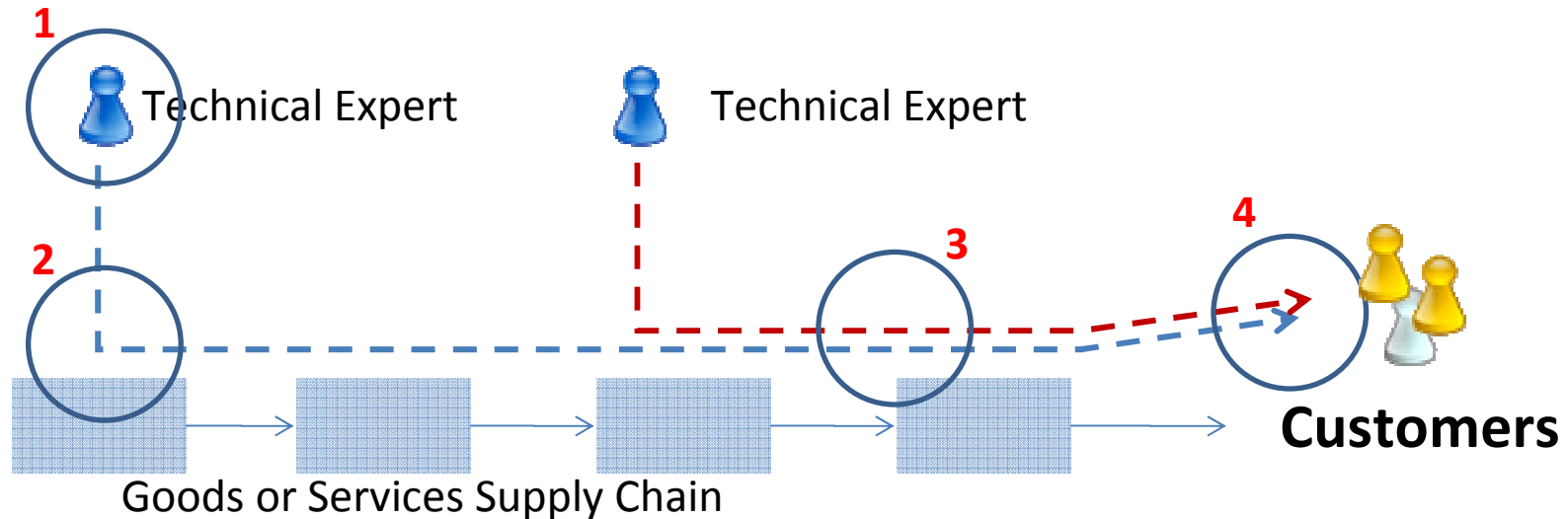


Building a video-based technical knowledge supply chain

Vic Uzumeri, Oct 2007
interactive Point of View

Technical Knowledge Supply Chain



- Four Challenges:
1. Generation
 2. Production
 3. Distribution
 4. Consumption

State of the Art

- Highly variable raw material (expert knowledge)
- Long cycle times
 - generation, production, distribution & consumption
- High activity costs
 - generation, production, distribution & consumption
- High error rate
- High loss rate
 - obsolescence, confusion & attrition

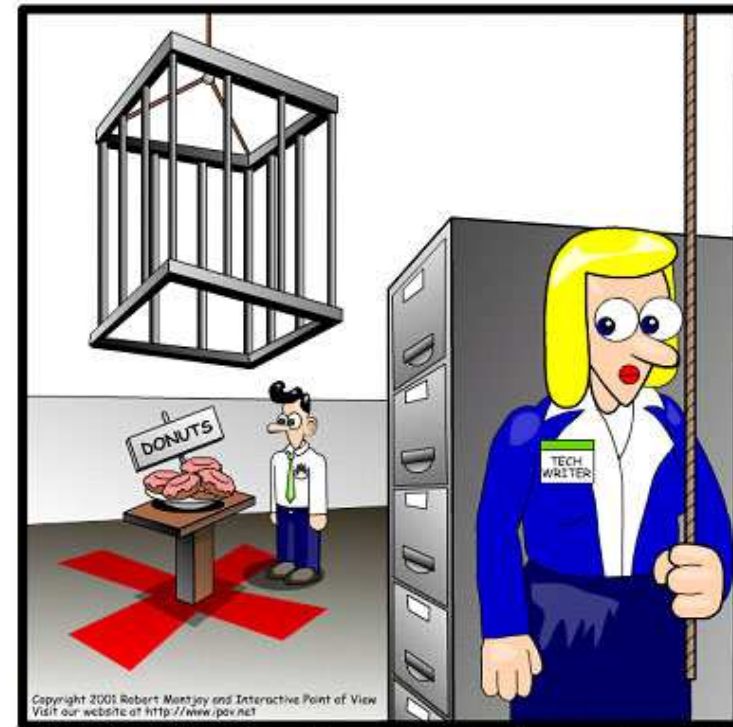
Knowledge Supply Chain Challenge

- The knowledge supply chain is the final frontier of lean thinking:
 - Contains multiple, constraining bottlenecks
 - Retards delivery and/or consumption of a wide range of goods and services.
 - Major source of error, loss and waste.
- It's mostly MUDA
- Not studied on a holistic basis.
- Minimal effort for holistic improvements.

KNOWLEDGE GENERATION

The Generation Challenge

- Experts are busy
- Experts are expensive
- Experts are not expert at communication
- Experts are retiring
- Experts are travelling
- Experts may not fully understand their own expertise



After three days of waiting, Barbara finally spots the S.M.E.

Simplified Video Capture Technologies

- Screen Capture Movie Software (\$45)
 - Make a movie of anything that can happen on a computer screen
- Digital Camcorders (\$500-\$1K)
 - Hard drive camcorders hold hours of digital video
- Solid State Camera (\$120)
 - Low cost, cell-phone sized video cameras



Insight: Knowledge in Video becomes Standard Work

- All behavioral complexity occurs in front of the camera lens.
- Regardless of the complexity of the knowledge that is recorded, all video falls into just two categories:
 - Contains audio that must remain synchronized to the video (e.g., lip sync)
 - Contains no audio or audio that can be asynchronous (e.g., no lip sync)

Insight: From Video to ...

- Informal, low-pressure settings elicit expert knowledge.
 - Active questioning encourages knowledge ‘yield’.
 - Video and audio capture entire elicitation session
- Derive other types of technical documentation from or the knowledge revealed in the audio/video record
 - text & graphics
 - classroom illustrations
 - software and simulations
- Video is the fastest and most cost-effective knowledge **capture** tool.

Insight: Reducing Camera Shyness

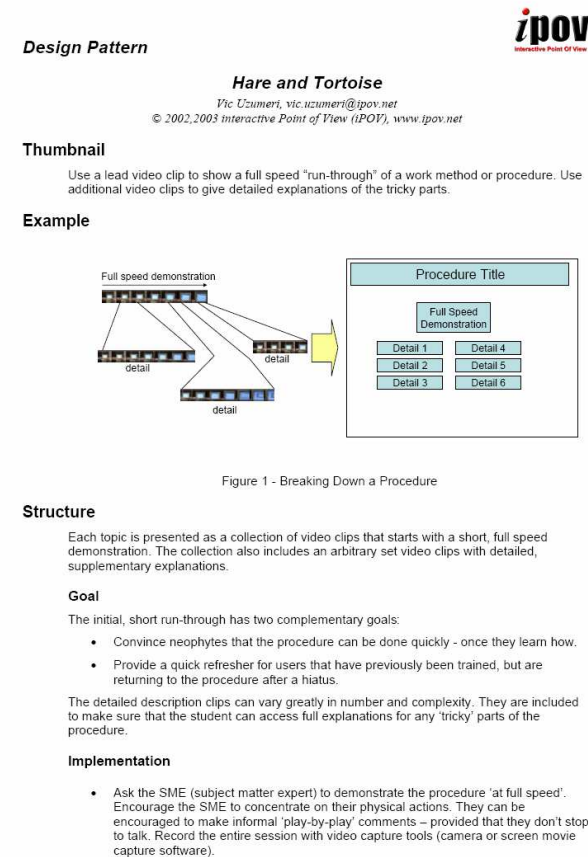
- In a video recording session, most mistakes occur in the audio portion:
 - Misspoken words, hesitations, coughing and ‘noise words’ (er, um, eh, etc.)
 - Key points are omitted
 - Comments wander off-topic
 - Script-reading sounds stilted
 - Interruptions and background noises
- Mistakes force multiple ‘takes’ and lead to frustration and resistance
- iPOV Solution:
 - Videographer avoids subject’s face and ‘moving lips’
 - not hard if videographer is creative
 - Review captured video with sound off – if visible action is good, it’s a wrap.
 - **Voiceover in production will eliminate ALL audio-related errors.**

Video Generation Opportunities

- Structured interview
- Physical demonstration
- Classroom session
 - If class members are active questioners
- Computer screen capture movie software
- Video-sharing (e.g., YouTube) portal
- Legacy videotapes

Insight: Design Patterns for Video-based Knowledge Capture

- Modeled after *Software Design Patterns*
- Standardized way to capture knowledge from a frequently recurring scenario or situation.
- Pattern anticipates downstream video handling and presentation requirements



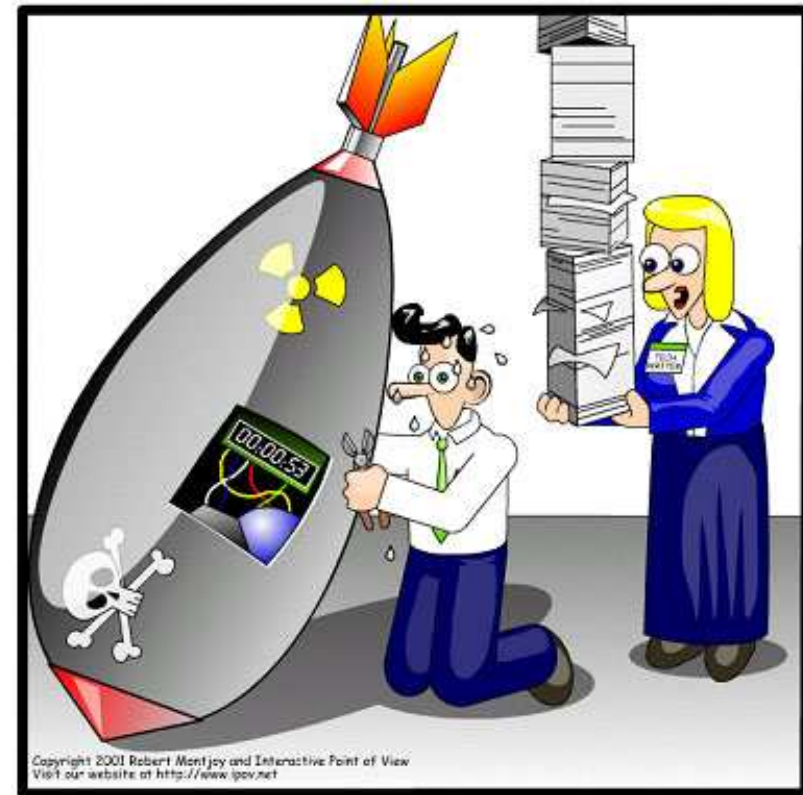
KNOWLEDGE PRODUCTION

The Production Challenge

- Experts don't like to write manuals
- Manual writers aren't experts
- Writers must continually bother experts for more information
- ...
- *[return to knowledge generation challenge]*
- ...

Plus:

- Text is inefficient for several major categories of knowledge.
- Video is inefficient for several major categories of knowledge.



"Since you're not too busy, could you take a minute to review these documents one more time?"

Insight: Integrate Video as a Routine Medium

Use Text/Graphics for:

- Lists & Catalogs
- Diagrams & Schematics
- Abstractions
- Behaviors that cannot be seen by a camera (i.e., must be inferred from evidence)
- Searchability

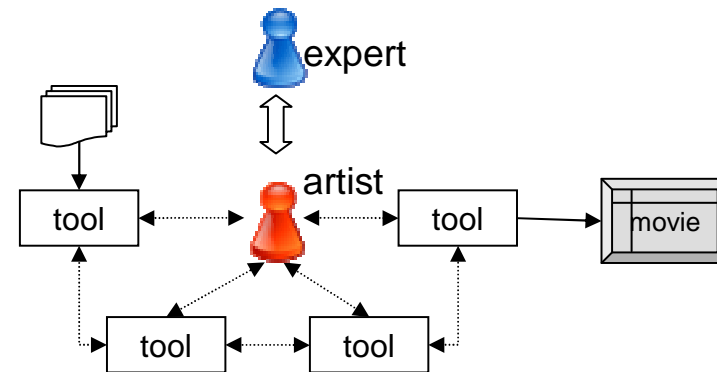
Use Audio/Video for:

- Procedural “how-tos”
- Dynamic behaviors
- Explanations that are too difficult/expensive to structure for text
- Explanatory emotional content
- Cross-cultural impact

Conventional Video Processes

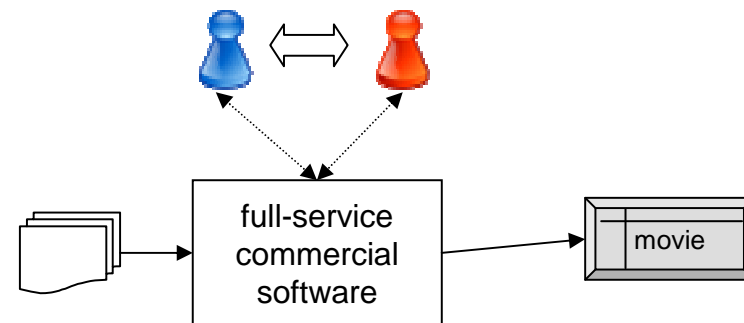
Studio Method

- Talented craftsmanship
- Iterative review
- Highly integrated output



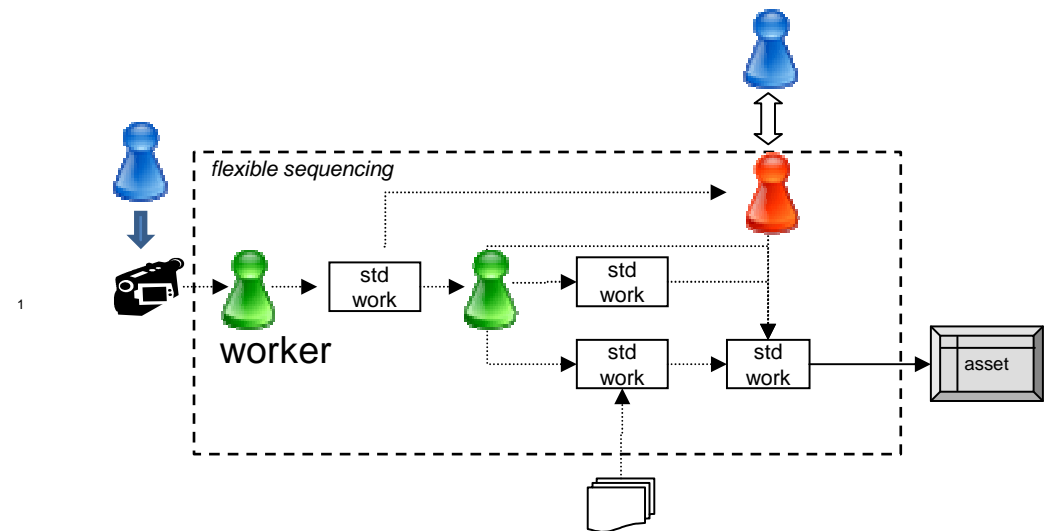
'Rapid' eLearning

- Teach expert to drive 'easy-to-use' software
- Help from software guru
- Iterative review
- Integrated output



iPOV Production Process

- **Video to ...**
- **Standard work**
- **Simple process steps**
- **Virtual cellular manufacturing**
 - Flexibly rewire simple steps to deliver wide variety of outputs
- **Dedicated, low cost automation**
- **Modular WIP and outputs**



STANDARD WORK = LEAN

Modular Video = Standard Work

- Separate video from audio/text
 - Video must be (nearly) correct, with no moving lips.
 - Extract audio/text for separate processing.
- Apply standard video processing steps
 - Digitize, edit/trim, resynchronize
 - Add modular overlays & inserts
- Apply standard audio processing steps
 - Transcribe to text and standardize grammar
 - Review & revise
 - Generate voiceover
- Resynchronize audio/text with video

Insight: Technical Video Standards

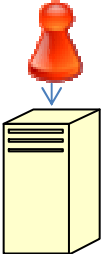

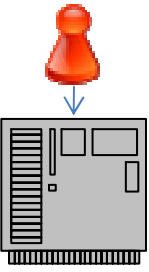

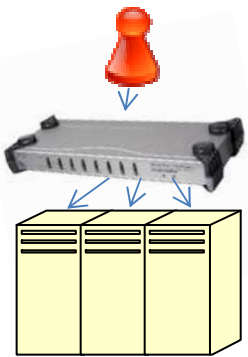
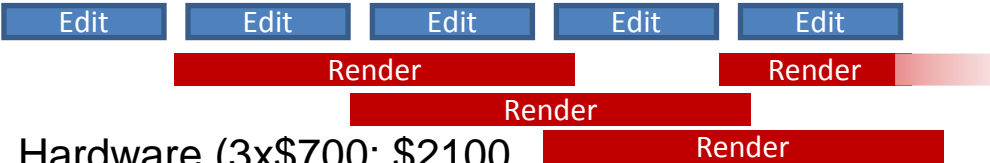
Conventional Video

	Technical Audience	'Mass' Market
Moving lips are visible	n/a	Studio/Talent Method (\$\$\$\$)
No moving lips	n/a	Informal Studio Methods (\$\$\$)

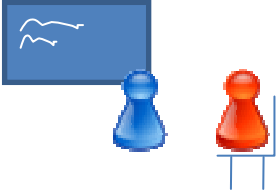


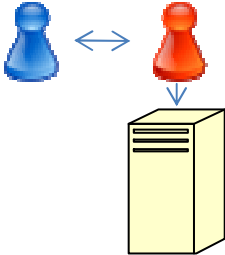


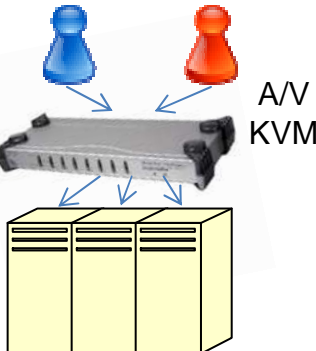
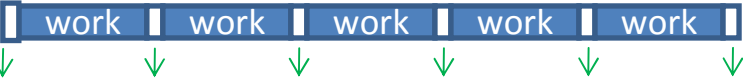

iPOV Process

	Technical Audience	'Mass' Market
Moving lips are visible	'YouTube' + 'Google Search' (\$)	<i>Studio/Talent Method (\$\$\$\$)</i>
No moving lips	Modular Video With Standard Work (\$ - \$\$)	

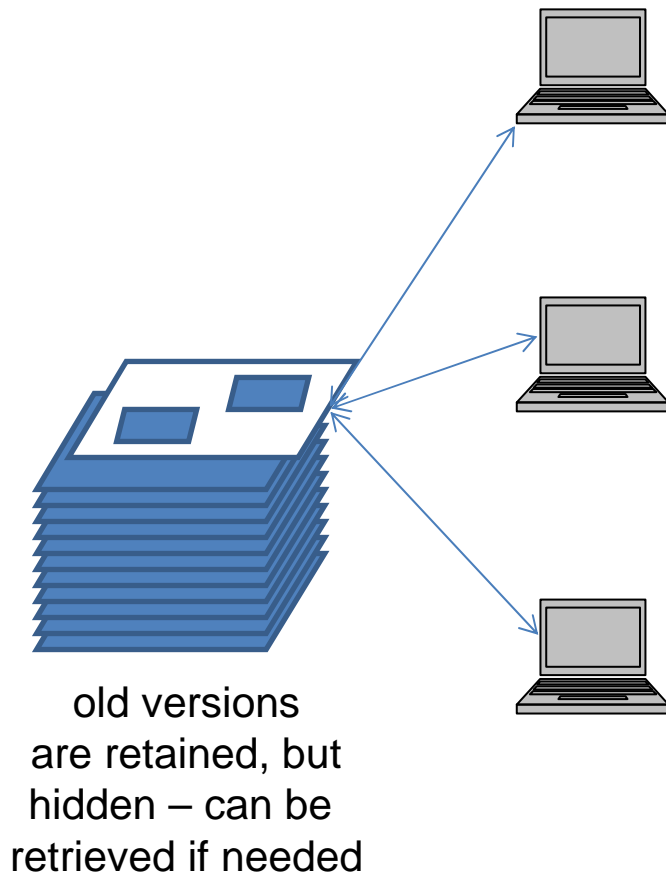
Insight: Round Robin Video Editing

	<p>Standard AV Capable Desktop</p>	 <p>Hardware: \$2500 Software: \$2000 Cycle Time: 50 min</p>
	<p>Dedicated Video Server</p>	 <p>Hardware: \$10000 Software: \$2000 Cycle Time: 25 min</p>
 <p>A/V KVM</p>	<p>Round Robin With Cheap Switched Computers</p>	 <p>Hardware (3x\$700): \$2100 KVM AV Switch: \$330 Software: \$200 Cycle Time: 21 min Multiple redundancy</p> <p><i>(If Standard Work!)</i></p>

Insight: Technology-aided OJT

	<p>Classroom Training</p>	<p>Instructor</p>  <p>Student</p> 
	<p>Standard OJT</p>	<p>Instructor</p>  <p>Student</p> 
	<p>Paired Work With Cheap Switched Computers</p>	<p>Instructor</p>  <p>Student</p>  <p><i>(If Standard Work!)</i></p>

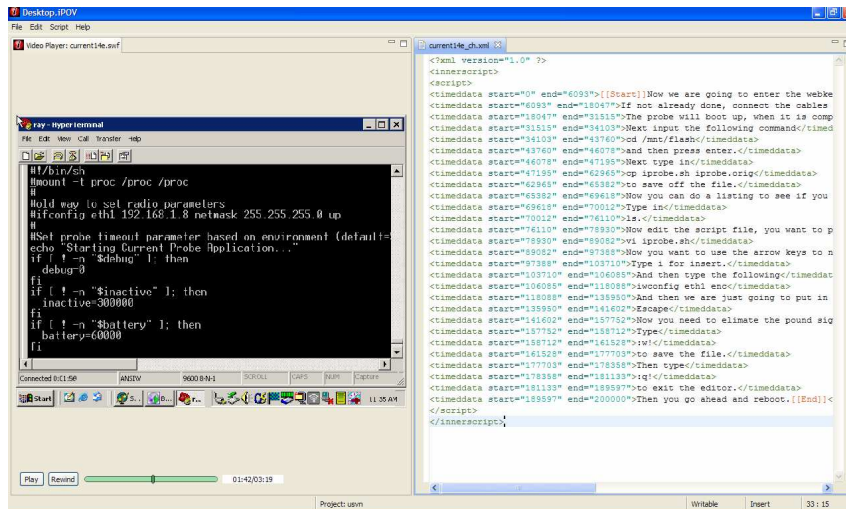
Insight: Automatic Version Control



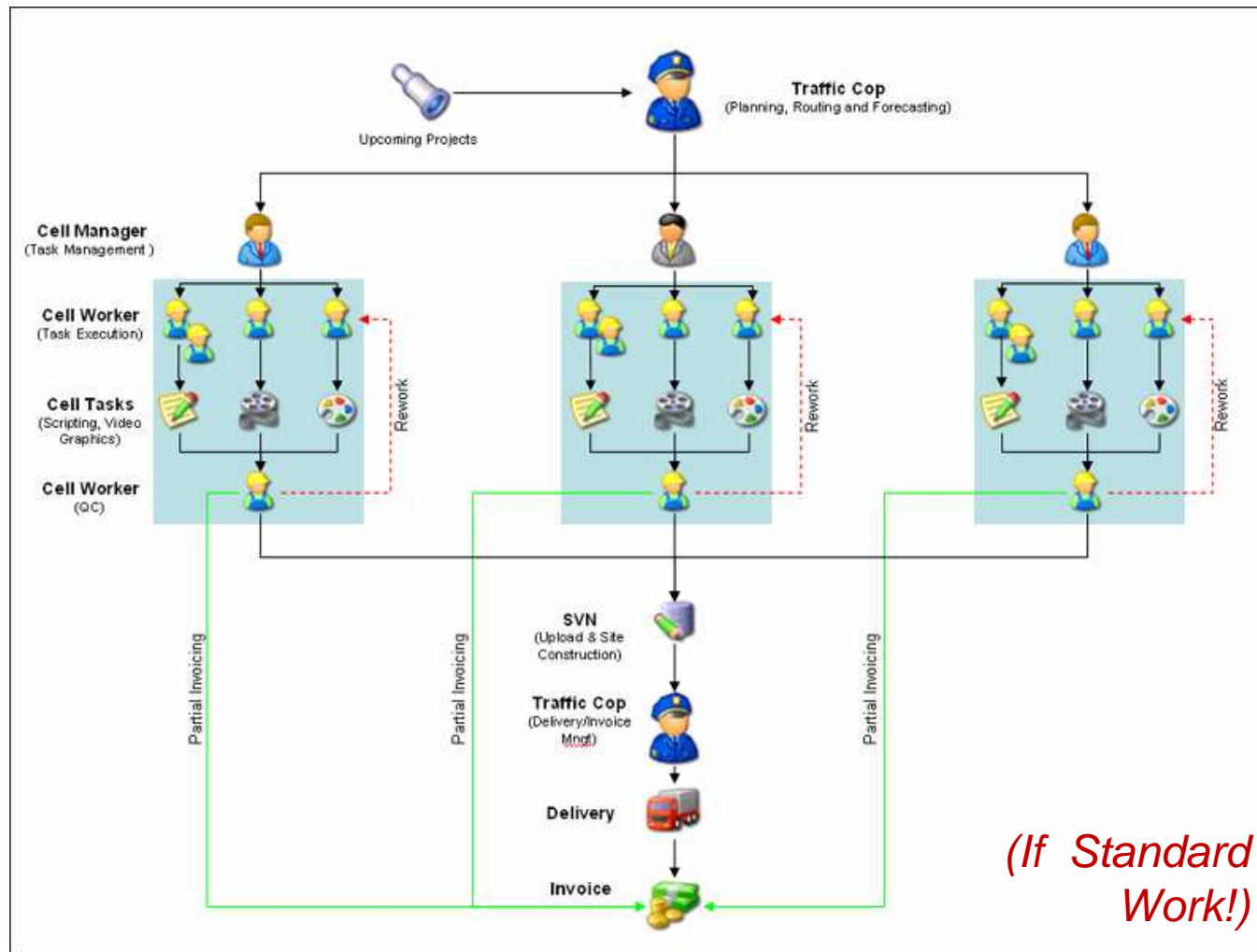
- Media constructed on Subversion version-control system
- All versions saved automatically and transparently to/from Windows folders
- Multiple users can locate most recent versions and resolve conflicts
- Free and open source

Technology: Remote Script Editing

- Text subtitles can be edited over Internet directly on iPOV server
- Subtitles can be synchronized with audio and video
- Video is not stored on local computer
- Multilingual support

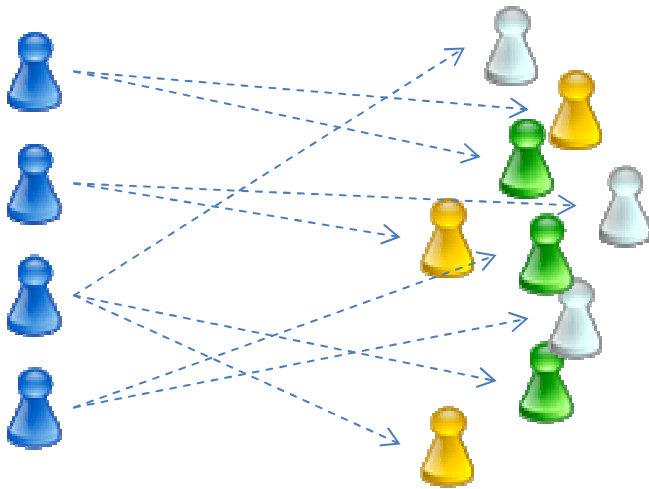


Insight: Cellular Production Flow



KNOWLEDGE DISTRIBUTION

The Distribution Challenge



- Knowledge must travel a lot farther these days.
- Expert often doesn't know where knowledge will go.
- Consumer often doesn't care where knowledge came from.
- Consumers don't know what knowledge exists.
- Knowledge can overlap and interfere.

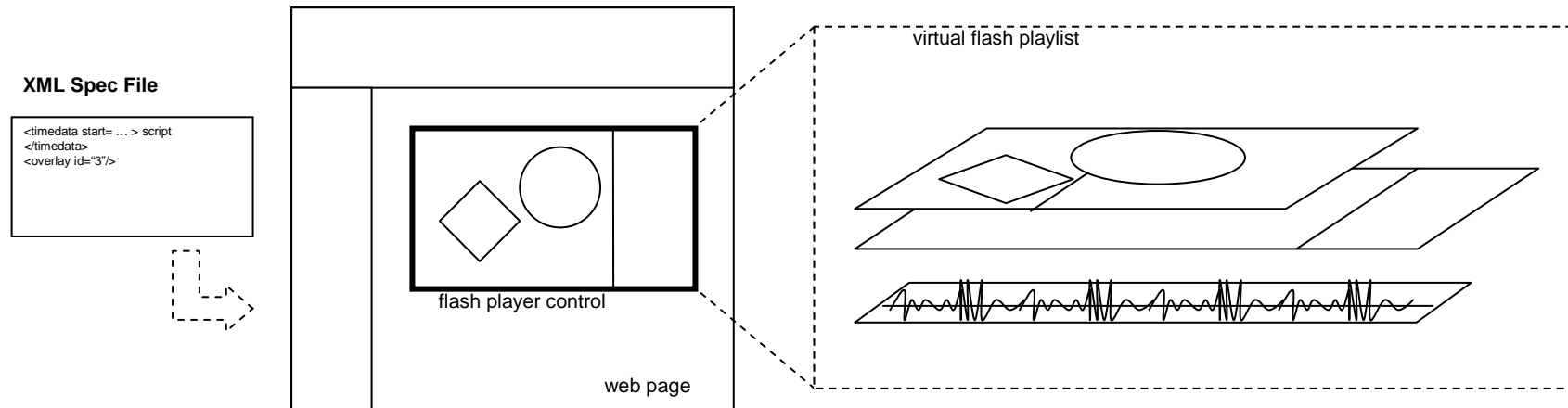
Standards-Based Distribution

- Open Source 'Standards'
 - HTML/XML/XSLT/Ajax (presentation)
 - SCORM Learning Objects (packaging)
 - Adobe Flash (media)
 - Unicode (language)
- Open Source Software
 - Apache/Tomcat (web server)
 - Eclipse (toolkit)
 - Subversion (version control)
 - Lucene (search engine)
- Browser-based Logic
 - Same material from server, LAN drive or stand-alone CD/DVD

Insight: Standard Work = Postponed Assembly

- Manage video and audio/text modules independently & asynchronously.
- Resynchronize when all parts meet final approval.
- Re-assemble at the viewer's desktop
 - Re-assemble video /audio/text in the browser Flash Player as the page is being viewed.
 - Video can be revised for next page load.
 - Viewer can (*theoretically*) control video/audio/text content (e.g., localization) in real time.

Technology: in-Browser Final Assembly



- Standard assets are assembled by Flash player at run time, following a web-supplied XML specification
- Assets are arranged in a multi-layer playlist timeline
- Interactive controls give viewer ability to manipulate timeline and embedded assets
- Delivered 'video' can be customized to the individual page load
- Technology proprietary to iPOV

Multi-channel Delivery Methods

- Integrate video with other media
 - Text
 - Graphics
 - Structured documentation
- Deliver to multiple platforms
 - PC
 - Tablet PC
 - Touchscreen
 - PDA
 - iPOD



KNOWLEDGE CONSUMPTION

The Consumption Challenge

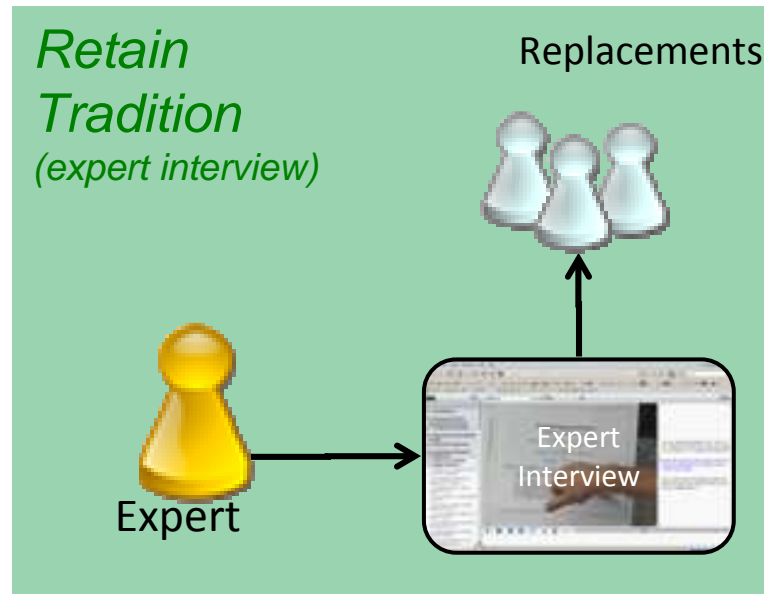


- Video often fails because it is:
 - Not at place of need
 - Not timed to need
 - Difficult to search/select
 - Delivered in big chunks
 - Contains irrelevancies
 - Inefficient for certain types of knowledge
 - parts lists
 - schematics

iPOV Design Philosophy

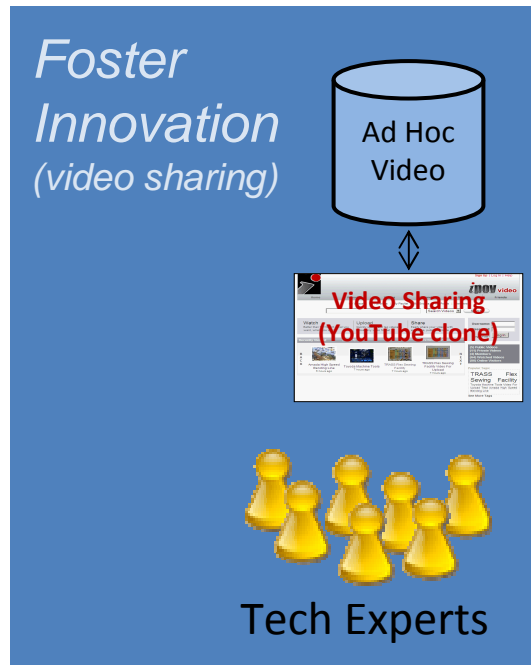
- Mimic or emulate 'organic' Web technologies
- Repackage Standard Work for:
 - Web information portals
 - Google-like free-form search
 - Structured eLearning courseware for LMS
 - 'Assets' for classroom instructors
 - YouTube-like video-sharing
 - Structured technical documentation
- Integrate into a community of practice
 - e.g., a technical knowledge 'ecosystem'

Retain Expert Knowledge with Video



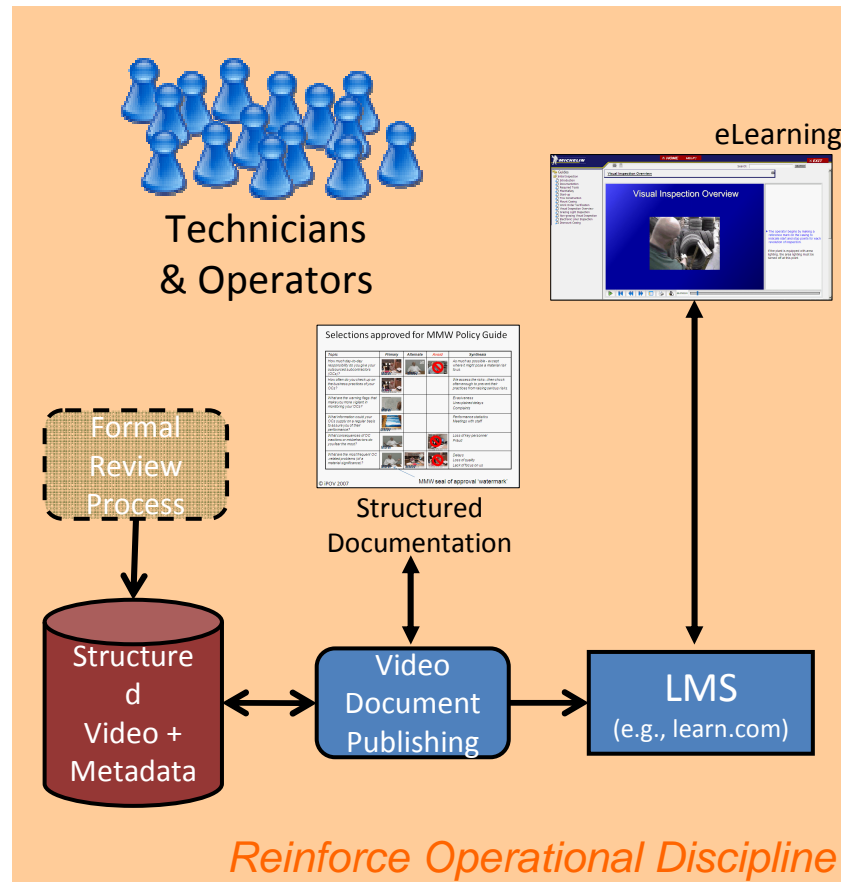
- Video-record expert
 - Expert gives informal presentation
 - Expert has favorite tools
 - Equipment & product samples
 - Drawings, PowerPoints and familiar documents
 - Questioner(s) probes logic
- Digitize video for web
- Transcribe commentary
- Deliver in ‘google-like’ search engine

Share Innovation with Video



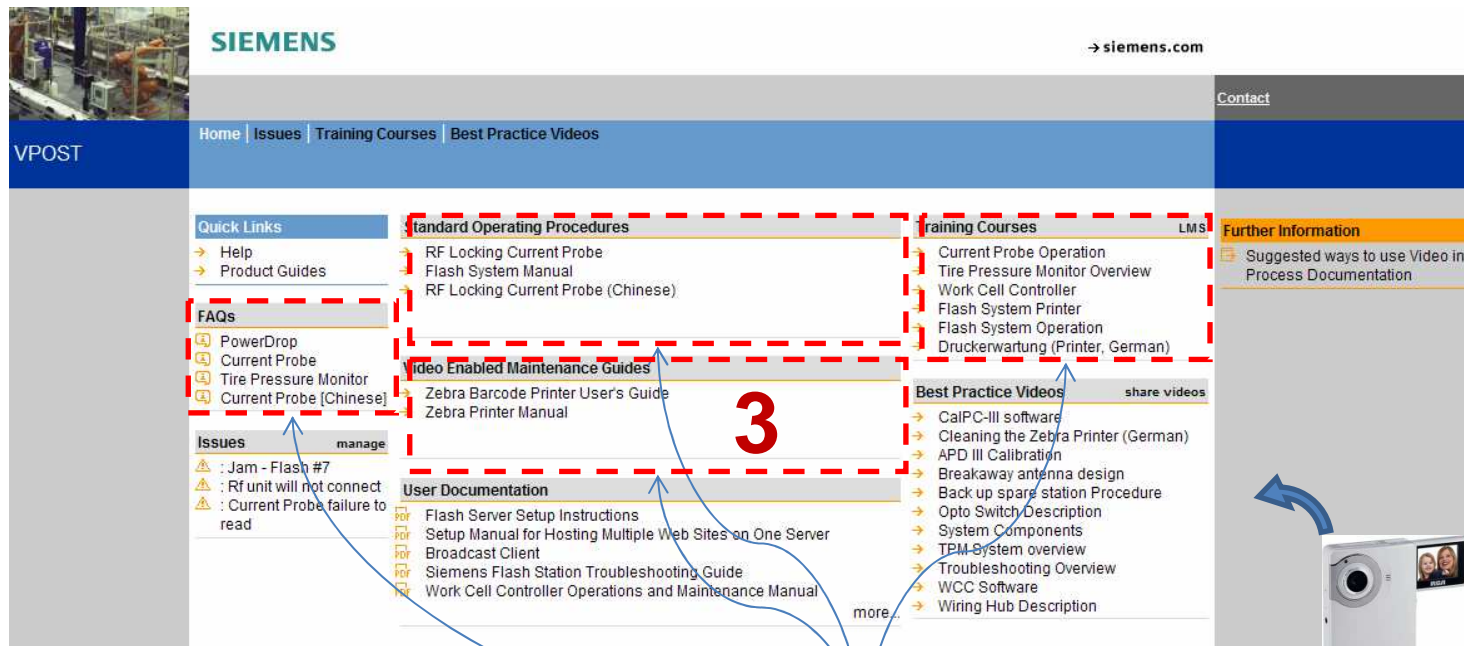
- Use Internet-based technology to build 'community of practice'
 - Youtube-like video sharing
 - Document sharing
 - Discussion board
 - Rating and approval voting system
 - News and notification system

Deploy Video-enhanced Documentation



- Store standard work video assets in searchable database
- Publish documents with video enhancements for
 - how-tos & SOPs
 - motivation for policy
 - procedural subtleties
 - models of good practice
- Reuse video assets in multiple documents

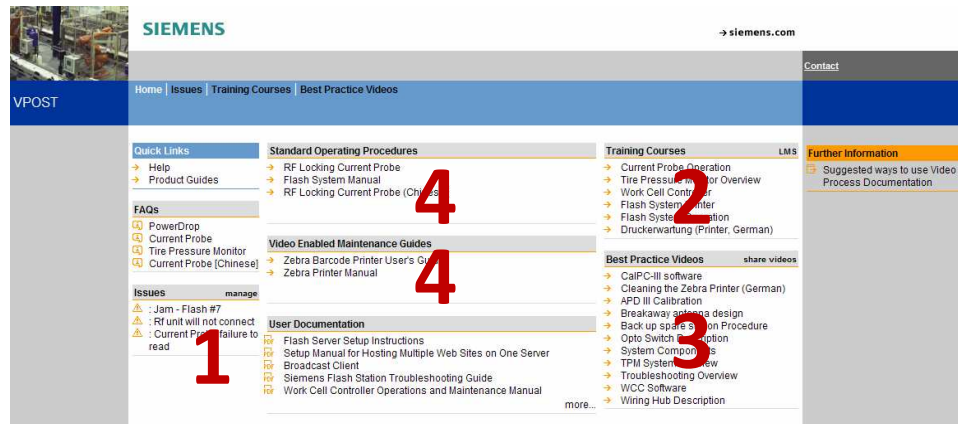
Process Dashboard Workflow



1. Use low-cost tools to **video-record informal technical explanations**
2. iPOV will **reverse-engineer structured knowledge** from the casual video recordings
3. iPOV will publish knowledge to Web in **different formats for different purposes**

**iPOV
Processing**

Dashboard Modules



Implemented & Visible


1. Issue Tracking System
2. Learning Management System
3. Video Sharing Application
4. XML Structured Documentation

Implemented & Hidden







Possible Free Additions

- Chat
- Video Conferencing
- PowerPoint to Flash Converter
- Project Management
- Address Book
- CRM System
- Wiki
- Version Control System
- Single-Signon System
- System-wide search







Current System Design Status

Element	Image	Status
Integrated System		<p>iPOV has 80-90% of the system components up and running in day-to-day production on its in-house servers. Clients can use these now.</p> <p>Significant packaging and customization remains to be done in order to deploy and support the overall system at a remote installation (i.e. behind a firewall).</p>







Deliverable Content

Element	Image	Status
Procedural eLearning		Mature >1000 video hrs
Expert Interview		Version 1 deployed >100 video hrs
SCORM eLearning for LMS		Version 1 deployed >40 video hrs
Structured Document XML		Version 1 deployed >100 projects Planning for Version 2
Video-enhanced Manuals		Version 1 deployed >10 video hrs
Video SOP		Working Prototype Planning redesign for Version 1

Web/Authoring/Mgmt Services

Element	Image	Status
Version Control		Version 1 deployed >30 customers/>100 sites Planning for Version 2
Video Sharing		Prototype deployed Working on Version 1
Video Library		Late Prototype deployed Working on Version 1
Web document prototyping		Several prototypes deployed Working on Version 1
Mobile device support		Early prototype under development
V-POST Help & Video Manual		Early prototype under development

Content Pricing & Delivery - iPOV

Content	Image	Description	Price		Delivery	Kiosk	Dashboard
			Low Volume	High Volume			
Video SOPs		Text SOPs with extensive, embedded video examples.	\$4-8K/vhr	\$3-6K/vhr	5-21 days	✓	✓
Process eLearning		Video-based, voicecovered, validated, technical eLearning courseware	\$5-12K/vhr	\$5-10K/vhr	14-40 days	✓	✓
Video FAQs/ Video Demos		Searchable video demonstrations with full text transcripts	\$2K/vhr	\$1-1.5K/vhr	2-5 days	✓	✓
Technician's Manual		Convert existing Word manuals to web with extensive embedded video examples	\$2K/vhr	\$1-1.5K/vhr	5-21 days	✓	✓
V-POST Help & Video Input Manual		Help documentation for system, including how to record and submit video mat'ls	\$10K setup + cost of localized content		System startup		✓
Best Practice Video Sharing		Private 'youtube-like' video sharing portal for sharing of video and documents.	\$5-10K setup \$1K/month		System Startup		✓

vhr = hr of finished video content
prices do not include in-plant videography

TECHNICAL SUMMARY

Key iPOV 'Research' Finding

- '**No moving lips**' video capture policy allows video to be packaged into '**standard work**'
- Standard work permits **one-pass editing** of video-based knowledge
- Standard work + Flash technology **postpones video assembly** to the final moment of viewing
- Assembly postponement means that **mass customization** of video-based knowledge is technically and financially achievable
- To achieve any of these gains, the entire video knowledge supply chain must be **holistically synchronized**:
 - Methodologically
 - Technically
 - Chronologically

SERENDIPITY

Serendipity: Business 'Farm Teams'?

- With standard work, a company can:
 - Locate near university
 - Employ 2 or 3 full time supervisors
 - Hire 15 to 20 FTE as part-time student employees
 - Hire from wide range of disciplines
 - Offer flexible work schedules
 - Most work will cost <\$10/hr all found
 - Hire the 'pick of the litter' on graduation
- Farm teams could change college recruiting programs into profit centers.

Student Labor Myths

- Transient?
 - A junior will stay for 2.5 years (or 4-6 years if they go to grad school)
 - Company knows when they will graduate - easy to prepare for replacement
- No work ethic?
 - At AU, thousands of students have work ethic – only need 30 to 40 at most.
- Students disappear over Break/Summer?
 - Half go away, half want double hours.
- Hard to schedule?
 - Not if you have standard work: next worker picks up where previous worker left off

University-based Workforce

- Studio/Talent Model
 - Actors
 - Creative artists
 - Software gurus
 - Specialist degrees
 - Long learning curve
 - 5+ yrs experience
 - Artistic freedom
 - Artistic temperament
 - High cost
- iPOV Production Model
 - Bright students (e.g., junior in liberal arts)
 - Cellular flow with simple process steps
 - Round Robin OJT
 - Standard work
 - Paired learning
 - Flexible scheduling
 - Systematic quality checks

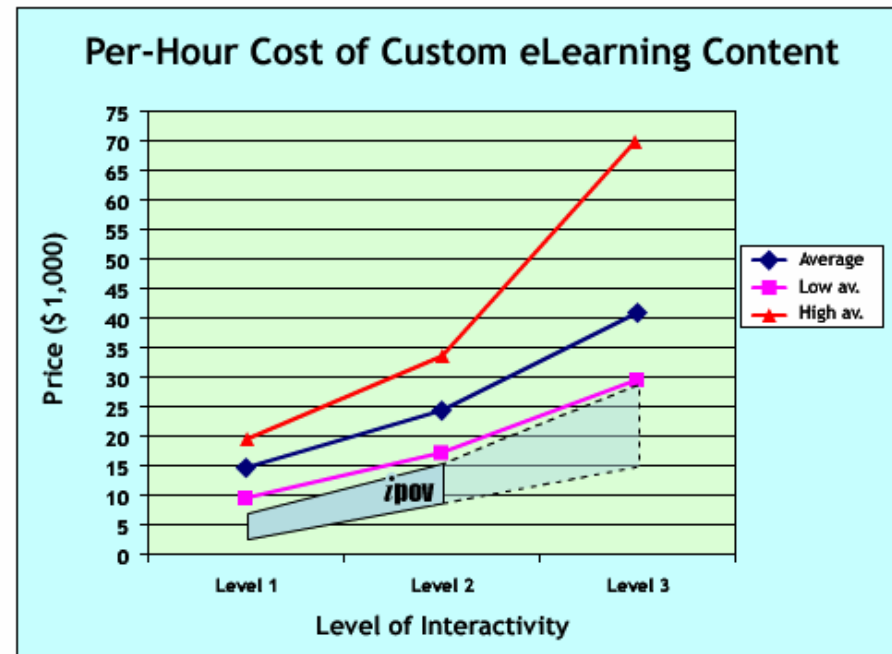
IPOV COMPANY PROFILE

History

- Began working on problem in 2000
- 300+ revenue and demonstration projects
- Clients:
 - Michelin, DaimlerChrysler, Siemens, Synovus, Comerica, BMW, AT&T, Bellsouth, State of Alabama, etc.
- Employees:
 - 5 full time
 - 5 to 15 part time

iPOV Competitive Performance

- Prices <40% of any known commercial competitor
- Delivery times <25% of any known commercial competitor
- DIY is biggest competitor
- Quality fluctuated, but has improved greatly in past 2 years – now comparable to most higher-priced competitors



Source: Brandon Hall Research (2006), Custom Content Developers 2006: A KnowledgeBase of 110+ Outsource Learning Providers. April 2006. Posted at: BrandonhallLMS@yahoogroups.com , 5/12/06 by Richard Nantel of BrandonHall