

## Broadcast Engineering and IT: Bridging the Cultural Divide

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April 10, 2015



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# A Perspective on the “Two Cultures”

“It is dangerous to have two cultures which can't communicate”

-- Lord C.P. Snow, 1959



# Today, Snow might be critical of ...



**Software Engineers**  
*...who reduce users  
to a “test load.”*

## Broadcast Engineers

*... “natural Luddites” who are  
unable to understand the software  
revolution, much less accept it.*



# Engineering and IT in the TV Environment

**The IT industry has transformed television, but what do they know about content creation?**

*The process may now use different technology to facilitate what we do, ... but it is not a fundamental change in terms of the creative process*

-- SMPTE Fellow, John Luft



*Silicon Valley reduces causes and cures to pure mechanistic explanations of the world and its problems*

-- San Jose State anthropologist Jan English-Lueck



# Quotes from Broadcast Engineering Execs

“Support could be a category of requirements and pain points unto itself”

“The key issue is the identification of who is accountable for the support. Right now, people don't know who to go to for various forms of tech support”

“IT software and hardware purchasing slows things down for broadcasting hardware requests”

“There is frustration that IT and Broadcast run projects differently. Broadcast does not use a lot of PMP approaches that are synergistic to IT”



# Typical Practices within Cultures



- Live Broadcasting
- Precise Measurements
- Single-function Appliance
- Design
- Redundancy/Failover
- Migration

- On-Demand/Download/Streaming
- Statistical Estimates
- Multi-function Platform
- Agile Development
- Reboot
- Disruptive Revolution



# Typical System Support SLAs



## Broadcast Systems focus “fix it”

- 9x5 technical phone support, equipment repair, software update and remote diagnosis
- Options for 24x7 technical phone support and advanced exchange of parts
- Options for onsite support and critical on site spare kit

Source: Thomson Broadcast public website , 2013 –  
<http://thomson-broadcast.com/wp-content/themes/thomson/pdf/sla.pdf>

IT Software Systems focus  
“acceptable downtime”

Service	Agreed SLA	Actual Performance
E-Mail	98.9%	80%
Internet	98.99%	95%
Antivirus update	100%	100%
LAN Uptime	95.9%	98%
HR Application	99%	99 %
ERP Application	99.9%	100%

*Example SLA management chart for a set of services.  
Company unnamed.*



# Broadcast Engineering Roles

Manage all engineering aspects of the technical facility including:

*Studio, Editing systems and transmission  
of live/taped programs and events ...*

*...in a 24x7x365 news and/or  
entertainment production environment*

*...with attention to availability,  
performance, capacity planning, and  
implementation*

-- From public job descriptions and LinkedIn profiles



# IT Engineering Roles

Develop and execute engineering projects as assigned:



- *Independently or as part of a team...*
- *...including integration oversight,*
- *...in collaboration with system design and implementations resources*

-- From public job descriptions and LinkedIn profiles



# Broadcast Engineering Skills

- 5 years of broadcast/media facility experience, modern hi-def environment
  - All areas of television production and all studio production equipment
  - Control room, non-linear editing, IT, ENG, studio and remote technologies and systems
  - Audio and video signal measurement equipment, standards, and practices
  - Technical setup in file base editing systems -- Avid ISIS/Interplay and Apple Final Cut systems with archiving LTO systems
  - IT/network administration
  - Computer operating systems knowledge
  - Analytical reasoning and technical troubleshooting skills
  - BS in Engineering
- 
- A photograph showing three individuals in a broadcast control room. Two women are seated at a large control console with numerous buttons and a central screen. A third person is visible in the background. The room is filled with multiple computer monitors displaying various video feeds and control panels. A clock on the wall shows the time as approximately 10:10. The overall environment is professional and technical.

*From public job descriptions and LinkedIn™ profiles*



# IT Engineering Skills

- Software development lifecycle, including the application design, testing, and release processes
- Administration concepts for Windows Server, Red Hat Linux, Oracle Linux, and HPUX
- Oracle DB2, MySQL, Sybase, Postgres, NoSQL database management and deployment
- Storage administration of EMC, Ibxix, Netapp, and/or 3PAR and related backup software

*BS in Computer Science or Electrical Engr. and 5+ years of recent experience in a television broadcast environment*



- OSX Client and Server, Open Directory and DNS, File Sharing, XSAN, Unix CLI, Scripting (BASH/Shell script, Applescript, Perl, shell, Python, PHP, JAVA, C/C++)
- Network protocols and standards (e.g. DNS, TCP, HTTP, FTP, SSH)
- Configuration Mgt tools (Chef, Puppet, Saltstack), system imaging, deployment, and monitoring with Splunk

*From public job descriptions and LinkedIn™ profiles*

# What kind of issues do these two approaches create in the modern broadcast environment?



- Never down, no dropped frames, minimal latency
- Drop everything “all hands on deck” 24x7 support
- Static appliance that “just works”
- Appliance switch outs
- 5-7 yr. depreciation

- Planned downtime, minimal viewer impact
- Acceptable buffering
- Trouble ticket, problem queue, and bug fix/ release
- Continuous patches
- Major software upgrades
- 2-yr obsolescence



# Radical Competitive Change enabled by Digital Technology

## Content Creation

- PBS
- ABC
- CBS
- Fox
- NBC
- Cable/Online Original Programming
- ... UGC

## Content/Asset Management

- OTA Broadcast
- Comcast/TW Cable
- AT&T Uverse/DIRECTV
- DISH Network
- Verizon FiOS
- Google/YouTube, Amazon Prime, Microsoft Xbox Live, Apple iTunes, Netflix, Hulu, and ... other VOD/OTT providers

## Content Distribution

- HD/UHD Televisions
- PCs / Laptops
- Tablets
- Smartphones
- Cars
- Outside Displays
- ... the Next Great Thing!



# Human Roles in Complex Systems

*Lessons from other engineering disciplines*

*“Increasingly, the most problematic technological systems to manage are complex networks –*

- Global automated financial trading,*
- Decentralized ubiquitous Internet,*
- Space vehicular systems,*
- Untested and unintended consequences of genetic engineering in live environments”*

-- Fritjof Capra



# Human Roles in Complex Systems

## *Lessons from other engineering disciplines*

When it comes to complex systems, the emphasis needs to be on making operators of technology more effective, instead of making machines more effective

The industry should consider systems that inform humans, rather than blindly automate and delegate important and risky operations to machines.

*"As technologies become more complex, engineers will find it increasingly necessary to take human performance and, eventually, organizational factors into account in their designs "*

-- Robert Pool

# Where are the skills sets headed?

*Entirely IT-based networks will be used to transport video around broadcast plants and distribute it to consumers*

- Resolution and frame-rate independent global infrastructure
- Multi-format ingest / transcode with automated QC
- EIDR UMIDs for video with flow thru metadata
- Scalable cloud-based storage, archives, collaborative production, and distribution
- Program automation and intelligent ad placement
- Ever-heightening security of networks and content
- Legal compliance of complex rights, licensing, payments, and local censorship
- Multi-platform content value and viewer analytics with privacy compliance



# Training for Blended Roles

Joint SMPTE - Stanford Center for Image Systems Engineering (SCIEN) symposia

*2014 Entertainment Technology in the Internet Age*

Non-traditional broadcast themes, enabled by Silicon Valley technology

- The Race to Premium
- Storytelling – Transmedia Style
- Quality Over the Internet: Oxymoron or the Future?
- Is The Technology of The Internet the New Standard For Quality Video?
- Sounding Good Over the Web: Accessible, Immersive, and Personalized Audio
- Live Sports Everywhere!
- User Data Coupled with Technology Can Facilitate Business Models Regardless of Platform or Device



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# Bridging and Blending the “Two Cultures”

*“ ... [we need] to make sure the next generation of industry professionals are savvy about not only the workflow, but also about the content creation process at a technical level, and how they inter-relate.*

*People need to know what is good imaging and what is not... We want them to have the institutional knowledge of decades ago and be able to apply and sustain it into the future.”*

-- SMPTE Fellow, John Luft



# Thank You

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