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An Experiment in Defining the Academic Discipline of System Administration

Summit for Educators in
System Administration 2013

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"What are you going to teach?"

An obscure Barnett Newman interview quote about Abstract Expressionism: "The problem for a painter is: What are you going to paint?"

For an academic program in System Administration, the problem is similar: "**What are you going to teach?**" What does an academic program need to contain for it to be and stay relevant?

Challenge Questions for SESA

Is an academic degree in System Administration even needed? Why?

What do students expect out of such a degree?

What do they expect out of a System Administration master's degree?

Does employability after graduation matter? To the program? To the student?

What do/will employers expect when they see "Master of Science in System Administration" on a resume?

Are current System Administration academic programs meeting expectations?

— Expectations of students, the program and university, the employer. Are there other stakeholders?

— Are we teaching the things employers and students want? That they need to succeed? **What defines "success?"**

— Do we agree that a very product-specific study is probably not academia and that a purely theoretical study is probably not a trade? In that range, where does the sysadmin degree fall?

— We don't (I assume) teach 16th century Hungarian poetry in order for people to enter a **hot job market.** Can we assume that we don't teach sysadmin in order for people to become edified on the human condition while waiting tables?

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Exploring these questions with some real students

- Visiting adjunct at HiOA, Teaching a master's course: "Network and System Administration II"

- Students are nearing graduation, several are working or have worked as professional sysadmins

- A great informal laboratory to explore questions about the profession and the **academic foundation of system administration**

- Asked discussion questions, followed up with formal written assignments to explore this topic

Experiment one: defining sysadmin from the student's view

1. Around 30 master's students in the HiOA System Administration programme

2. Asked an open question, define the academic discipline of "System Administration"

3. Premise: **Graduate students should have some strong, relatively convergent ideas**

4. In other disciplines, you might expect answers like:
   — Computer Science: The study of algorithms and logic
   — Computer Engineering: The study of lifecycle processes
   — Information Systems: The study of business applications in technology, or maybe the study of human use of systems

Experiment one early results:
These words were thrown out in the room

- stability
- creativity
- services
- availability
- breaking
- **users**
- maintaining a system
- bigger picture
- build and connect systems
- security
- downtime
- keep up to date
- services interoperability

- storage
- redundancy
- new technology upgrades
- disaster recovery
- **depends on the industry**, must be SME
- installation
- network QOS
- keep things running in a safe manner
- sometimes development/automation scripting
- communicate with users
- scalable

- smart solutions for problem prediction, backups, failure prediction
- users roles
- border security
- patching
- trouble tickets
- Troubleshooting
- **market surveys/cost estimates**
- licensing
- change
- config
- training

Experiment one continued:
The written paper, a sample excerpt (1/2)

1. "Modern organizations, regardless of what they specialize in are dependent on an efficient, fast, secure data network backbone in order to be able to do their business. The **network of workstations, servers and various devices like telephones, wireless routers, printers, etc** is necessary for the organization to work as a team whether they sit in the same room or co-operate from different parts of the world. It is crucial that the resources needed for the team of co-workers are **available** when they're needed and can be accessed in a **secure** and a fast way often from a centralized pool or a cloud."

2. "This task requires smart and both short and long-term oriented **planning**, hard work to put all the pieces together and continuous **maintenance** in order to ensure that the system is up and running with minimal or no downtime."

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Experiment one continued:
The written paper, a sample excerpt (2/2)

3. **"The process of planning, implementing and maintaining such a network is called system administration** while the person responsible is the system administrator."

4. "The system administrator might be working alone, as a **leader** for an IT team or together with fellow sysadmins."

5. **"Defining system administrator's duties is a tricky job** as there are no clear definitions as to what exactly system administration comprises and where exactly the borders between system administrator and say network technician, IT consultant, IT specialist or a network engineer are drawn."

Experiment one, analysis of the sample paper

1. Defines the working environment, but no theoretical aspect. **This is all about what job we have**. Defines a support role, that the "team of co-workers" is doing a non-IT function and IT supports them.
2. Scopes in the skills needed to do a task, seems like the student is starting to write **a job description**.
3. Defines system administration as a process. Would this definition be better suited for a "system engineering" role?
4. Refines the definition to talk about management and teamwork. **Do you agree this is a core sysadmin function?**
5. Defaults to indecision and leaves the reader to define sysadmin using terms of other established job titles.

Experiment two: Discovering the job market

— Around 30 master's students in the HiOA System Administration programme

— Asked them a "raise hands" question, "who here has looked at job posting in the last 7 days? In the last 30?"

    — Results: maybe 10% or less raise hands

    — (similar result at University of Tampa last year)

— Did an in-class survey of job boards around the world

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Experiment two: Results, these terms were discovered in 20 minutes of job searches

- vshpere, networking (vm), storage
- support and operation, networking, users support, purchase, pc, smart phones, tablets, **training**
- tomcat, weblogic, B&R solutions, tuning optimization linux, solaris
- **architectures**, security infrastructure
- vmware, hyper-V
- centos, mysql, apache, ldap, **communication skills**
- sysadmin, microsoft technologies, remote support
- security systems, **physical security**
- hpux, linux, cisco, sql, oracle, veritas backups
- NAS, SAN, bash, perl, python
- BES, antivirus, firewalls, MS 2003, 2008, XP
- DNS, DHCP, AD, TCP.IP, LAN/WAN, Exchange 2007 XP, 2008, W7, Office, VMware

Experiment two assignment: Market survey

Student paper sample (1/3):

"Jobseekers in US and Canada are asked for having at least a bachelor's degree in a related field of study and 35% of them are also asked to have a **valid certificate** from Microsoft (e.g. MCSE, MCITP) or Cisco (e.g. CCNA, CCNP) which means that academic acquirements play an important role to find a proper job in the western countries. In the same way, the number of companies in Asia which are looking for system administrators who are holding bachelor's (or higher) degree, are incredibly high and it is near to 90%. However this is quite different in European countries which are mostly looking for **previous work experience** rather than an academic degree. Finally, beside the other abilities, **ability to documentation, writing and reporting properly as well as having good skills of communication is highly required by most of employers**. "

Experiment two assignment: Market survey

Student paper sample (2/3):
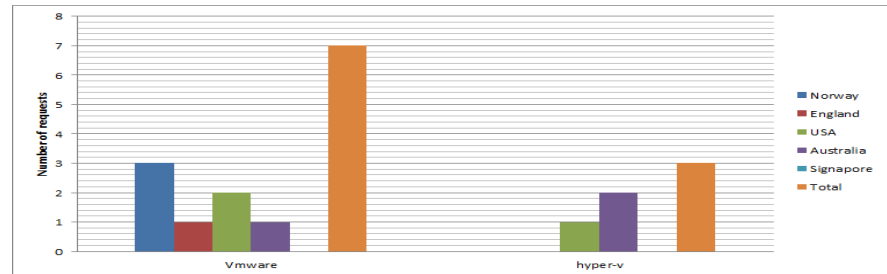
"As can be seen from the graph VMware is the most requested virtualization technology/brand. Personally this was what I expected to begin with. What I find more interesting is the existing technologies that are lacking from the graph. **In particular I am surprised that none of the typical Linux virtualization technologies (such as XEN and KVM) are represented**. I find it especially interesting because Linux as an operating system was well rep-resented in the previous graph. This raises a question as to why they do not use the built-in virtualization technologies in Linux, when they do so in Windows (Hyper-V is well represented). Could it be that they feel that the virtualization technologies in Linux are not production ready yet, or that they lack experience/competence? This is of course only speculation, but it would be interesting to find out why it is lacking."

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Experiment two assignment: Market survey

Student paper sample (3/3):

This is quite a big description which requires tons and tons of **experience**. So the question is, what is defined as the most important technologies to know? What will get you the job? What is ABSOLUTELY necessary? What can be pin pointed as basic necessary skills for a system administrator? What is the industry standard? **The industry uses the term the system administration over a widespread of different tasks within a working environment**. As they should, because this is a field which expands over many different technologies. As discussed in the previous paper, a **system administrators most important job is to be a problem solver**. To be a problem solver in the computer environments today, **the skills and prerequisites required are the ones set by the industry itself**.
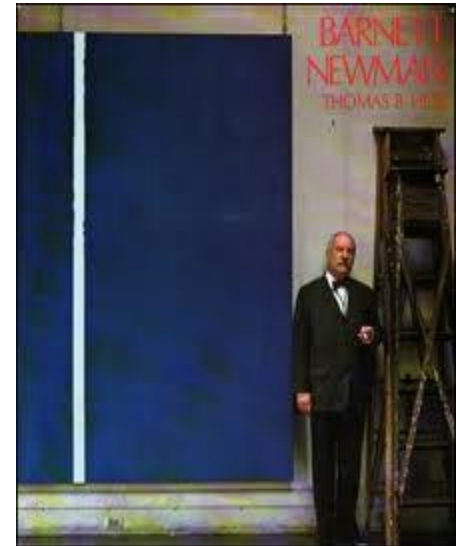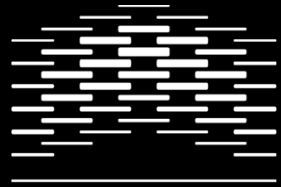
Drawing early conclusions

— A professional system administrator's skills aren't defined by academia, they're defined by industry

— With relatively little effort, we can map the job market's needs and prepare students for a realistic entry

— Senior sysadmins are expected to know non-system things like documentation, team skills, management

— Certifications count, so does practical experience

— There are regional differences in market expectations; we can teach to these differences relatively easily

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Recommendations

— Understand the market's needs, trend and predict to adjust teaching topics for emerging needs … maybe annually

— Understand and define what the market expects out of a sysadmin degreed person, ensure students know this early

— Understand and help guide what the student expects out of a sysadmin degree

— Encourage and provide for certifications as a side-effect of the academic program

— Teach soft-skills like documentation, team leading, and IT processes … the things that are found in professional senior sysadmins

— Teach troubleshooting as a stand-alone concept

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