy/Archive/News_Feb.shtml

17 http://www.ou.edu

ing the students and faculty the ability for a free flow of ideas. The director of the IT Forensics department at OU is working to take measures to develop levels of security that need to be implemented and put in place. Some of the research conducted at OU is confidential and requires security. Multiple attacks in the past ranged from simple probes to direct target hacking. They too note, China has developed a reputation for attempting to steal military and business secrets from the United States. "Many of the attacks come from IP addresses in China…Although that doesn't necessarily mean the attacks themselves originate in China, the nation has developed a reputation for attempting to steal military and business secrets from the United States. "[18] Their primary focus is not in catching the perpetrator. It is, however, in learning to protect their research and sensitive information. In addition, any classified research is no longer housed on the university's network. These are just some steps taken toward a safe network.

Fortunately, there seems to be more awareness for the need of increased security for these network infrastructures if they are to continue to allow sharing of information. Recent funding for programs to fight cyber security is making its way to new programs, curriculums and degrees on college campuses. The Bureau of Labor statistics boasts a 22% increase in cyber security jobs by 2020. IBM recently developed cyber security curriculum and programs to share with several universities across the country.[19] Carnegie Mellon, George Washington University, Penn State and others have received federal funding for scholarships, books, curriculum and programs to support their Cybersecurity programs Apparently the rise in cyberattacks has not gone unnoticed by those tasked with ensuring overall safety.

The U.S. is slowly making some headway on these challenges. October 4, 2013, the U.S. brought criminal action against 13 individuals for DDoS (Distributed Denial of Service) attacks. The individuals caught were members of a group called 'Anonymous' who allegedly tried to launch cyber-attacks against government, law firms, individuals, financial institutions and others. Organizations targeted included MasterCard, Visa, the British Recorded Music Industry, the Ministry of Sound, and the International Federation of the Phonographic Industry. All thirteen individuals were caught and plead guilty to "conspiracy to intentionally cause damage to a protected computer" . [20]

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18 Retrieved February 4, 2015 http://newsok.com/as-cyberattacks-increase-universities-in-oklahoma-look-to-strike-a-balance-between-openness-and-security/article/3868617

19 Retrieved February 3, 2015 http://www-03.ibm.com/press/us/en/pressrelease/42479.wss

20 Retrieved January 22, 2015 http://www.pcworld.com/article/2052360/us-indicts-13-anonymous-members-for-ddos-attacks.html

Research into further development and implementation of defensive measures is necessary to combat and prosecute cybercrime. Attacking cybercrime is a moving target, and thus must be addressed in an ongoing fashion. As mentioned, it starts with a plan of action and awareness.
Here are a few universities that have taken a proactive stance against cyberattacks

1. **Utilize shared resources needed for cybersecurity to help reduce costs.**
   a. Bucknell University, Susquehanna University and Franklin & Marshall College brought their expertise together and then shared the resources needed to protect their information.
2. **Be innovative.**
   a. A team of researchers at North Carolina State University has written an algorithm that can detect cyberattacks on a network based on the program they wrote.
3. **Make a commitment**.
   a. Indiana University created a $2 million initiative to invite and encourage colleges and universities to band together in fighting the war on cyberattacks.
4. **Commit necessary funding.**
   a. Double your resources as did the University of California, Berkley. They recognized with the huge increase in cyberattacks, their need for additional resources would be critical. They doubled their cyber security budget from last year.

It seems universities and colleges recognize the need for more detection and protection measures if they are to protect information. They are starting to band together to explore new ideas and develop systems for protecting and ensuring our systems continue to hold information secure while allowing ease of access and sharing of ideas.

Login IDs and passwords

It is typical for users to enter their username and password in order to authorize a computer for one year. A problem is that an attacker could get around this quite easily. So, why do it? Well, it does provide a certain level of security, and in combination with other procedures/policies, true security could be found. A problem is that many users may think this is "enough security". Of course, it isn't.

Wireless Networks

Also, many universities use both encrypted and unencrypted wireless networks. Central Washington University, for example, has both an encrypted network (cwu-wpa) and an unencrypted one (cwu-guest), the latter typically used for guests. The first network uses WPA, a basically non-yet-broken encryption protocol. A problem is that many students do not bother to sign onto the encrypted network by going to the appropriate campus office. So, anyone within range of the wireless network can employ software such as Wireshark to gather any sensitive information such as logon ids/passwords, etc.

NFS

It is very common for organizations such as Dartmouth to utilize the Network File System (NFS) protocol throughout. Basically, this allows users to access their home directory from any computer.

Many organizations and colleges use IP rules to authenticate the clients. If someone can gain physical access to the network, an attacker can change certain settings to gain full access. Why? The server will assume that user so-and-so has been properly authenticated when it communicates with any machine with an IP it recognizes as "valid", possibly including the computer of an attacker as well. The catch is that once here, the attacker can view, modify, delete, and create files as if they were any user.

Do mitigations exist? Yes, modern, updated, versions of NFS use Kerberos technology. Microsoft offers a superb explanation of how Kerberos operates. "Kerberos Version 5 is standard on all versions of Windows 2000 and ensures the highest level of security to network resources. The Kerberos protocol name is based on the three- headed dog figure from Greek mythology known as Kerberos. The three heads of Kerberos comprise the Key Distribution Center (KDC), the client user and the server with the desired service to access. The KDC is installed as part of the domain controller and performs two service functions: the Authentication Service (AS) and the Ticket-Granting Service (TGS). Three exchanges are involved when the client initially accesses a server resource:

1. AS Exchange
2. TGS Exchange
3. Client/Server (CS) Exchange

Let's take a closer look at this exchange process and its component parts.

AS Exchange

When initially logging on to a network, users must negotiate access by providing a log-in name and password in order to be verified by the AS portion of a KDC within their domain. The KDC has access to Active Directory user account information. Once successfully authenticated, the user is granted a Ticket to Get Tickets (TGT) that is valid for the local domain. The TGT has a default lifetime of 10 hours and may be renewed throughout the user's log-on session without requiring the user to re-enter his password. The TGT is cached on the local machine in volatile memory space and used to request sessions with services throughout the network. The following is a discussion of the TGT retrieval process.

Example AS Administration

To begin the AS exchange process, the AS request identifies the client to the KDC in plain text. If pre-authentication is enabled, a time stamp will be encrypted using the user's password hash as an encryption key. If the KDC reads a valid time when using the user's password hash (stored in the Active Directory) to decrypt the time stamp, the KDC knows that request isn't a replay of a previous request. The pre-authentication feature may be disabled for specific users in order to support some applications that don't support the security feature. Access the user account from the Active Directory users and the computers will snap-in and select the account tab. From the account options: slide window, check mark the "Do not require Kerberos" pre-authentication option (Figure 1).

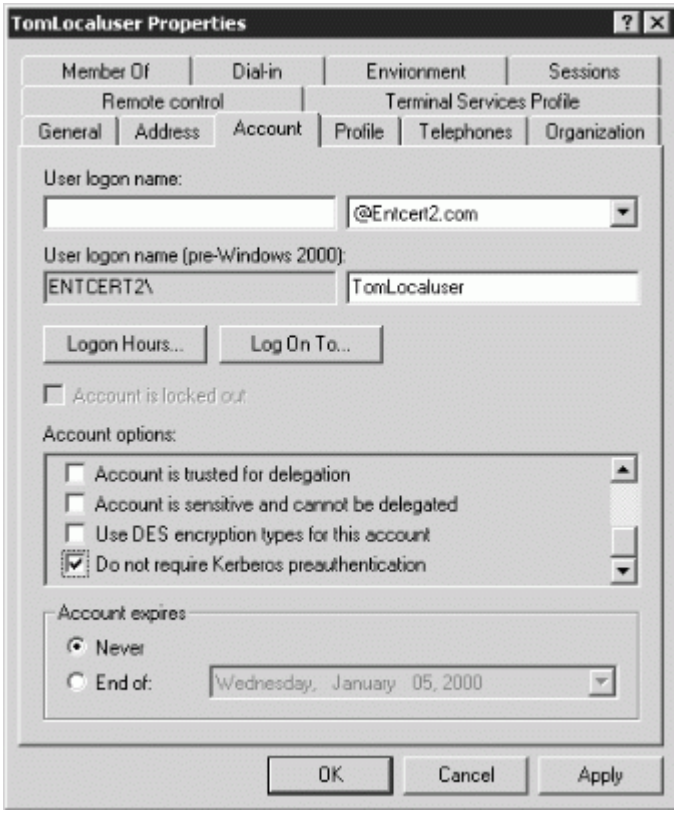

Figure 1: Disable Kerberos Pre-authentication

If the KDC approves the client's request for a TGT, the reply (referred to as the AS reply) will include two sections: a TGT encrypted with a key that only the KDC (TGS) can decrypt and a session key encrypted with the user's password hash to handle future communications with the KDC. Because the client system cannot read the TGT contents, it must blindly present the ticket to the TGS for service tickets. The TGT includes time to live parameters, authorization data, a session key to use when communicating with the client and the client's name.

TGS Exchange

The user presents the TGT to the TGS portion of the KDC when desiring access to a server service. The TGS on the KDC authenticates the user's TGT and creates a ticket and session key for both the cli-

ent and the remote server. This information, known as the service ticket, is then cached locally on the client machine.

The TGS receives the client's TGT and reads it using its own key. If the TGS approves of the client's request, a service ticket is generated for both the client and the target server. The client reads its portion using the TGS session key retrieved earlier from the AS reply. The client presents the server portion of the TGS reply to the target server in the client/server exchange coming next.

Client/Server Exchange

Once the client user has the client/server service ticket, he can establish the session with the server service. The server can decrypt the information coming indirectly from the TGS using its own long-term key with the KDC. The service ticket is then used to authenticate the client user and establish a service session between the server and client. After the ticket's lifetime is exceeded, the service ticket must be renewed to use the service.

Client/Server Exchange Detail

The client blindly passes the server portion of the service ticket to the server in the client/server request to establish a client/server session. If mutual authentication is enabled, the target server returns a time stamp encrypted using the service ticket session key. If the time stamp decrypts correctly, not only has the client authenticated himself to the server, but the server also has authenticated itself to the client. The target server never has to directly communicate with the KDC. This reduces downtime and pressure on the KDC.

Further Clarification of the Log-in Process

A TGT and a service ticket are needed to access services on remote computers, but they are also required to successfully log on to a local system. When the log-on window appears, password encryption using a one-way hash algorithm occurs immediately and negotiations commence with the KDC for a valid TGT and service ticket. The process is the same as accessing a remote service. An access token is created for the user containing all security groups to which they belong. This access token is attached to the user's log-on session and is subsequently inherited by any process or application the user starts.

Referral Tickets

The AS and TGS functions are separate within the KDC. This permits the user to use the TGT obtained from an AS in his domain to obtain service tickets from a TGS in other domains. This is accomplished through referral tickets.

Once a trust has been established between two domains, referral tickets can be granted to clients requesting authorization for services in other domains. When there is a trust established between the two domains, an inter-domain key based on the trust password becomes available for authenticating KDC functions. This can best be explained by example of a user/client seeking services in another domain. As illustrated in Figure 3, a user client in Entcert1.com requests authority for a server in Entcert2.com. He utilizes referral tickets. The process is as follows:

1. The client contacts its domain KDC TGS using a TGT. The KDC recognizes a request for a session with a foreign domain server and responds by returning a referral ticket for the KDC in the foreign domain.

2. The client contacts the KDC of the foreign domain with the referral ticket. This ticket is encrypted with the inter-domain key. Given that the decryption works, the TGS service for the foreign domain returns a service ticket for the server service in Entcert2.com.

3. The client performs the client/server exchange with the server and begins the user session with the service.

When more domains are involved, the referral process extends and involves the transitive properties between Windows 2000 domains. Maintaining individual two-way trusts between all domains creates a complex administrative nightmare. The use of Kerberos transitive domains cuts down on inter-domain administration. This can best be explained by example of a user/client seeking services in another domain. As illustrated in Figure 11-4, Entcert1.com has a trust relationship with Entcert2.com. Entcert2.com has a trust relationship with Entcert3.com. There is no trust between Entcert1.com and Entcert3.com. A client from Entcert1.com accessing a service on a server in Entcert3.com would obtain a service ticket through the following steps (the numbers appearing in Figure 4 correspond to the following numbered explanations):

1. Use the TGS service in Entcert1.com to obtain a referral ticket for a KDC in Entcert2.com.

2. Use the referral ticket with the TGS service on the KDC in Entcert2.com and obtain a referral for Entcert3.com.

3. Use the second referral ticket with the TGS service on the KDC for Entcert3.com and obtain a service ticket for the server in Entcert3.com.

4. Use the Client/Server Exchange to open a session with the service in Entcert3.com.

Delegation with Forwarding and Proxy

Some server services require access to a second server, such as a back-end database. In order to establish a session with the second server, the primary server must be authenticated on behalf of the client's user account and authority level. This is common in a three-tier client/server model. This activity is commonly accomplished with proxy or forwarding authentication."[21]

Student Enrollment Applications

21 Retrieved March 12, 2015 Kerberos Explained. http://technet.microsoft.com/en-us/library/bb742516.aspx

Many colleges use student information systems. Some names of these include Banner, Canvas, and so on. These are central cogs in the college process for students, administrators and even faculty. Students/administrators/faculty typically use these systems to pay for/enroll/change courses, enter/change/access grades, access housing assignments, change contact information and a myriad of other functions. This, of course, makes this an attractive target for attackers. These applications contain their own vulnerabilities as any application software does. Are they always kept updated? Are they fully secure? Have they been previously penetrated? And so on.

Mitigations

Universities should use, at a minimum, a signature based intrusion prevention system (IPS), and an anomaly based IPS system. Intrusion detection/prevention systems "are security tools that, like other measures such as antivirus software, firewalls and access control schemes, are intended to strengthen the security of information and communication systems".[22]

The third system, Snort, provides detection of possible attacks which have circumvented the prevention systems.

Palo Alto Systems, an important purveyor of network security hardware and software provides what an IPs is in a thorough and yet clear manner.[23] "An Intrusion Prevention System (IPS) is a network security/threat prevention technology that examines network traffic flows to detect and prevent vulnerability exploits. Vulnerability exploits usually come in the form of malicious inputs to a target application or service that attackers use to interrupt and gain control of an application or machine. Following a successful exploit, the attacker can disable the target application (resulting in a denial-of-service state), or can potentially access to all the rights and permissions available to the compromised application.

Prevention

The IPS often sits directly behind the firewall and it provides a complementary layer of analysis that negatively selects for dangerous content. Unlike its predecessor the Intrusion Detection System (IDS)—which is a passive system that scans traffic and reports back on threats—the IPS is placed inline (in the direct communication path between source and destination), actively analyzing and taking automated actions on all traffic flows that enter the network. Specifically, these actions include:

- Sending an alarm to the administrator (as would be seen in an IDS)
- Dropping the malicious packets

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22 "Anomaly-based network intrusion detection: Techniques, systems and challenges", P. Garcıa-Teodoro, J.Dıaz-Verdejo, G. Macia Fernandez, E.Vazquez. Computers & Security 28 (2009) 18–2.

23 Retrieved March 12, 2015 https://www.paloaltonetworks.com/resources/learning-center/what-is-an-intrusion-prevention-system-ips.html

- Blocking traffic from the source address
- Resetting the connection

As an inline security component, the IPS must work efficiently to avoid degrading network performance. It must also work fast because exploits can happen in near real-time. The IPS must also detect and respond accurately, so as to eliminate threats and false positives (legitimate packets misread as threats).

Detection

The IPS has a number of detection methods for finding exploits, but signature-based detection and statistical anomaly-based detection are the two dominant mechanisms.

Signature-based detection is based on a dictionary of uniquely identifiable patterns (or signatures) in the code of each exploit. As an exploit is discovered, its signature is recorded and stored in a continuously growing dictionary of signatures. Signature detection for IPS breaks down into two types:

- **Exploit-facing** signatures identify individual exploits by triggering on the unique patterns of a particular exploit attempt. The IPS can identify specific exploits by finding a match with an exploit-facing signature in the traffic stream
- **Vulnerability-facing** signatures are broader signatures that target the underlying vulnerability in the system that is being targeted. These signatures allow networks to be protected from variants of an exploit that may not have been directly observed in the wild, but also raise the risk of false-positives.

Statistical anomaly detection takes samples of network traffic at random and compares them to a pre-calculated baseline performance level. When the sample of network traffic activity is outside the parameters of baseline performance, the IPS takes action to handle the situation."

It is crucial this software, much like virus software, gets routinely updated against attack definitions. In addition, campus administrators need to configure this software to properly block the network traffic, or, depending upon need, simply get the software to generate an alert according to these attack definitions. These attacks are typically numerous. Andreas Bohman, the Chief Security Officer for Central Washington University, indicates that the university gets "attacks" many thousands of times a month.

The noted anti-virus vendor, McAfee describes this issue in this manner.[24] "Simply put, anomaly-based intrusion detection triggers an alarm on the IDS when some type of unusual behavior occurs on your network. This would include any event, state, content, or behavior that is considered to be abnormal by a pre-defined standard. Anything that deviates from this baseline of "normal" behavior will be flagged and logged as anomalous.

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24 Deciphering Detection Techniques: Part II Anomaly-Based Intrusion Detection, Fengmin Gong, McAfee Systems, https://secure.mcafee.com/japan/products/pdf/Deciphering_Detection_Techniques-Anomaly-Based_Detection_WP_en.pdf

"Normal" behavior can be programmed into the system based on offline learning and research or the system can learn the "normal" behavior online while processing the network traffic.
Some examples of anomalous behavior include:
• HTTP traffic on a non-standard port, say port 53 (protocol anomaly)
• Backdoor service on well-known standard port, e.g., peer-to-peer file sharing using Gnutella on port 80 (protocol anomaly and statistical anomaly)
• A segment of binary code in a user password (application anomaly)
• Too much UDP compared to TCP traffic (statistical anomaly)
• A greater number of bytes coming from an HTTP browser than are going to it (application and statistical anomaly)

Anomaly-Based vs. Signature-Based

What ís the Difference?

When a network is being monitored for potential security incidents, an IDS can implement anomaly and/or signature-based intrusion detection. There are advantages and disadvantages to each method. The best-fortified network uses the two methods together to provide the maximum defense for the network infrastructure.

A signature generally refers to a set of conditions that characterizes the direct manifestation of intrusion activities in terms of packet headers and payload content. Historically, the signature-based method has been the more common of the two methods when looking for suspicious or malicious activity on the network. This method relies on its database of attack signatures and when one or more of these signatures match what ís observed in the live traffic, in the case of a NIDS, an alarm is triggered and the event is logged for further investigation. Signature-based intrusion detection is only as good as its database.

If a signature is not in the database, the IDS will not catch the attack. This is obviously a drawback when you consider that hackers spend a great deal of their time crafting attacks designed to fool signature-based systems.

Anomaly-based intrusion detection, on the other hand, takes a more generalized approach when looking for and detecting threats to your network. When an event falls outside baseline parameters, it is flagged and logged. The behavior is a characterization of the state of the protected system, which is both reflective of the system health and sensitive to attacks. In this context, an anomaly-based method of intrusion detection has the potential to detect new or unknown attacks. Like the signature-based method, however, anomaly-based intrusion detection also relies on information that tells it what is normal and what is not. This is called a profile, and it is key to an effective anomaly-based intrusion detection system.

The Profile

For anomaly-based intrusion detection to be effective, it must have a robust profile that characterizes normal behavior. The target could be a host/IP address, VLAN or physical LAN segment. A profile consists of a comprehensive list of parameters and values that are specifically geared to the target being

monitored. A robust profile must be stable and consistent in tracking the normal behavior of the target environment. An effective anomaly profile must also be sensitive to occurrences of any events that are deemed to be security concerns. Constructing an effective profile involves gathering information on behavior and activity currently considered acceptable on your network. Profiles can vary in complexity from a couple of simple thresholds to comprehensive content characterizations to multi-variable distributions." These systems can be effective. Over the past decade many anomaly-detection techniques have been proposed and/or deployed to provide early warnings of cyber-attacks due to this success.[25] Dartmouth's anomaly IPS system blocked almost 20,000 attacks in 2009 alone.[26]

Spam filtering technology

Many universities utilize several layers of spam filters in order to identify and drop suspicious email. One such software product is Precise Mail. This tool is used by universities as diverse as Rutgers on the East Coast to Central Washington University on the West Coast. This tool allows end-users to:

1. Have control over how they want their external, non-CWU, mail processed, with more or less being sent to GroupWise, the email platform.

2. Add entries on their Allow list so expected mail goes straight to GroupWise, without getting hung up in Precise Mail.[27]

Precise Mail Anti-Spam Gateway can do any of the following things with a message it determines to be spam:
• The message can be discarded
• The message can be quarantined
• The message can have X-PMAS headers added to it
• The message can have its subject line modified and be delivered.[28]

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25 Undermining an Anomaly-Based Intrusion Detection System Using Common Exploits, Kymie M.C. Tan, Kevin S. Killourhy, and Roy A. Maxion. http://www.cs.cmu.edu/afs/cs.cmu.edu/user/maxion/www/pubs/TanKillourhyMaxion02.pdf

26 Retrieved January 22, 2015 http://dujs.dartmouth.edu/fall-2009/cyber-attacks-on-the-dartmouth-college-network#.UuAWSbTTmUk

27 Retrieved January 22, 2015 https://www.cwu.edu/campus-notices/spam-filtering-here-cwu

28 "PreciseMail Anti-Spam Gateway User's Guide http://sebsits.rutgers.edu/pmas_users_guide.pdf

Server and Workstation Systems

This category fits into the standard anti-virus software environment familiar to most of us. Each institution uses its own preferred software suites. Arguably, any of the more effective products will serve well. For example, servers should execute local firewalls and anti-virus software from vendors such as McAfee or Symantec, or a myriad of others. And then there are products such as LanDesk. LanDesk keeps Windows computers up-to-date with patches. LANDesk is an asset management software system used to remotely inventory and manage desktop computers. It has the ability to report on installed software and hardware, allow remote assistance, and install operating system security patches.[29] Also, it is necessary to provide an early-warning of data compromises on Unix servers. Open Source Tripwire software is such an example. Tripwire is a security and data integrity tool useful for monitoring and alerting on specific file change(s) on a range of systems.[30] Finally, some servers also use log monitoring tools like Logwatch, LogLogic, Snort or Splunk to detect suspicious anomalies in server logs. There is also a wealth of antispyware and anti-malware products that should be installed and executed and kept up to date such as MalawareBytes.[31]

Workstation Systems

Universities, of course, are able to maintain control over university-owned systems such as administrative servers, desktops, laptops, tablets, etc. However, control over non-university owned systems is less sure. LanDesk can be tasked to update workstations under college control. Recent malware such as the Conficker worm have left Dartmouth systems relatively untouched (see "Malware" for details) suggesting that the College's compulsory update practices work well. It is also wise to have a current acceptable use policy. An example can be found at http://www.cwu.edu/its/acceptable-and-ethical-use-policy by Central Washington University in Ellensburg, Washington. Copyright infringement rules should also be posted and students/staff/faculty sign an acknowledgement of abeyance. An example of one such policy can be found at http://www.cwu.edu/its/intellectual-property-copyright-infringement

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29 Retrieved March 12, 2015 http://www.american.edu/oit/software/LANDesk-FAQ.cfm#whatis

30 Retrieved March 12, 2015 http://sourceforge.net/projects/tripwire/

31 Retrieved March 12, 2015 https://www.malwarebytes.org/enterprise/

Conclusion

It is clear that cyberattackers will continue to be active. A problem exists In that they are both prolific and increasing in the complexity of their attacks. This, of course, means that academic institutions must correspondingly be both proactive and effective in dealing with this threat. There is a definite need to continually employ the latest mitigation strategies and products and continue to be vigilant. Open source products can be used whenever possible to control costs but more effective products such as Splunk may need to be purchased and effectively deployed and upgraded as time progresses. Above all, institutions of higher education must continue user training so that these users can be yet another defense to cyberattacks.

Cyber Security Applications: Freeware & Shareware

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Abstract:

This paper will discuss some assignments using freeware/shareware instructors can find on the Web to use to provide students with hands-on experience in this arena. Also, the college, Palm Beach State College, via a grant with the U.S. Department of Labor, has recently purchased a unique cyber security device that simulates cyber security attacks upon servers/hosts/devices. Information on this is also discussed and included herein.

Cyber Security Topic Area: Firewalls

ASSIGNMENT: Run Shields UP! save this analysis (you can print screen it or save it; your call). see https://www.grc.com/shieldsup. Also, run the LeakTest test as well at https://www.grc.com/lt/howtouse.htm.

ZoneAlarm is one of the most secure and proven personal firewall products you can purchase. ZoneAlarm protects over 80 million PCs from viruses, spyware, hackers and identity theft. The award-winning Internet security product line is installed in consumer PCs and small businesses, protecting them from Internet threats. I use it at home myself for additional protection.
Download the free version at their website at
http://www.zonealarm.com/security/en-us/trial-download-zap.htm.

Go to CNET.com and download one of their free Internet speed testers. Examples are Broadband Speed Test or Internet Speed Test or CNET Bandwidth Meter or any one of a hundred others. Install it. Turn it on so it will be testing your Internet connection and measure how fast it is. Record/remember this as you surf a bit on the Net.

Next, let's test your new ZoneAlarm. Begin by surfing a location on the Net. Then send an email to anyone. Proceed with this process for several minutes. Pay close attention to your Internet speed and any messages which may appear.
Then produce a one-page analysis of this product. Evaluate it in these categories:

- Ease of installation
- Price
- Platforms supported
- Execution (how well did it execute? did it continually interrupt your life with annoying messages? did you notice any degrading of your Internet speed after it was installed and executed? and so on...)

Run Shields Up! and LeakTest again. Compare the results of this Shields UP! / LeakTest run and the earlier one you performed before you installed ZoneAlarm. Report on any differences. Also, submit a print screen of each of these tasks.

Cyber Security Topic Area: Authentication

Go here: http://www.majorgeeks.com/mg/sortname/password_recovery.html. These are FREE apps that perform various password recovery/discovery functions. There are many other password apps on the web at www.download.com or other locales...Simply locate some password cracker/recovery apps and try them out in order to get a good idea what they are like, what capability is out there in this domain, etc. You can fine them all over the Web. It is your choice where you get them.

Download, install and execute three of these apps. Produce a brief report where you report as follows:

Include a screen shot of each running on your computer.

- Price
- Platforms supported

For each: A one-paragraph report analyzing how it works, whether it is effective, when it was/was not effective, etc.

Include a screenshot of each app running on your system.

Compare/contrast them. Which would you use and why?

Dashlane

Go to www.dashlane.com.

Install and execute this app. Dashlane saves your passwords when your visit websites and stores them in an encrypted folder. Only by entering ONE master password, can this folder be accessed so it provides enhanced security. Also, and perhaps as importantly, you no longer have ot memorize a log id and password for all your websites from Amazon to eBay and so on since Dashlane memorizes them for you. Very handy tool.

Execute Dashlane and produce a report on how well it executes. Is it effective? What are its strengths/weaknesses?

Include a screenshot of its execution and upload all this.

Cyber Security Topic Area: Network Monitoring

In order to be an effective network administrator, you MUST know how to capture/look at and analyze the data on your network. Wireshark is the acknowledge tool of choice to do this. Therefore, you MUST know it!

For this assignment, analyze the attached Wireshark sample and provide ten insights into it. You must produce ten facts about the captured data.

Upload a file where you document your findings AND a screenshot of its execution on your system. Wireshark can be found in various locations on the web including https://www.wireshark.org.
<< you can also include another network monitoring tool such as *tcpdump* if you desire >>

Cyber Security Topic Area: Wireless Security

 Did you forget your wireless password again? At a friends house and they have no idea what their login information is? Well, there are several tools out there to help you. Unfortunately, hackers sometimes use them as well for nefarious purposes (but YOU won't!)

Download WiFi Password Hacker for Android at
http://www.apk4fun.com/apps/com.brnk.apps.wifihacker/
---- or ---
Download WiFi password revealer at http://wifi-password-revealer.soft112.com/.

WiFi password revealer is a small program which will show you all stored passwords to your wireless (WiFi) network(s). Each time you connect to a wireless network using a password - Windows OS encrypts and stores it in the system. This program (WiFi password revealer) will find, decrypt and show you all your WiFi passwords, whenever it is your home wireless network with WPA / WPA2 encryption or WEP network in a coffee-shop.

WiFi password revealer can recover WiFi passwords from on Windows XP, Windows Vista, 7 and 8.
--- or ---
Download WIfi Password Finder. This tool can locate passwords on WEP, WPA, or WPA2 WLANs. It's very simple -- you can use it by clicking one button. http://wifi-password-finder.com/

Submit a one-page analysis of your efforts and screen shots of them running on your system. Select any two of these (or a similar tool from somewhere else).

Advanced IP scanner

Download this app (Advanced IP Scanner OR another app called Angry IP Scanner.. Install and execute one of these. Or, select a similar app to this one. You can find them from various places on the web. Here is one: www.***angryip***.*org or* www.advanced-ip-scanner.com.

Produce a one-paragraph report where you describe the operational characteristics. Include a screen shot of its operation. What benefits can be derived from this? What did you learn?

WiFi encryption methods

There are three primary encryption methods used in wireless LANs: WEP, WPA and WPA2.

STEP 1 -- Produce a one-page paper where you discuss the evolution of these methods from the oldest, WEP, to the latest WPA2. Address the primary characteristics of each as well as how difficult is to "break" each and their strengths/weaknesses.

STEP 2 -- Also, download an app for either your Android or iPhone and attempt to hack a local Wi-Fi (whom have given you prior approval first). Develop a one-paragraph analysis of what the tool is, and each step of the process you employed, followed by your results, if any. There are many FREE apps you can download from iTunes or the Android Store for this purpose. They can easily "break" WEP Wi-Fi in a few seconds, for example. Here are several examples:
http://www.wikihow.com/Hack-Wi-Fi-Using-Android and
http://www.hackersthirst.com/2012/01/four-best-wifi-cracking-applications.html.

Cyber Security Topic Area: Web Security

Zone-H

Go to www.zone-h.org. This site contains security news and a “cybercrime archive” which quickly became a success story. The goals of Zone-H were to follow security trends and analyze the growing importance of hacktivism. Recent website defacements are shown in detail as well. Pretty fascinating.

Read this website and carefully analyze the service this organization provides. Produce a one-paragraph analysis of this site's capabilities, its value, who it benefits the most/least, etc.

Web passwords

Sterlo Wirelesss Passwords discovers web passwords you may have forgotten, etc. Pretty handy tool.
see http://www.sterjosoft.com/wireless-passwords.html

Download this app, install it and execute it. Produce a screenshot of it running on your PC along with a one-paragraph analysis of its performance.

Detecting open ports

SterJo NetStalker is an interesting network tool. This is a tool that will detect all the connections to your computer. It analyzes all your ports as well. Download it at
http://www.sterjosoft.com/netstalker.html.

Install and execute it and produce a one-paragraph analysis of its performance. Did it run? What did you discover and so on.

Cyber Security Topic Area: Network Vulnerabilities

Vulnerability scanners are an extension to a sniffer. They provide a more well-rounded picture of the "holes" in your network. Select one of these found at the below location or any other vulnerability tool you can find.

See
http://www.networkworld.com/article/2176429/security/6-free-network-vulnerability-scanners.html

Install the tool and execute it. Then upload a screenshot of the tool executing on your system and a one-paragraph analysis where you discuss the tool's effectiveness. Address how you came to this conclusion. Also address the price, platforms supported, etc.

Sam Spade

Sam Spade is an excellent general purpose vulnerability tester. Many network admins use it to see how vulnerable their own networks are. It can be found at many locations on the Net. Others say "Hey, its just a cool bunch of network tools". Which do YOU think it is?

Also, see this useful document on how to use Sam Spade:
http://www.sans.org/reading-room/whitepapers/tools/sam-spade-934

Download this tool install it and execute it on your system. Use several of its functions and report on your experience!

Upload a screenshot of its execution along with a one-paragraph analysis of its effectiveness.

The Cyber Security Range/Lab
Product Overview:
http://www.ixiacom.com/products/ixia-breakingpoint

FireStorm
Product Menu

- Overview(active tab)
- Features
- Specifications
- Resources
- Test Suites

Overview:

Whether validating a single device, an application or service, or an entire network, you need real-world traffic scenarios to test against. Ixia's FireStorm™ load module blade simulates massive-scale application and security traffic to power BreakingPoint® test solutions for your students.

Providing twenty universal 1/10GE SFP+ ports, and 60 ports per 4U chassis, the FireStorm 20 combines the high performance, realism, and large port densities needed by the large-scale development and testing labs of equipment manufacturers and carriers. Alternatively, the FireStorm ONE offers a 4-port appliance that meets the portability and performance needs of enterprises, equipment vendors, and government and military organizations.

These links will provide more information as well as the demo we will show at the conference.

Tutorial 1: Starting BreakingPoint
Tutorial 2: Reserving Ports on Ixia BreakingPoint
Tutorial 3: Configuring a Network Neighborhood
Tutorial 4: Building and Running and Appsim Test
Tutorial 5: Adding Security to a Test
Tutorial 6: Reviewing the Test Reports

For more information on how to get onboard with a cyber range such as Palm Beach State College now has, feel free to contact our grant director, Jose Ortiz:

Jose Ortiz
Director XCEL-IT
Palm Beach State College
Office: 561.868.3822 | Email: ortizj@palmbeachstate.edu
www.PalmBeachState.edu/Cybersecurity

Ideas on Learning a New Language Intertwined With the Current State of Natural Language Processing and Computational Linguistics

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Abstract

In 2014, in conjunction with doing research in natural language processing and attending a global conference on computational linguistics, the author decided to learn a new foreign language, Greek, that uses a non-English character set. This paper/session will present/discuss an overview of the current state of natural language processing and computational linguistics intertwined with ideas for using traditional and technology-assisted ways of learning a new language. Included will be practical issues of character set representations, translation technologies, web-based and traditional resources, etc., and ideas on how to immerse oneself in language learning and/or integrate such methods into a class whose goal involves learning a foreign language.

Languages and writing

Language is the means by which humans communicate meaningful and abstract thought, primarily by making a noise that is recognizable and understood by another human. That is, a message that goes from an origin to a destination. On the other hand, writing is a technology. Language is not a technology. According to Alan Kay, a primary inventor of "object-oriented" and graphical user interface fundamentals in the 1970's at Xerox PARC which led to the introduction of the Apple MacIntosh computer in 1984, "Technology is what wasn't around when you were a kid.".

At some point in human history, writing was invented as a technology. Written communication was first done with sticks making marks on mud tablets and then dried. Later, written communication was done on papyrus form by the Egyptians and stored as scrolls. Later yet, parchment (animal skins) was invented at Pergamus in Asia Minor, eventually cut and bound into codices/books. The concept of paper from wood fibers from the Chinese greatly expanded the use of written communication. At the end of the 20th century, the use of physical written paper began to disappear, with large phone books, out of date shortly after being printed, began to stop being printed. [1]

Languages are based on a finite set of words. This finite set ranges from a few thousand words for useful communication to upper limits of hundreds of thousands, based on the source, for good communication. But a finite set of words and grammar constructs allows humans to express a countably infinite number of thoughts. One can, statistically speaking, easily construct a meaningful sentence that has never before been expressed.

That being said, the author is still learning "English" and will never know it completely. The same is true for any language. One needs to decide the meaningful level of proficiency one desires to attain within the resources of time and space available.

Writing was originally on clay tablets, then on scrolls, then on parchments, with the creation and copying of text a manual, tedious, and potentially error prone process.

It took a while for people to realize that one can read silently without reading. Augustine wrote in the 4th century that he was amazed when he realized that one could read silently without reading aloud and listening to what one was reading. The audit process was originally a process by which the text of records was read aloud. The legal process still uses the terms hearing, and hears evidence.

To make the "paperwork" easier to run his empire in the 800's in Europe, Charlemagne invented lower case letters to same space on valuable and costly parchment. Italic type originated in the same manner, to save printing space. The growth of the written word was greatly increased by the "invention" of movable type by Gutenberg. A half century later, Martin Luther posted some "academic" discussion points on a door. A friend, with the help of a printing press, reproduced them and distributed them all over Europe. Within a month, Europe was into a religious war that wold go on for quite some time, showing the potential power of information. As the use of the printing presses increased, the cases in which the type was stored led to the terms "upper case" and "lower case" letters, in contrast to the terms "magniscule" and "miniscule".

Learning languages

According to Steven Pinker [2], a leading authority on acquisition and use of human language, the ability to learn and communicate via language is built into humans (i.e., in the DNA code) though much is not understood about language as it continues to be an important research area. Children have a built-in mechanism to learn any language to which they are exposed until a certain window of opportunity is closed, somewhere between 8 and 12 years old. Thereafter, learning a new language is much more difficult. Learning a language as an adult is not easy.

The brains of children are designed to learn and construct syntax, grammar, and meaning from what they see, hear, and learn from their parents. How fast do children learn language? Pick a number of words, say 6,000, even though precisely defining words is difficult. Pick an age range to start talking, say 2, and an age to check progress, say age 8. This is 6 years or 6*365 = 2,190 days. To accomplish this, the child must learn about 3 new words every day while integrating those new words, in the proper grammar context, with everything learned so far.

Children will fill in gaps and extend the language using rules of other constructs. My son would sometimes inadvertently annoy his older sister by making statements such as, "Can we go tennising today.". That is how new language is created, but enough people must agree and start using the new terms until they become established.

An adult must do the same thing as a child, but with the burden of already knowing a language, and having some of the switches for learning in the brain, as theorized by linguists, turned off.

Years ago, the author switched from the QWERTY keyboard layout to the Dvorak keyboard layout. Although one can become productive in a week or so, it took months for the typing to become automatic without reverting to learned and common QWERTY keystroke patterns.

Years ago, the author spent time learning Classical and Biblical Greek. Unfortunately, at least in the United States, this is mostly done using a contrived Greek pronunciation that goes both ways (reading to speaking, and listening to writing), which is good for academic study, but the modern Greek pronunciation only goes reading to speaking. It took months to automatically change to the new reading and speaking patterns.

The Greek language has a long history. An early form of Greek, called Linear B, uses an older alphabet. The current alphabets of all alphabetic languages (pretty much by definition) derives from the Phonetician/Hebrew alphabet. The Hebrew form changed during during the Babylonian captivity. The Greeks adapted the original alphabet.

Originally, the alphabet was used for a syllabic script where there are no spaces between words and the letters are like a recording of the spoken word. When listening to a foreign language, one notices that there appear to be no spaces between words. The brain learns to put spaces between words where, in actuality, there are none. Over time, spaces between words made the written word easier to work with with fewer scribal copying errors.

English words from the Greek come from various sources. Words can come directly from Ancient Greek, through other languages such as Latin, as terms borrowed starting with the Renaissance and the rediscovery of the Greek language. In modern times, Greek has borrowed many English (and other) words.

In languages such as English, seeing a word may not mean one can pronounce the word, and hearing the word may not mean that one can write the word. In German, the process pretty much goes both ways. In Modern Greek, if one can see the word, one can pronounce it, but if one hears it, there may be many possible ways to write that word. In Chinese, hearing the word gives no clue as to how to write it, and seeing the word provides no clue as to how to say it, and dialects of Chinese can pronounce the same written word in vastly different ways.

Linguists make the distinction between a pidgin language (note, not the same word as the pigeon bird) and a creole language. In general, a pidgin language is a greatly simplified language created by adults in order to communicate for practical (e.g., business) purposes. Pidgin languages lack the ability to express precise and abstract thought, being a practical language compromise for immediate purposes. A creole language tends to be a pidgin language, created by adults for practical purposes, that is extended and filled out by children who are in an environment where they must deal with a native language at home but another language with other children. In order to more fully communicate, the language is made more complete.

Note that, in practice, what people call pidgin languages, creole languages, and language dialects, may not fit the general pattern described. For example, there are many "dialects" of Chinese, but although they share the same writing system, they are very different spoken languages. The concept of precisely identifying a language can be confusing. As example, the verbal language of Serbo-Croatian is called Serbian when written in the Cyrillic alphabet but called Croatian when written in the Latin alphabet.

A dialect of a language is not easy to define but tends to be a variation of a language that is still understood by another group but yet differs in the way it is pronounced, written, structured, etc. Most languages have what is called a high language, or official language, that is the way in which written and formal communication is done. Then the low language, or local language, or language dialect, is the way that local people communicate. In high school or college, a student is almost always taught the high language, so they can communicate anywhere that language is spoken. But when they travel to a country that speaks that language, their speech is immediately recognizable as a non-native speaker since no one speaks the high language in practice. In English, the high and low languages are less recognizable but there are some traces. But even English has many dialects throughout the world. See Pediatric for a long list of English dialects.

Immersion

It takes a lot of time and a lot of effort to learn a new language as an adult. To effectively and efficiently learn a new language as an adult, it helps greatly to organize one's efforts in time and space. In essence, one must learn to immerse oneself in the language.

Estimates vary, but a concerted effort of about six months time, more or less, is needed to attain a decent pidgin language proficiency, where one knows hundreds of simple words, some simple grammar rules, common phrases, and is comfortable using them in normal conversation. It takes a year or more to fill in more details and refine the language. It takes many years to attain great fluency in the language, and one may never lose the accent so that native speakers will usually always be able to detect that non-native accent.

In essence, to learn a new language, one must immerse oneself in the language to the greatest extent possible. Fortunately, with the available resources of the Internet, this is much easier than at any point in the past.

Author background

In early junior high school, the author discovered a book an linguistics that was fascinating. At the same time, that school provided a half year of Spanish, French, and German, from which the student, if so inclined, could pick one of the three for study in 9th grade. The author spent 3-1/2 years in high school and 2-1/2 years in college studying German and had become quite proficient in it, to the point where the author could think in that language. In 2014, the author decided to learn modern Greek, which uses a very different character set than English or German. The author has had a lifetime interest in languages, both human languages, ofter called natural languages, and programming languages which have many similarities but also many important differences. With a PhD in computer science in programming languages, and working in areas of applied research in natural language processing and computational linguistics, the study of learning the Greek language and processing Greek text fit in with both personal and professional objectives. In addition, the Greek language has an almost 3,000 year history of use so changes over time can be studied, many English words have their origin in Greek, and in doing sophisticated text processing, the Greek character set provides challenges to getting programs and features to work properly.

To be really proficient, one needs to get to the point where one can think in the language without actual translation between native and non-native languages. The same kinesthetic aspects are required for sports, music, etc. In music, another lifelong interest of the author, one gradually learns to recognize patterns and use those patterns in both reading, playing, and improvising music. From a language perspective, the author has found, often, that when trying to get the Greek word to pop into mind, if it is not readily available, the German word pops instead into mind, not really desirable. Switching between languages while speaking (e.g., words in one language, grammatical structure in another language) is what linguists call code switching.

Getting started

How exactly does one get started learning a new language? There are a large number of products that claim to help one get started in learning a language, and they vary greatly in price and value. The author has tried many of them. The general approach used by the author was as follows.

1. Learn some basic words and some useful grammar, including some common irregular constructions.
2. Learn basic phases for travel, etc., using any of the many options available.
3. Long term fill-in with more vocabulary, nouns, verbs, idioms, constructions, etc.

Many native speakers speak the language very fast. In addition, and, as in many languages, if the vowel sound at the end of one word is the similar to the vowel sound at the start of the next word, those words are just combined together in speech, but not in the written words, which have the artificial spaces between them.

The best method found for #1 by the author was the Michel Thomas method, available on CD, in three versions. The "Start" method (1 CD), the "Total" method (4 CD's, including the beginning CD) and the advanced method (3 more CD's). The Michel Thomas approach assumes that the teacher is teaching two students, and you are the third student. The quality of the teachers and sound quality vary, so one may want to try the beginning CD before purchasing more. The Greek was excellent. The Spanish was much less so, and the sound quality was not that good. The languages supported include: French, Spanish, Italian, German, Dutch, Greek, Portuguese, Japanese, Polish, Russian, Arabic, Mandarin Chinese.

Another author requirement was for the system to be mp3-based so that the time spent learning could be combined with other activities (e.g., working out, riding bicycle on the trail, commuting, etc.). There is a lot of marketing for Rosetta Stone. But their approach used pretty much requires the user to sit in front of a computer and run a copy-protected program that could possible interfere with the normal working operation of the computer. So Rosetta Stone appeared to be very expensive, not geared towards deep grammar and written communication understanding, and so did not meet the basic requirements of the author for a language learning system.

If one does #2 first, one hears and repeats many phrases, but it is often very unclear where the phrases come from and how they are constructed. Doing #1 first, when one hears phases from #2, one has a much better idea of the actual construction properties such as gender, case, irregular parts, etc.

Some languages are spoken at a very great speed. Some systems account for this, but others do not. It as a basic property of most learning that if one learns to do something slowly, one can always increase the pace, but starting at a higher speed does not work well if at all. The author has found this true in music, athletics, and other areas such as learning languages . In earlier years, the author spent many years in musical endeavors. One jazz band director explained many times (paraphrased here), "If you are not good at music, play loud and fast. It is much harder to play slow and soft". Needless to say, we had to learn to play slow and soft, at which point, we could then easily play loud and fast, and vary the volume and pace as needed.

In the absence of people speaking the desired language, recognizing language can be facilitated with audio CD's, podcasts, DVD's, etc.

The web site at http://www.50languages.com allows one to "**Learn more than 50 languages for free online or with our Android or iPhone AP**". There are more than 8 hours of audio recordings of basic phrases from any one of 50 languages to any of the other remaining 49 languages, though at some point more languages may be added. Part of their business model is to sell a $10 book showing the written form of the audio. The author found the German once and Greek twice (i.e., two speakers) to be useful in reviewing German and learning Greek.

A daily calendar in the language of interest, if available, can be useful.

The site at http://www.innovativelanguage.com offers many ways to learn a language. Their free word a day email is useful. The author subscribed to their advanced model for a few months. They tend to send a lot of marketing emails, and their audio is not perfect, but it can be very useful approach to learning a new language. The word a day tends to repeat itself after a few months.

YouTube has a huge collection of video's in many languages, but one may need to search around for them. One needs to sift through the beginning ones of basic words, to advertisements for purchasing other systems, etc. Once native language videos are found, there are usually links to other such videos. The author found many YouTube videos in Greek for learning programming, solving high school math and science problems, science and technology, lectures on various topics, etc., as well as radio, TV, and children's shows in Greek. One just needs to spend some time searching. To get started, it may help to use the transliterated name in the search. If one searches for "Greek" on gets advertisements and beginning Greek words. Searching for the transliterated name "Ellinika" provides better results. Better yet, change your Google account to the desired language - which can then take effect on every device used with that account. The same strategy works well for searching in, say, the iTunes Apple Store for podcasts, Amazon.com for books, etc.

Devices and software

Some easy places to immerse oneself are by changing the language of the phone and/or the computer. Warning: Whenever you change a language in a phone, computer, program, etc., document exactly how you did it so that if you need to, you can change the language back. This is especially important when faced with important and long messages, user agreements, etc. If possible, having a similar device that is in one's native language can be useful if one gets lost in the new language. Be aware that

your device language has changed. At a wedding rehearsal dinner, my brother asked to use my phone. No problem. I handed it to him. He looked at it for a while, then said, "How do I use this?".

For some reason, the Amazon.com music program will not work if one sets the language of the phone to Greek, or a host of other languages. No problem. Just use the Google music player which works just fine.

Operating systems such as Windows may need a special version to switch the language. Windows 7 Professional can only be installed in one language. The author upgraded one machine to Windows 7 Ultimate so that any of more than thirty languages could be used. Be aware that some programs may alter their behavior when the language is changed. Microsoft Office reset some of the default features that caused existing VBA macros to not be found, so they needed to be referenced again.

Keyboards to get alphabets into the computer are straightforward. Keyboards to get any one of thousands of Chinese characters into the computer are not. The Greek language is based on 26 characters, the vowels of which can have accents, and most of the letters map/transliterate to English characters.

Learning ideas

This section mentions learning ideas that the author has found useful, or, in some cases, less than useful.

Amazon.com has stores in Germany, France, Spain, and, by the time this is read, perhaps in other areas. These are a great place to get books in other languages. Since the author had learned German in earlier years, German books that teach Greek were/are a good way to review German while learning Greek. For some of the audio CD's, the Greek speakers tended to use a German accent.

DVD's are a great way to get improve a language. Greek DVD's are mostly require a Zone 2 or Zone free player, but these are not difficult to obtain. Since the author had watched many animated movies with his son many many times, in watching the same movie in Greek, the author already knew the English lines which made it easier to concentrate on the Greek lines. Note that the subtitles appear to be direct translations of the English into Greek. The Greek actors, however, use the Greek that best approximates the semantics expressed by the characters. In that sense, the subtitles are not very useful. However, one can obtain the text of the subtitles for many movies in many languages online. These can be useful in studying the foreign language as some words can be difficult to hear and not easy to get off the screen when one needs them.

Audio and music CD's are great for helping learn the language. Children's books that have an audio CD or mp3 that allows one to listen while following along in the book are very helpful.

There is a huge market for children's books to help in the learning process. Those same books, with stories, pictures, etc., can help adults with the same basic vocabulary and terms.

At some point, one will want books in addition to the ones in the local bookstore or from Amazon.com, whose selection of Greek books is very limited. The Internet can help in finding a bookstore in the country here the desired language is spoken. The author eventually located the Greek bookstore at

http://www.malliaris.gr located in Thessalonica. The shipping costs are high, of course, but the credit card company provides a reasonable conversion from the Euro into dollars. It takes about 3 weeks from order time until delivery time. One can then order the English version of the book, if available, from Amazon.com. However, it is very useful to order some books written by authors in the native language. This author found a great number of children's books and books with audio CD's that were very useful.

Google has news available in many languages, including Greek. Search for Google news in the desired language.

Research articles in the desired language can be useful. One can use the Google advanced search with, say, a file extension of "pdf" and a language of "**Greek**".

Character representation

When the first working programmable computer was developed in the 1950's, the language was English (primarily United States and Great Britain). A small character 7 bit character set called ASCII, character codes 0 to 127, later 8 bits for character codes 0 to 255 for extended ASCII, sufficed (ignoring the IBM 9 bit EBCDIC code). Western languages such as Spanish, French, German, etc., which use the Latin alphabet were added using special characters in the extended range 128 to 255, using a technique called code pages (still used in Windows by default). The oriental languages, referenced as CJK (for Chinese Japanese Korean) required thousands of character glyphs each. The Unicode representation was developed, of which there are many variant encodings, the most common of which today is a UTF-8 encoding that allows a more compact encoding/storage of characters in 1, 2, 3, or 4 bytes. UTF-8 is backward compatible with the original ASCII, codes 0 to 127, while avoiding issues of large or small endian encodings (i.e., high to low end ordering of bytes, or low to high ordering of bytes). Each language, even ancient languages, have a space in the Unicode code space.

A useful program to explore and work with Unicode is BabelMap for Windows. A Linux alternative for exploring fonts, etc., is **`gucharmap`**. Note that to see the characters one needs a font installed that supports those characters. A fairly complete, but huge, font that does this for modern languages is the Microsoft "Arial Unicode MS" font. Unicode fonts such as "**Egyptian Hieroglyphics**", "**Linear B Ideograms**", "**Cuneiform**", etc., need other fonts.

In programming systems with ASCII, Unicode, UTF-8, etc., it can become very problematic if the program processes text as if it were in the wrong encoding.

Computational linguistics

Computational linguistics is the study of using computation to perform natural language processing. Natural language processing is inherently difficult, the common example being the following.

- Time flies like an arrow.
- Fruit flies like a banana.

Another being the following.

John saw Mary with a telescope.

Who has the telescope? If a human cannot tell, how could a computer? An upper bound for recognizing parts of speech in a language is about 96% since human experts in the field tend to disagree on the assignment of parts of speech tags.

But just like weather prediction, though chaotic and not exactly predictable, it is useful. If the forecast is pretty good out to 48 hours, natural language processing and computational linguistics can provide useful results.

Expert systems have two primary means implementing expertise. One is a rules-based model whereby rules are used. The other is a statistical pattern based model where patterns, and lots of data are used. In practice, both methods are used. In machine learning, a lot of effort is put into what is called feature extraction (e.g., data scrubbing, picking out parts of an image, etc.), and then the statistical models are used on the extracted data.

Natural language processing has traditionally been rules-based, with tokenizers, parts of speech taggers (for nouns, verbs, etc.), grammars, both fixed and probabilistic, etc. A few years, Google came in and easily beat every rules-based system by using a probabilistic pattern-based machine learning technique that had millions of documents of translated works (e.g., United Nations transcripts, etc.) on which to train.

Google makes their translation system, based on machine learning techniques, available to everyone for browser web use for free, and for other commercial type uses for a minimal fee. Their free translation system is great for anyone learning a language. They use crowd sourcing to help improve the system, whereby anyone who sees something incorrect can help provide a better translation. But be aware that some phases do not translate perfectly. Idioms may not translate well. And the case, upper, lower, etc., may not match as the translations are based on machine learning matching.

Software systems

Many native speakers speak the language very fast. Software that can slow down the speed without changing the pitch can be useful. Such software, often command line, include Sox. The author prefers command line programs that can be automated for large numbers of files, but Audacity in a GUI program that can be used to do similar things.

As a research and learning tool, the details of which are beyond the scope of this paper, the author has created a system that has the following features.

1. Supports typing in either language based on a mode. The Greek characters are transliterated with the single quote modifying the character before to either have or not have the quote. If in the wrong mode, switch the characters already typed.

2. Hyperlink from a Greek or English word to Firefox and pull up the Google translation. In vocabulary files, the form of a line is as follows.

```
Greek text = English text
```

So if the cursor is to the left of "=" the mode is Greek, to the right of the cursor, English.

3. The vocabulary documents can be processed by scripts to extract the corresponding English and Greek words. If the English is not provided, do a programmed translation via Google. Divide the groups of words into sections based on hints.

4. For each English and Greek word/phrase, use Google to obtain a mp3 file of each translation.

5. Convert each mp3 to wav, decreasing speed if necessary, then combine all of the desired ones together according to patterns, such as English once, Greek three times, low sounding beep, repeated for all words, with three low sounding beeps at the end of each section.

6. Create a Word document for reading the words while listening. A quick version of the mp3 file, just one Greek at a time, is for proofing and reading along.

This system allows the author to put together vocabulary words gradually, and then listen as convenient. Another system hooks in with subtitles for movies as another way to learn vocabulary.

Another related system takes Greek words/text, divides it up, and creates a web page with words not known yet with links that, when clicked, bring up the Google translation for that word in Firefox.

Summary

This paper/session has discussed and/or demonstrated some ideas on learning a new language intertwined with the current state of natural language processing and computational linguistics.

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An Introduction to Topic Modeling as an Unsupervised Machine Learning Way to Organize Text Information

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Abstract

The field of topic modeling has become increasingly important over the past few years. Topic modeling is an unsupervised machine learning way to organize text (or image or DNA, etc.) information such that related pieces of text can be identified. This paper/session will present/discuss the current state of topic modeling, why it is important, and how one might use topic modeling for practical use. As an example, the text of some ASCUE proceedings of past years will be used to find and group topics and see how those topics have changed over time. As another example, if documents represent customers, the vocabulary is the products offered to customers, and and the words of a document (i.e., customer) represent products bought by customers, than topic modeling can be used, in part, to answer the question, "customers like you bought products like this" (i.e., a part of recommendation engines).

Introduction

The intelligent processing of text in general and topic modeling in particular has become increasingly important over the past few decades. Here is an extract from the author's class notes from 2006.

> *"Text mining is a computer technique to extract useful information from unstructured text. And it's a difficult task. But now, using a relatively new method named topic modeling, computer scientists from University of California, Irvine (UCI), have analyzed 330,000 stories published by the New York Times between 2000 and 2002 in just a few hours. They were able to automatically isolate topics such as the Tour de France, prices of apartments in Brooklyn or dinosaur bones. This technique could soon be used not only by homeland security experts or librarians, but also by physicians, lawyers, real estate people, and even by yourself. Read more for additional details and a graph showing how the researchers discovered links between topics and people." Text Mining the New York Times* http://slashdot.org/article.pl?sid=06/07/29/0634232&from=rss [as of Sat, Jul 29, 2006]

In 2006, the author had little idea that he would do significant work in that area just a few years later. Processing text in intricately related to natural language but the applications of topic modeling, as we shall see, are not limited to just text.

The common theme in this paper is that of sophisticated text analysis (matching, grouping, etc.) for decision making using probabilistic models and distributed processing. This includes probabilistic topic modeling and various aspects of natural language processing and computational linguistics. In June, 2014, the author attended the Association of Computational Linguistics conference, held in Baltimore, MD. Practically unheard of a few years ago, that conference was the biggest ever, with over 1,400 at-

tendees, from all over the world, and all the big companies - Google, Baidu, Amazon, Facebook, Microsoft, Yahoo, Facebook, IBM, etc., looking for students and others to hire for sophisticated text analysis - topic modeling, sentiment analysis, etc.

The author has written software code to do many of the things described in this paper, and has used many Open Source software systems that make it easier to do the things described in this paper, but such details are beyond the scope of this paper.

Some actual topic modeling results and information visualization of such results were not available yet at the time of the paper submission, but will be presented at the session at the conference.

Expert systems

Topic modeling has its roots in expert systems. It has long been conventional wisdom that "expert systems" do not replace the experts. Rather, "expert systems" do several things.

1. Expert systems amplify the intelligence of non-experts - allowing non-experts to behave much more like experts. This has eroded job security in fields where the "experts" were not really experts - such as loan approval, risk assessment, athletic talent assessment, etc., and statistics-based decisions are better than the so-called "experts". It is often the case in such fields that the computer, with relevant data, machine learning techniques, etc., can make better predictions than the so-called "experts". Such jobs then become less common and/or become lower paying jobs.

2. Expert systems help real experts, such as doctors, lawyers, etc., make decisions in that by providing a list of alternatives and probabilities, the expert is less likely to overlook and/or be unaware of viable options in a given situation. For example, if an expert system provides a doctor with possible diagnoses for given symptoms, the overworked and time-stressed doctor should be less likely to overlook a possible condition that might otherwise later lead to a lawsuit in that the "expert" doctor "should have known".

Expert systems have two primary means implementing expertise. One is a rules based model whereby rules are used. The other is a statistical pattern based model where patterns, and lots of data are used. In practice, both methods are used. In machine learning, a lot of effort is put into what is called feature extraction (e.g., data scrubbing, picking out parts of an image, etc.), and then the statistical models are used on the extracted data.

Computational linguistics

Computational linguistics is the study of using computation to perform natural language processing. Natural language processing is inherently difficult, the common example being the following.

- Time flies like an arrow.
- Fruit flies like a banana.

Another being the following.

John saw Mary with a telescope.

Who has the telescope? If a human cannot tell, how could a computer? An upper bound for recognizing parts of speech in a language is about 96% since human experts in the field tend to disagree on the assignment of parts of speech tags.

But just like weather prediction, though chaotic and not exactly predictable, is useful if the forecast is pretty good out to 48 hours, natural language processing and computational linguistics can provide useful results.

Natural language processing has traditionally been rules-based, with tokenizers, parts of speech taggers (for nouns, verbs, etc.), grammars, both fixed and probabilistic, etc. A few years, Google came in and easily beat every rules-based system by using a probabilistic pattern-based machine learning technique that had millions of documents of translated works (e.g., United Nations transcripts, etc.) on which to train.

Google makes their translation system, based on machine learning techniques, available to everyone for browser web use for free, and for other commercial type uses for a minimal fee. Their free translation system is great for anyone learning a language. They use crowd sourcing to help improve the system, whereby anyone who sees something incorrect can help provide a better translation. But be aware that some phases do not translate perfectly. Idioms may not translate well. And the case, upper, lower, etc., may not match as the translations are based on machine learning matching.

Machine learning

Machine learning is a collection of techniques based on statistical, with some rules, usually via feature extraction, that are used to do pattern recognition. The field of artificial intelligence, a better name for which would have been machine intelligence, which got a bad reputation for promising too much that was not delivered, was somewhat vindicated by the appearance and success of machine learning, which one can take as a new term for what was previously called artificial intelligence.

But machine learning is not the answer for everything. One does not just get a lot of data and apply computing power to the data. In practice, a potentially very complicated and somewhat intuitive/intelligent process called "feature extraction" is used to extract features and then the machine learning works on the "features". So, to recognize a car, one might develop techniques to extract and thereby recognize features such as wheels, windows, etc. The field of syntax and parsing in natural language attempts to extract features on which other techniques can be applied.

Deep learning

Andrew Ng is leader in the field of machine learning. He has many good YouTube videos describing his word and, of course, the work of his many students. A good YouTube video by Andrew Ng is at:

https://www.youtube.com/watch?v=W15K9PegQt0

Here is a summary of some aspects of his video as interpreted by the author. Ng, a leader in the field of machine learning and deep learning, did work for Google, a short walk from his Stanford office, but now appears to now be doing work for Baidu, the most well known Chinese search engine. Baidu had a big presence at the Computational Linguistics conference in Baltimore.

"Machine learning" has made more and more progress in the past decade, not necessarily by better algorithms but, by feeding the algorithms more data. In the era of applying "Machine Learning" to "Big Data", there was initial good progress, and progress continues to be made, but that progress has leveled off. Better methods are needed. Ng has led the way in what he calls "Deep Learning". He (and his students) have solved problems including having machines learn to grasp objects, 3-D perception without multiple stereoscopic images, etc. His primary working assumption is that there is a general learning algorithm in the brain and he is looking for it. The learning algorithm of the brain appears to make use of edge detection methods (e.g., "Sparse Coding") to chunk/segment what is seen rather than just looking at the low level parts (e.g., pixels). A problem with traditional "machine learning" is that it does not look at the individual small parts of the data. Rather, much work goes into manually tweaking code to do "feature extraction" so that the machine learning algorithms can then make use the features. As an example, parsing rules for a sentence attempt to extract features (e.g., nouns, verbs, phrases, etc.) from the text and then make use of these features, either by more rules or statistical machine learning (e.g., language translation).

Ng led the Google Brain project. Instead of the usual 10 million neuron connections, they used 1,000 million (1 billion) connections and are expanding to 10,000 million (10 billion) connections. With access to millions of YouTube videos, which included over 10,000 cat videos, the Google Brain learned to recognize the concept of a "cat", without, of course, knowing much else but that there are "cats" on the Internet. They used 16,000 computers running for 3+ days in the experiment. The media hyped this, but the Google Brain also learned to recognize faces, etc.

Ng sees one of the many near-future uses of Deep Learning as that of natural language understanding. He has worked with Chris Manning (from Stanford, a leader of the field of natural language processing).

The concept of "edge detection" appears to be important in eliminating what is less important from what is more important, but after that some patterns still need to be recognized. Looking for search terms, etc., appears to be a form of "feature extraction" that can be used to identify true positives in terms of false negatives (recall) and false positives (precision) in the search process.

So the "Deep Learning" technique is a (deeply) layered neural network approach that recognizes and categorizes patterns. A neural network, loosely based on an analogy the neurons in the brain, consists of layers of "neurons" that have forward and backward feedback mechanisms that help in recognizing patterns. Such pattern recognition approaches are categorized under the general umbrella term of machine learning.

The neural network technique is similar to linear and nonlinear regression techniques whereby one hypothesizes a linear or non-linear equation that fits the data. The differences are that instead of fitting data to pre-defined equations, neural networks separate patterns into groups and do not require a predefined equation - the "patterns" are "learned" by the neural network.

The described "Deep Learning" appears to be an operational methodology of what Jeff Hawkins, inventor/developer of the Palm Pilot handwriting system, describes qualitatively in his book "**On Intelligence**" [1] (a very interesting read).

Every new advance in technology makes possible new economies that are not at this time possible or feasible. One goal, then, is to identify those economies that can use these new technologies. A classic example is that, years ago, when Toshiba announced a tiny hard drive, Steve Jobs (and Apple engineers) decided that consumers would want their own enormous collection of songs on their own small personal device, even though no consumer had actually asked or even knew they would want such a device.

Data and problem solving

Data tends to come in two varieties. Structured data is the traditional data of name, address, phone number, etc. (though address is sometimes unstructured). Unstructured text data can be processed using various techniques - topic modeling, probabilistic modeling, etc.

Some methods for text/data analysis are the following.

- Topic modeling - clustering of topics distributions in text, trends over time, etc.
- Sentiment analysis - determine positive, negative, neutral comment according to some question
- Recommendation engine - recommend additional products based on previous purchases

Problem solving: For any problem, it helps to start with the questions one wants to answer. That is, identify the problem(s). Such problems (and associated solutions) tend to come in two varieties. Those that will cut costs, and those that will increase revenue. To cut costs, one should have an idea of where the costs are arising (e.g., too many phone calls, mailings, returns, etc.). To increase revenues, one should have an idea of where and how people would buy more or get others to buy, etc.

Some examples of problem solving are the following.

1. What additional products might this customer buy? Recommendation engines help answer this question.

2. How can the satisfaction with a product be summarized for the seller and for other customers? Summarization engines and sentiment analysis can help.

3. What are the traits in common when a customer abandons a shopping cart? Cluster analysis, user experience/interface analysis, etc., can help here.

4. Many sites will have automatons/robots answering chat questions and then switch to humans when appropriate. The data/text collected can be used to improve service, question answering, etc.

Text processing

Processing large amounts of text can require lots of computation. A common way in information retrieval to decrease the search time for text is to use an inverted dictionary, where each word has a list of documents in which it appears.

The Redis in-memory key-value database for distributed networked access can work well for inverted dictionary support of large amounts of text. Redis is being used by many big tech companies to speed up distributed web access or local text access within a more localized network.

An inverted dictionary stores every word and the documents in which that word appears. This provides very fast access to those document sets and Redis supports set operations such as intersection and union. In topic modeling, it may help to stem each word, do quick searches for just the stems of words, and then do more complete searches or topic models for those results for more context-sensitive matching.

To support topic modeling over time, the author designed and implemented a way, using Redis, for an inverted dictionary of stemmed words with date support.

At some point, a tagger such as the Stanford Part-Of-Speech tagger could be used to add ports of speech for searching and topic modeling. Such search tasks can be distributed to many computers at once, when needed.

Anyone attempting to match keywords with any "document" (e.g., email subject and body) would extract all the words from the document and then compare the words in the document to the the keyword list and decide whether it is a match.

However, the hard part is how to "decide" what is a "good" match. This is not obvious and the key part of any such method. Most simple systems simply return the search results and let the user decide what is a good match.

Traditionally, as in the example of language translation, rule-based systems have not done as well as machine learning approaches - which match patterns rather than having an understanding of the content. But an effective matching process appears to need the system to have some understanding of the material being searched.

The author calls the obvious matching technique a "syntactic" match which is based on symbol matching whereas a higher level and deeper matching a "semantic" match - which is a match by meaning and may or may not have an obvious "syntactic" match. A "semantic" match requires a deeper understanding of the material and a way to infer meaning from parts that logically connect together but whose connections are not obvious in a textual matching.

And this harder problem of meaning is why, once the large majority of documents are rejected as not being relevant, human inspection is required to do the final determination. Those "semantic" matches that are not correctly classified fall into the category of false-negatives.

Bayes Rule

Topic modeling as a direct application of the ideas of graphical models and Bayesian analysis.

The essential inter-related ideas of big data, computer science, and Bayesian and frequentist statistics are well described by a recognized expert in the field, Michael Jordan (machine learning statistician from Berkley, not the basketball player), in a recent YouTube video, at http://www.youtube.com/watch?v=LFiwO5wSbi8. A good book on the history of Bayes Rule, and also of frequentist statistics, is "The Theory That Would Not Die: How Bayes' Rule Cracked the Enigma Code, Hunted Down Russian Submarines, and Emerged Triumphant from Two Centuries of Controversy" by Sharon Bertsch McGrayne.

What kept Bayes Rule an academic oddity for almost 200 years was the lack of a computational way to handle some intractable integrals arising from the equations in hierarchical models. Perhaps this is one reason why Laplace leaned towards frequentist methods - the manual computations were just too involved to solve even simple problems that had practical significance. The use of Markov Chain Monte Carlo (MCMC) techniques along with a simplified variation, Gibbs Sampling, that works in many cases, together with increases in the storage and power of computers, has made Bayes Rule much more tractable for practical use. Some of these techniques took a while to become known because they were used during World War II in both cryptography and the atomic bomb project and, as such, both the techniques and the people who would have developed them were classified information not to be released to the public.

According to Jordan, a frequentist approach will average over the possible data to see if the sample result is within a certain limit (i.e., confidence interval) while a Bayesian approach will look at just the available data, and what is know about the past data, in making a decision. Jordan makes the analogy to physics of the early twentieth century, when physicist looking at the some data would classify it either as wave phenomena or particle phenomena and gradually came to an understanding that it was just different ways of looking at the same phenomena. The field of computer science has no such dichotomy. Jordan points out that, just like the wave-particle duality, statistics has two main ways of looking at the same phenomena - called Bayesian statistics and frequentist statistics. And is in the same way that specific phenomena might be better analyzed with either wave theory or particle theory, specific statistics problems may be better analyzed with either Bayesian statistics or frequentist statistics.

Jordan sees computer science and statistics merging in the next 50 years. Many algorithms of interest are now probabilistic algorithms. And once data becomes too large to look at all the data, and one needs results based on many factors, query results will (and sometimes now have) error bars associated with them. In computer science, a linear algorithm is needed to at least look at all of the data once. At some point, as databases become bigger and bigger, the only way to get sub-linear algorithms is to not look at all of the data, which requires probabilistic models.

Topic modeling

In terms of topic modeling, both LSI (Latent Semantic Indexing), a VBM (Vector Based Model) and LDA (Latent Dirichlet Allocation), a hierarchical (and generative) Bayesian inferencing method, use a BOW (Bag of Words) approach.

- A set has items that appear only once in a set.
- A bag has items that can appear more than once.

Since topic modeling almost always uses a BOW approach, each "word" and a count of the number of times that a word occurs in a document is used. Better results are usually obtained by modifying the count using tf-idf (term frequency - inverse document frequency) to not inflate the importance of repeated words in a document or collection of documents. There are variations but usually a logarithm function is used to not overly weight words that appear more and more times in a document. However, this is done in the preprocessing step so that this modification can be easily be omitted or changed.

The general approach used to pre-process a document for topic modeling includes the following.

1. Remove "stop" characters (such as period, comma, etc.), separate the text into words.
2. Remove common words that are in an "omit" list or patterns (e.g., common numbers), depending on the application.
3. Use stemming to consider some words with the same stem as the same word. For example, "car" and "cars".
4. Bi-grams (adjacent words that often appear together), tri-grams, etc. can be considered one "word".
5. Transform the resulting list of words into a bag of words (words with count) for that document.
6. Modify/weight the counts if desired (e.g., using tf-idf, etc.).

This pre-processing, or feature extraction, is the messiest part of the process and cleaning up this pre-processing, often with long lists available from different sources, etc., helps a lot in getting valid results. A lot of NLP (Natural Language Processing) techniques are used in this pre-processing.

The order of the words, unless used as bi-grams, tri-grams, etc., is not considered important to the analysis - probably because no one who has tried it has found it useful - probably because there is too much noise to discern any useful signal. And, to date, topic modeling has worked will without that complication.

Note that LSI, LDA, etc., is designed to be general and to smooth out differences in the document so that it may find a document relevant/similar even if the keyword of interest is not found in that document.

Since the introduction of LSI, LDA, etc., derivative works have appeared (usually in academia) that cover almost any conceivable alteration to the original model. This includes temporal orderings (e.g. date and time), word orders (e.g., bi-grams, tri-grams, etc.), hierarchical levels, etc.

In topic modeling, the entire corpus of documents is pre-processed in the above manner and then LSI, LDA, etc., is used. Document similarity allows these documents to be grouped/clustered into similar documents (using a variety of methods).

Methods to compare a new "document" to existing documents include the following.

- A search query is converted into a document in the same manner as described above.

- A dictionary of words with importance indicated by repetition is just a search query with those important words repeated and then processed in the above manner.

- An advertiser could supply search terms, a dictionary of words with frequency count, are examples of what they are interested in in terms of paragraphs, documents, etc. In each case, that information supplied is converted into a list of words with frequency count (i.e., bag of words) that represents a "document" and then document similarity is used to determine and do something with similar documents.

Topic modeling helps identify "similar" documents without knowing anything about the actual documents, one must specify which group or groups of documents that are of interest. This is, in contrast, to having humans manually identify those groups by annotating a small subset of documents. Other ways include, as mentioned above, search queries, a dictionary with frequencies, example text, etc.

Topic modeling is a very general idea that has found applications in, for example, DNA processing/research, image processing, etc.

For example, if customers are considered "documents" and the number of each item they have bought are considered "words" with associated "counts", then, without knowing the details of any customer or product, topic modeling can help answer questions like "customers like you bought these products" (i.e., document similarity and then most associated products) and "here are products similar to the one you are considering" (word/topic similarity), etc. This is the basis of recommendation engines and was a key part of the winning solution to the NetFlix competition a few years ago. Note: The "cold start" problem happens, for example, when a new product is introduced that has no history and a way is then provided to jump start this product, which is why, in the NetFlix competition solution, topic modeling is only part of the overall solution.

One is always free to integrate specific queries into the process but, for the problem being solved, this may help or hinder the process and make the results better or worse, depending on the application, the model, the implementation, etc.

It is still true that to solve any of problem, one must carefully identify and define the problem that one is solving and then, if off-the-shelf methods do not work well, one needs to create or adapt some model to solve that particular problem.

LDA

The LDA (Latent Dirichlet Allocation) model originated with Jordan, Ng, and David Blei. All have done many interesting YouTube videos that explain this and other related work.

The following is a commonly used general method for setting up documents for analysis.

1. Convert each document to text.
2. Remove all extraneous characters from the text using a list of characters to remove.

3. Pick out all of the words from the text of each document.
4. Convert words to their base word. For example, the word cars would be stemmed to car and considered the same word.
5. Remove stop words - words that are to be ignored - from a list of stop words.
6. If desired, consider select bi-grams (adjacent words), tri-grams, etc., to be the same word for computation purposes.

Thus each real document is transformed into a cleaned-up document for processing.

The above process converts each document to a "bag of words". A "set" of words would only contain a list of words where each word can appear only once. A "bag of words" includes each word and a count of the number of times it appears in the document. This "bag of words" document model can be modified by weighting the word count using a suitable measure, such as tf-idf (Term Frequency - Inverse Document Frequency), so that repeated words do not adversely influence the results.

From this starting point, two methods to compare the documents are the following.

1. LSI, Latent Semantic Indexing, a VBM, Vector-Based Model of document/word comparison.
2. LDA, Latent Dirichlet Allocation, a HBM, Hierarchical Bayesian Model, of document/word/topic comparison.

These methods provide a higher-dimensional way of comparing documents than is obtained just by looking at the intersection of words between documents.

In addition, the following method for similarity processing (again, having studied, coded, and customized it).

3. LCS, Longest Common Subsequence, a dual (i.e., the same) problem to the MED, Minimum Edit Distance between documents.n

Much text analysis and comparison can be done with the LCS, Longest Common Subsequence, problem, a dual problem to the MED, Minimum Edit Distance problem. The LCS/MED algorithm is used, for example, to compare two programs to see what has changed.

The methods such as LSI, LDA, etc., help automatically determine document similarity such that documents can be grouped together according to some criteria. Which similar documents are most relevant needs an appeal to an authority "outside the box", in the same manner as "Sentiment Analysis" requires some pre-determined authority on whether text fragments are positive, neutral, or negative.

By analogy, a computer program could be created to group monetary currency bills into similar types, resulting in piles of bills for the denominations $1, $5, $10, $20, etc. But such a program would have no idea which were more valuable unless some "outside information" were programmed into the system - so that, for example, $20 is worth more than $1.

Software

The author has been using Python and Python libraries to prototype and semi-automate most of the work. By semi-automate, it is meant that there is no convenient GUI (Graphical User Interface) with which a user can use a finished system. Instead, a collection of ad hoc scripts that can be easily changed (as necessary for research purposes) are used to automate what is being done. Python, using the scientific libraries for NumPy, SciPy, etc., and gensim, etc., is the language system and libraries used by many researchers and developers in the field - including many of the original authors of the relevant research. Such methods (e.g., the gensim libraries) already have built-in support for huge amounts of data, incremental addition of new information, and the effective use of multi-core processors and collections of machines that can all work on the task - LSI, LDA, etc.

Another Open Source machine learning / topic modeling software is Mahout - which runs on Hadoop using MapReduce and which has been greatly improved in the past few years. The symbol for Hapdoop is an elephant, an idea of the young daughter of the inventor and founder of Hadoop. Mahout is an Indian word (from India, not the United States) for an elephant rider. Mahout thus claims to assist in riding the Hapoop elephant.

Mallet, Java-based topic modeling software recommended by Dr. Jordan Boyd-Graber, computational linguist professor with many very useful and well done educational videos on YouTube.

The Standford Parts-Of-Speech tagger is a Java-based software for tagging parts of speech. This is useful, for example, if one wants to only look at nouns, verbs, etc., in a large corpus of documents. The Stanford Natural Language group has published a large number of educational and well-done YouTube videos.

Summary

This paper/session has discussed and/or demonstrated some ideas on the state of topic modeling as an unsupervised learning technique for relating documents in order to extract useful comparison information in order to make decisions.

Screencasting— A Way to Increase Contact Hours, Without the Contact

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Abstract:

Have you wished you had more classroom hours to cover more difficult concepts, allow for more exam reviews, and cover prerequisite material that many students desperately need help with? Do the questions "Will there be a review day?", "Can we go over the exam we just got back?", "What if our computer skills are weak?", "How can I strengthen my math skills?" come up often in your classes?

Screen Capture and Video-Based Learning Objects have been used to supplement classes, reinforce difficult concepts, and even "Flip Classrooms" where videos have been used to replace what often was presented as in-class "lectures." As I celebrate my 42nd year in the college classroom, I now realize that the two most important implementations which have enhanced student-centered learning and retention are mastery-based learning, and the use of multimedia reusable learning objects as a supplement to, and yes, sometimes as a replacement for "lectures," leaving class time for student-centered activities.

Presenter Bio:

Steve has been attending and presenting at ASCUE since 1990. He is an Associate Professor at the University of South Carolina Sumter and over the course of his 42 years in university classrooms has taught Statistics, Math, Computer Science, Web Design, and .Business Research Design , and BOWLING!

Revitalize Your Online Class with Increased Student Engagement

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Abstract:

Creating effective and engaging course content in online classes can be challenging, especially for those who are new to teaching in the online environment. This session will reveal some challenges, failures and successes learned from developing and teaching an online class. Specific tools and course design modifications that were incorporated into the class in an effort to improve student participation will be discussed. A general discussion forum, for example, was unused the first semester the course was taught. The next semester, a small adjustment contributed to students posting over thirty questions, answers and comments to that same forum. The maturation of assignments and assessments will also be reviewed, with a focus on how student interaction and participation have been incorporated into those components of the online course. During the presentation, attendees will have the opportunity to use and evaluate some of the tools that have been integrated into the course.

Presenter Bio:

Ariana Baker is the Distance Learning Librarian at Coastal Carolina University, where she works with faculty to incorporate library resources into their online classes. In addition, she has taught online library courses for the past three semesters.

Streamlining Coordination and Communication in Online Program Development

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Abstract:

The Ohio State University Office of Distance Education and eLearning has grown rapidly and there was a need to document a process for online program development. A recent initiative was launched to meet with all of the parties around Ohio State who play a role in online program development and ascertain their individual processes. The end result of this initiative was a complete phased plan of online program development identifying all of the involved parties around campus, their roles and responsibilities, and how they interconnect. This discussion will focus on the process used to ascertain and create the plan for online program development at Ohio State as well as share what was found to be best practices to ensure proper communication and resource allocation throughout the process. Beyond this sharing, this discussion will ask for audience participation to share what has worked at their institutions.

Presenter Bio:

Jacob is an Instructional Designer in the Ohio State University Office of Distance Education and eLearning. Jacob works with faculty on instructional design projects to adapt courses and pedagogy for the web. Jacob is a Quality Matters Master Reviewer.

Working Toward Maintenance-free Classrooms

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Abstract:

With shrinking budgets and increasing demand for BYOD and classroom capabilities, college IT departments are in a crunch. We've worked to find the best solution at the lowest cost for classrooms that are inexpensive, digital, and user-friendly. This will be an opportunity to share solutions from your school as well.

Presenter Bio:

Shawn is Educational Technology Manager at Augustana College in Rock Island. He has an M.S. in Instructional Technology from Western Illinois University. Other ed tech interests include Moodle, digital video, and retro computing on the Apple II.

Capturing Qualitative Data using Technological Aids

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Abstract:

Conducting phone interviews and transcribing the results during qualitative research can be a tedious time-consuming process. This session will focus on a technique developed that streamlined the collection and categorization of qualitative data. Multiple technologies were combined to record the phone conversation and transcribe results. Using Google Voice, the researcher was able to record and download an audio file of the conversation. Then, using Rev.com, that audio file was uploaded and transcribed. Finally, the data in the transcription was coded and categorized. This inexpensive solution saved hours worth of analyzing and provided a higher level of accuracy. This presentation will focus on the details of this process and the challenges faced and overcome during the implementation.

Presenters' Bios:

Suzanne has over 25 years teaching experience in public school and higher education. She is currently a member of the Business Department faculty at Sweet Briar College in Virginia. Her research interests include assessment, career & technical education, and gardening!

Tom Marcais is the Technology Integration Specialist at Washington and Lee University. He facilitates the use of technology for university staff and faculty with a focus on support for the sciences.

Impact of 802.11AC GigaBit WiFi and How to Plan for it on a Limited Budget

Thierry Chau
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Abstract:

Gigabit 802.11AC WiFi is now the latest wireless standard which promises to address capacity, but multiple development wave's (literally) is confusing. This presentation will discuss what's different with 802.11AC Wi-Fi technology for both WAVE 1 and WAVE 2 and why does it matter. We will explore if these new technologies make sense for various applications and use cases as well as how to solves WLAN related issues such as sticky clients, dynamic channel selection, interference, and how to best deliver WiFi performance for all users, while not breaking the bank.

Presenter's Bio

Thierry Chau is the Regional Sales Manager for Ruckus Wireless for the past 4 years. He is a long time veteran of the technology industry with over 20 yrs experience with over a dozen of those years specifically in wireless business.

I Walk the "Online"

Cathleen Goode
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Abstract:

"I keep a close watch on this heart of mine. I keep my eyes wide open all the time. I keep the ends out for the tie that binds. Because you're mine, I walk the line." Johnny Cash may have walked the line, but at Brookdale Community College we walk the "online". Information about the full-service online advising model offered at Brookdale Community College will be shared, including the history and timeline of this project. Some of the pitfalls of implementing such this model will be revealed. Additionally, a demonstration of how Adobe Connect is used in our online advising sessions will be given.

This presentation was given at the 2012 Annual Conference of the National Academic Advising Association (NACADA) in Nashville, TN. It was selected as one of only three to receive "Commission-Sponsored Status" by the Distance Education Advising Commission.

Presenter Bio:

Cathleen Goode, Ed.S. has been serving students in the Counseling & Advising Division since 1988 and has received numerous honors for that service, including the 1998 Counselor of the Year from the New Jersey Community College Counselors Association. She also teaches Psychology and Sociology.

In 2004, Marlena Frank earned her Master of Science degree in Counseling Psychology from Northeastern University. Marlena currently works in the Counseling Department where she provides academic, transfer, career and personal counseling to the general population of students. She also enjoys working closely with students registered through the Office of Disability Services and student athletes. Marlena created, and is currently Chairing, the Online Advising Committee in the Counseling Department. This committee is responsible for promoting online contact with students by way of social media sites, a blog page and an updated department website. Most recently, the committee created an Interactive Distance Counseling Model and has initiated the process of counseling students online via Adobe Connect, a web conferencing software.

No More Lone Rangers – A Team Approach to Online Course Development

Kim Hunter
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Abstract:

In an effort to respond to the growing interest of online learning, Mount Saint Joseph, a small liberal arts university in Cincinnati, Ohio, launched an initiative to offer 3 fully online programs in late 2012. The Mount hired consultants to assist with development of predevelopment, course development and course delivery processes. Using a backward design perspective, the Mount has identified strategies to assure quality online programs that meet measurable objectives that are aligned with program and course-level assessments, The team-based approach to course creation totally separates course design from course build and course delivery.

In this presentation, participants will view a demonstration of a variety of strategies that have been successful in the Mount's blended and online courses. The session will begin with an overview of the Predevelopment, Course Design, Course Build and Course Delivery processes. The presenter will discuss the course design team composition and many other aspects.

Presenter Bio:

Kim Hunter is the Director of Institutional Technology at Mt. St. Joseph University in Cincinnati, Ohio. Kim joined the Instructional Technology team after 20 years as a faculty member coordinating and teaching in the Computer Information Systems programs at Mt. St. Joseph and the University of Toledo. Kim earned a MBA and BBA from the University of Toledo. Kim has been teaching online courses at the Mount since 2008.

Motion Based Video Gaming: Fitness, Pedagogy, and Technology Support Considerations

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Abstract:

83% of American children between the ages of 8 and 18 own one or more video game consoles. Motion-based video gaming (MBVG) systems, such as the Xbox Kinect and Nintendo Wii, promote exercise through utilizing technology that tracks human body movements and reactions during game play. These MBVG's are fun, provide a method of caloric expenditure, and may provide an opportunity to learn skills through a video game that can be applied to an authentic sporting environment. As MBVG technology becomes more accessible in educational, fitness, and recreation settings, it is important to understand how MBVG's can be used as an effective pedagogical tool for students to become more active. Furthermore, instructional technologists must become aware of these technologies and understand considerations when creating and supporting an "Exergaming" facility. Attendees will get the opportunity to play the Xbox Kinect MBVG system.

Presenters' Bios:

Dr. Seth Jenny is an assistant professor in the Department of Physical Education, Sport and Human Performance at Winthrop University where he created the course "Technology in Physical Education." He is a former K-12 health & physical education teacher and U.S. Air Force exercise physiologist.

Physical Security on Campus

Charles Johnson
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Abstract:

Access Control software solution that will allow customers to manage and control what doors and buildings all faculty, staff, students, contractors and visitors have access to and what areas are restricted. Topics discussed will include proprietary vs open architecture as well as technology advancements in door and building access management, biometrics on campus, having the ability to lock down a building or campus and the benefits of integrating your access management system with your video camera system.

Presenter Bio:

A 20 year veteran of the electronic security industry who has worked on the installation, sales, software manufacturing and biometrics industry. Father of five children, spouse to a public school teacher, lover of hunting, fishing and tennis.

Establishing a Distance Learning Framework for the Institution: Part II

Sali Kaceli
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Abstract

As online education continues to be a critical component of the long-term strategy of the institution, establishing a Distance Learning Framework is key to ensuring quality online education and at the same time meet federal and accreditation requirements.

This session is part II of what we presented last year and covers additional key components , the formalized course development process. The session also goes into detail on the best practices and findings at our institution as well as establishing new policies to comply with various new requirements in order to offer and support 4 new online programs starting in Fall 2015.

Presenter's Bio

Sali has been serving as Director of Educational Technology and Distance Learning at Cairn University since February 2012. Prior to this position, he served as Manager of Academic Computing for the 14 years for the University.

Creating a Predictive Analytics Model with Free Software

Steve Knode
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Abstract:

Within the last year predictive analytics has become the hottest aspect of analytics. Among other things, being able to "predict" fraud, customer churn, student dropouts, hospital re-admissions, likelihood of responses to solicitations, etc. has become important for organizations to maximize their performance.

Predictive algorithms, although complex and often confusing, are becoming easier and easier to apply. With advanced computers and easy-to-use software now available to assist with the computational burden, the emphasis is moving to an understanding of the techniques used and the ability to fully explain and implement the insights from the predictive modeling.

In this session, I will demonstrate and discuss how quickly a predictive analytics model can be developed with free software. Powerful free software utilized in the Masters in Data Analytics (MSDA) program at the University of Maryland University College (UMUC) will be featured in the model development.

Presenter Bio:

A faculty member, Steve develops and teaches graduate courses in data analytics at the University of Maryland University College. He has an extensive background in data analytics, artificial intelligence, emerging technologies, decision support systems, quantitative methods and decision-making.

Assessment Tools and Strategies for Non-Teaching Faculty

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Allison Faix
Coordinator of Reference Services
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Horry Georgetown Technical College
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Abstract:

This session will cover assessment tools and strategies for academic librarians and other "non-teaching" faculty. The presenters will suggest ways in which educators teaching non-credit bearing classes can both evaluate their work and document classroom success. They will compare popular instructional tech apps – such as Socrative, Poll Everywhere, Padlet, etc. – and weigh the pros and cons of more traditional methods of receiving feedback (e.g. online and paper surveys) as they are used in different on-campus environments. They will also briefly discuss quantitative versus qualitative data collection, the challenges in meeting current professional association standards as well as the requirements of accrediting bodies, and other important considerations when it comes time to draft learning outcomes for specific courses and disciplines.

Presenter Bio:

Amanda Kraft is the Electronic Resources Librarian at Horry Georgetown Technical College. In addition to ERM and mobile tech troubleshooting, she is in charge of reference and instructional services at HGTC's Grand Strand Campus Library and coordinates social media for all three library branches.

Allison Faix is the Coordinator of Reference Services at Kimbel Library, Coastal Carolina University.

Tech Talk Sessions

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Abstract:

We are aware of the interest in and use of technology across all the departments at Sweet Briar. We wanted to find a way to continue to gauge the interest of students, faculty and staff in learning ways to expand their current knowledge and expertise in various technologies. We are pursuing two additional ideas this semester as part of what we are calling "Technology for the Liberal Arts" (TLA).
The first initiative is TechTalk Thursdays," a series of five interdisciplinary lectures by Sweet Briar faculty on Technology for the Liberal Arts" (TLA), were held during lunch this past semester. The other project is the development of a Technology Certificate based on an interdisciplinary curriculum.

Presenters' Bios:

Tom Marcais is the Technology Integration Specialist at Washington and Lee University. He facilitates the use of technology for university staff and faculty with a focus on support for the sciences.

MJ Clark is the Academic Technology Coordinator at Sweet Briar College. She is responsible for installing and maintaining the hardware/software in the computer labs and classrooms on campus.

Providing Cloud-Based Virtual Workspaces to Students, Faculty, and Staff

Clif Morgan
Solution Architect
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Abstract:

While providing virtualized applications and desktops is proven to bring real transformational benefits such as Business Continuity, BYOD, Remote Secure Access and Increased Productivity, the adoption rate is less than 10% for these technologies in the marketplace. Analyst firms attribute these low adoption rates to obstacles that involve cost, complexity and lack of certain functionality. In addition, analyst firms state that over 50% of projects of this nature fail or fall disappointingly short of achieving stated objectives. Well implemented, Cloud based, virtual workspace services offer the potential to overcome obstacles and increase the probability for project success. This presentation will provide a discussion of the obstacles and risks of virtual workspaces projects and our experience in overcoming them in the higher education space. At the end of the presentation, participants should have a greater understanding of the steps required to ensure the successful envisioning, socializing and implementing of virtual workspaces projects leveraging the Cloud.

Presenter's Bio:

Clif Morgan is a Solution Architect in the Cloud Services business unit at Dell Inc. While studying programming at a local community college in 1993, he began his IT career as a second shift computer operator in a chicken processing facility in North Carolina. Since then he has held many roles in desktop, data center, management and consulting across many verticals such as banking, manufacturing, higher education and consulting. In his current role, Clif is the pre-sales subject matter expert for Dell's portfolio of Cloud based virtual workspace services.

Using Quality Matters for Course Development Internal Reviews

Carmen Morrison
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Abstract:

With the rising cost of college tuition, higher education institutions face increased scrutiny and a call for evidence of a high-quality educational experience. Some states are even adopting performance-based funding models, with the promise to deliver graduates on time or forfeit funding. With the increased pressure to improve student retention and success (frequently on a restricted budget), how can faculty improve the quality of their online and hybrid courses? By identifying a standard to measure each course's effectiveness, establishing a peer-review process, and providing professional development opportunities, faculty are more prepared to meet the demands to develop and deliver exemplary courses. Even with budget cuts and a diminishing pool of full-time faculty, our college was able to adopt the resources provided by the internationally recognized organization, Quality Matters, and create the framework necessary to develop and continuously improve our online and hybrid courses.

Presenter's Bio:

Carmen Morrison enjoys the diversity of her roles at North Central State College as a faculty member, Program Coordinator, and Distance Learning Faculty Mentor. She enjoys the challenge of continuous improvement in her classes and the privilege to work along side brilliant minds in higher ed.

Wireless Mobility without Limits

Gen Olds
Network Access Control Specialist
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Abstract:

Aerohive Networks unleashes the potential to move applications to the air, and maximize employee and student learning productivity. The company's cooperative control architecture eliminates costly controllers, saving money and providing unprecedented resiliency, up to 10X better application performance, and an opportunity to start small and expand without limitations to address the rapid increase of personal mobile devices within campus environments. Having been recognized as the "most innovative" vendor by Gartner in their Wireless and Wired LAN networking report for the last three years is a testament to Aerohive's ability to provide the best WLAN solution to Enterprise and Education customers.

Presenter's Bio:

Gen Olds has been with Aerohive Networks since October 2014. Previous to Aerohive Networks, she was with Impulse Point for 9 years, who specialized in Network Access Control and has worked almost exclusively with the education vertical for the past 12 years.

Free & Easy Project Management Software

Mark Poore
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Abstract:

Zoho Projects is a free and easy projection management tool. This session will describe and demonstrate how Roanoke College uses it to plan, track and collaborate on the multi-year migration of its Ellucian Colleague ERP system from Unidata to Microsoft SQL. Besides basic project planning tools, Zoho Projects boasts a dashboard, charts, reports, mobile app access, and a bug tracker.

Presenter Bio:

Mark Poore is the Director of IT Projects at Roanoke College. He is responsible for overseeing all IT project requests and managing the IT project portfolio. Before coming to Roanoke College in 1997, he held several IT positions in software development companies.

Just the FAX Ma'am. FAX in the Digital Voice World.

Bill Ramsay
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Abstract:

Berea College has implemented an IP phone system and moved to a digital SIP connection to the public phone network. Fax machines do not fit in to this environment. We will review the approaches we have tried and discuss issues surrounding alternative fax services including requirements, cost, international coverage, administration and security. Finally we will demonstrate the alternative fax solution we have implemented.

Presenters' Bios:

Bill Ramsay serves as a senior analyst with the Berea College department of Information Systems & Services. Bill has been a programmer, analyst and IT manager in both manufacturing and higher education over the past 35 years. He lives in Berea, KY with his wife Anne and enjoys 4 grandchildren.

Student-Centered Scheduling

Charles Smith
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Abstract:

More and more schools are starting to incorporate student course needs and preferences when time slotting courses. Traditional class scheduling models only take faculty and facility resources into account. The presenter will describe the advantages of considering student availability when time slotting courses and highlight the costs and benefits of doing so. Results from three case studies will included in the presentation.

Presenter's Bio:

Mr. Smith has been developing systems for over fifty years. He graduated from Cornell University in 1969 with a Bachelor of Science degree in Industrial Engineering and Operations Research. He received his Master of Science degree in Industrial Administration from Carnegie-Mellon University in 1973. Upon graduation, Mr. Smith joined Arthur D. Little, Inc. in Cambridge, Massachusetts as a Senior Consultant in the Operations Research Group. Most assignments required definition of new control methods for clients who found themselves strapped by their existing systems. Most involved introduction of modern computerized control techniques. In 1981, Mr. Smith joined Hercules, Inc. in Wilmington, Delaware as Manager, Operations Research. In 1996, Mr. Smith joined Applied Business Technologies, Inc. of Newtown Square, Pennsylvania as Vice President and General Manager. Mr. Smith is currently President and General Manager of ComQuip, Inc. In its seventeen years, he has grown the company to serve hundreds of higher education and government clients throughout the United States. He has been a guest speaker and member of APICS, the Operations Research Society of America, The Institute of the Management Sciences, and the Council of Logistics Management. Mr. Smith has been a guest lecturer at the Amos Tuck School of Management, Dartmouth University.

Online Program Assessment Rubric and Process

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Abstract:

Are you constantly looking for ways to manage your day through digital organization? Do you have to manage faculty and staff that are not always in the office? Do you need ways to collaborate on projects and ensure your team is working together toward its goals?

Trello is an organizational tool used by Campbell University Online's campus for project management, employee management, and goal setting/tracking.

For this workshop, you will need to bring a laptop or a tablet. You should create a free Trello account prior to arriving at www.trello.com.

Presenter's Bio:

Katherine Spradley has served as the Director of Campbell University Online and Online Education since 2010. Prior Katherine served as the Coordinator for Instructional Design and Training.

Reading, Relating, and Responding: Using Technology to Engage Readers in a Literature Course

Krista Stonerock
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Abstract:

One of the greatest challenges in the teaching of literature is finding ways to empower students as readers and actively involve them in the process of making meaning. In many literature classrooms, students passively receive information from a professor, who offers his or her own interpretations of the assigned reading. In a move toward active learning, class discussion has taken the place of the lecture; however, many students still struggle to find value in their ideas and confidence to voice them. This presentation will examine the ways technology is being used in a hybrid literature class to empower and actively engage all students in the study of literature. Some examples of the technologies which have enhanced the literature class experience include the following: online linking and sharing of texts, integrated video and film, discussion forums, multimedia presentations, interactive SMARTboard use, and use of technology to dramatize literature.

Presenter Bio:

Krista Stonerock has been teaching writing for over twenty years at Ohio Christian University, where she also serves as the Writing Program Administrator and Director of the OCU Writing Center.

Information Technology in Higher Education - 2014 Survey Results of CIOs

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Abstract:

To get a complete picture of IT on campuses today, the Leadership Board of CIOs surveyed a broad range of colleges and universities in April and May of 2014 to collect strategic and tactical information on major issues that higher education CIOs face. Survey questions included financial and budget information for IT; organizational and governance questions; personnel and staffing questions; infrastructure and networking questions; security; questions about consumerization; administrative computing plans; strategic planning for IT; academic technologies, etc..This survey was developed as a global survey to provide CIOs with key metrics to help them do the work of managing and planning IT for their institutions. Designed to simply tell the story of what CIOs are currently doing and their thoughts about the future. Results from the survey will be shared.

Presenter's Bio:

Dr. Tina Stuchell, Executive Director of Information Technology is in her 24th year at the University of Mount Union. She holds her Bachelor of Science in Information Systems from University of Mount Union, Master's of Arts in Management from Walsh University and Ph.D. from Nova Southeastern .

Access Control - Changing systems

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Abstract:

After reaching a point where the old system had become none sustainable, Young Harris College decided to move to another access control vendor. This will document the journey, hurdles and lessons learned about moving vendors in the access control environment.

Presenter Bio:

Hollis Townsend is the Director of Technology, Support, and Operations at Young Harris College. With over 20 years in the Higher Ed environment and another 15 plus in the commercial arena. He has worked in most areas of IT from Net Admin, Sys Admin, DBA, Phones, Virtual, Security, and management.

Sip Trunking as a Replacement for Traditional Telephone Lines

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Abstract:

This session will cover how Young Harris College leveraged SIP trunking to lower campus telephone expenses and increase services. This will cover an executive level overview for the basics, then a short technical dive to cover technical requirements, political issues, and then also the lessons learned section.

Presenter Bio:

Hollis Townsend is the Director of Technology, Support, and Operations at Young Harris College. With over 20 years in the Higher Ed environment and another 15 plus in the commercial arena. He has worked in most areas of IT from Net Admin, Sys Admin, DBA, Phones, Virtual, Security, and management.

The Power of Three – A Social Media Strategy in 3 Words

Steve Weir
Website Coordinator and Board Member for ASCUE
Association Supporting Computer Users in Education
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Abstract:

Social Media is here to stay (for now) and we all need help with how to use these platforms effectively. But the power of social media isn't in the platform. It's in the strategy. In this session we'll cover how to create a culture in your classroom using social media and then give you a three word social media strategy.

Presenter Bio:

Steve has worked in Educational Technology for 14 years and currently serves as Director of Technology & Communication for a non-profit organization in Newtown, PA. He is also the Website Coordinator and Board Member for ASCUE, and led the rebranding process.

Presenters Index

Dmitri Gusev	Purdue University School of Technology
33	
Kim Hunter	Mount Saint Joseph University
100	
Jonathan Hurt	Aerohive Networks
109	
Seth Jenny	Winthrop University
101	
Charles Johnson	Open Options
102	
Sali Kaceli	Cairn University
103	
Steve Knode	U. of Maryland University College
104	
Amanda Kraft	Horry Georgetown Technical College
105	
Tom Marcais	Sweet Briar College
8,97,106	
Clif Morgan	Dell, Inc.
107	
Carmen Morrison	North Central State University
109	
Scott Moser	Tri-County Technical College
42	
Gen Olds	Aerohive Networks
109	
Mark Poore	Roanoke College
110	
Bill Ramsay	Berea College
111	