



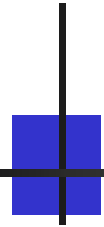
# Technologies and Services in Support of Virtual Work

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# Agenda

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- Economic drivers for virtual work
  - Virtual workers, virtual enterprises, virtual workforce
- Virtual work challenges
  - physical space, connectedness, enterprise systems, global infrastructure
- Classes of virtual work tools and the virtual work tool market
- Virtual work management issues
- A Virtual Work Services Management Framework
  - Technology Assessment
  - Organizational Assessment
- Future Trends and opportunities
- Discussion



# How Is Our Economy Changing?

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- Industrial economy increasingly stressed
  - “Tragedy of the Commons” (Hardin, 1968)
- Information economy is different
  - FROM physical capital TO intellectual capital
  - Information is “free” and cannot be stressed
  - User-centered innovation
- New models for competitive advantage
  - “IT Doesn’t Matter” (Carr, 2003)
  - “Wikinomics” (Tapscott, 2006)
  - “The Big Switch” (Carr, 2008)



# Enterprise Challenges

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- Technological and managerial issues
  - Global & enterprise IT context
  - Nature of virtual work tools
  - Best practices for managing virtual work
- Computer supported cooperative work
  - "... combines understanding of [how] people work in groups with enabling technologies of computer networking, hardware, software, services and techniques."
    - (Wilson 1991)



# Virtual Work

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- Virtual worker
  - Dislocated from co-workers / supervisors
  - Teleworkers, isolates, nomads
- Changing workforce
  - ~90% of US workers perform some work away from office
  - >44M of US workers perform some work from home
  - Globalization, pervasive IT, M&As drive virtuality
  - >40% of jobs now involve tacit work
  - Social networking and “networked individualism”
- Changing technologies
  - Short innovation & adoption cycles
  - Consumerization “leapfrogs” technologies



# Virtual Work Drivers

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- Work = Complex + Tacit + Asynch + Distant
- Emergence of standards
  - SIMPLE (instant messaging, presence awareness)
  - CPIM (common profile for IM)
  - Human ML (human markup language)
  - xCAL (calendar management)
  - iTIP (free-busy time)
  - VideoML (video markup language)
  - SMIL (synchronized multimedia integration)
- Employee experience with IM, file sharing, blogging
- Gap between “efficiency” & “effectiveness”

# Virtual Work Challenges

- Physical space “comfort”
  - Hearing each others' voices
  - Seeing each others' faces
  - Routine “look and feel” of workplace
- “Connectedness”
  - Time & space
  - Ease of idea exchange
  - Network effects
- Immature and “lumpy” technologies





# Book Chapter

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- McCord, S.A. & Boone, M.D. (2008). Technologies and Services in Support of Virtual Workplaces. In Zemliansky & St. Amant (Eds.). *Handbook of Research on Virtual workplaces and the New Nature of Business* (346-363). New York: IGI Global.



# Classes of Virtual Work Tools

- Communication Tools
  - Telephony, VM, EM, office tools, browsers, search engines
  - VM notification, revision tracking, listservs, message boards
- Conferencing Tools
  - Audio/Video/Web conferencing, webcasting
  - Surveys and polls, whiteboards, app sharing
- Collaboration Tools
  - Document development, team workspaces, PM, PLCM, design, engineering
  - Federated contacts, repositories, KM, presence, dashboards, personalization, agents





# Virtual Work Tools Market

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- Mainstream providers
  - IBM, MS, Oracle, Novell, Vignette, WebEx, Groove, A(MM)
  - On-site & hosted services
- Open sources options
  - TikiWiki, WebCollab
- Social networking entrants
  - Google, Yahoo!, MS, AOL, Skype
- Challenges
  - Cross-cultural/language, context-nuance, social networking, usability, A&R
  - Balance “networked individualism” w/ “one size fits all” architecture



# Virtual Work Management

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- Challenges
  - Isolation from colleagues – build community
  - Inadequate coordination – promote clarity
- Virtual work should reflect business strategy
  - Value chain, location of work units, reliance on technology
  - Virtual groups may interact at a deeper level, provide easier access, promote empowerment
- Managing Virtual Teams
  - Proactive leadership, project mgt, personal attention, clear objectives and language, frequent communication, context setting, constructive discourse



# Virtual Work Management

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- Team members from different companies
  - Group formation & norming, personal networking, task-related & social interaction
- Team members from different countries
  - More task communication, initial FTF meetings, facilitated & documented meetings, time zone awareness, tracking
- Team members from different cultures
  - Discuss cultural diversity, values, communication differences
- Team members who speak different languages
  - Pre-project training & practice, translation, comprehensive written communication, time to interpret context

# Organizational Readiness

- “E-mail is not to be used to pass on information or data. It should be used only for company business.”
  - Accounting Manager, Electric Boat Company



# Analytic Frameworks

## ■ Technology and collaboration readiness

Technology Services Framework			Virtual Services Management Framework
<i>TCP/IP Model</i>	<i>Web Services Model</i>	<i>Virtual Work Tools</i>	
---	<b>Discovery</b>	---	<b>Enterprise Knowledge Practices</b>
---	<b>Business Services</b>	<b>Collaboration Tools</b>	<b>Virtual Group Management Practices</b>
---	<b>Applications</b>	<b>Conferencing Tools</b>	<b>Enterprise Workgroup Practices</b>
---	---	---	<b>Business Process Decisions</b>
---	---	---	<b>Intellectual Property &amp; Security Policies</b>
<b>Application</b>	<b>Technologies</b>	<b>Communication Tools</b>	<b>Enterprise Architecture Decisions</b>
---	---	---	<b>Business Practice Decisions</b>
<b>Transport</b>	---	---	<b>Strategic Technology Assessment</b>
<b>Internet</b>	---	---	---
<b>Network Interface</b>	---	---	---
---	---	---	<b>Business Strategy Decisions</b>



# Virtual Services Mgt Framework

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- Enterprise Architecture Decisions
  - Network / OS / DB / Apps supporting strategy & practices
  - Interoperability – enterprise / technical / group / process
- Intellectual Property and Security Policies
  - “Collaboration life cycle”
    - Exploration / joint development / commercialization
    - NDAs, JDAs, TAs, SLAs, licensing agreements
  - IP policies drive security policies, shorter life cycles
- Business Process Decisions
  - Detailed spec for carrying out business tasks
  - Requirements for virtual work tools



# Technology Assessment

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- Frequency of use of business apps & virtual tools
- Match frequency of use with employee skills
- Employee use versus perceived importance of business apps and virtual tools
- Employee use versus perceived utility of business apps and virtual tools
- External expert assessment of infrastructure, business apps, & virtual tools





# Technology Framework

Stages	Enterprise Technology Infrastructure	Predominant Business Applications	Predominant Virtual Work Tools
<b>Traditional</b>	<ul style="list-style-type: none"> <li>•Server focus</li> <li>•Desktop focus</li> </ul>	<ul style="list-style-type: none"> <li>•ERP</li> <li>•Web-enabled processes</li> </ul>	<ul style="list-style-type: none"> <li>•Telephone</li> <li>•Fax</li> <li>•E-mail</li> <li>•Voicemail</li> </ul>
<b>Mobile</b>	<ul style="list-style-type: none"> <li>•Mobile devices for field personnel</li> </ul>	<ul style="list-style-type: none"> <li>•Customer Relationship Management (CRM)</li> <li>•Supply Chain Management (SCM)</li> </ul>	<ul style="list-style-type: none"> <li>•Cellular telephony</li> <li>•E-mail with attachments</li> <li>•Audio conferencing</li> </ul>
<b>Integrated</b>	<ul style="list-style-type: none"> <li>•Wireless LANs</li> <li>•Ubiquitous communication</li> <li>•Personalization</li> </ul>	<ul style="list-style-type: none"> <li>•Real-time CRM</li> <li>•Real-time SCM</li> </ul>	<ul style="list-style-type: none"> <li>•Videoconferencing</li> <li>•Webcasts</li> <li>•Information repositories</li> <li>•Shared calendaring</li> </ul>
<b>Pervasive</b>	<ul style="list-style-type: none"> <li>•Ubiquitous access</li> <li>•Enterprise integration</li> <li>•Content management</li> <li>•Infrastructure abstraction</li> </ul>	<ul style="list-style-type: none"> <li>•Automated CRM</li> <li>•Automated SCM</li> <li>•Automated Workflow</li> <li>•Knowledge management</li> </ul>	<ul style="list-style-type: none"> <li>•Web collaboration</li> <li>•Document tracking</li> <li>•Knowledge management</li> </ul>



# Organizational Assessment

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- “Dimensions of virtuality”
  - (Chudoba et al., 2005)
- *Team distribution* – teams distributed over different geographies and time zones
- *Workplace mobility* – people work in environments other than regular offices
- *Variety of practices* – people experience cultural & work process diversity

# Organizational Framework

Stages	Characteristic Organizational Practices	Predominant Team Distribution	Predominant Workplace Mobility	Predominant Work Practices
<b>Traditional</b>	<ul style="list-style-type: none"> <li>●ERP focus</li> <li>●Individual and group communication</li> </ul>	<b>Centralized</b>	<b>Immobile</b>	<b>Homogeneous</b>
<b>Mobile</b>	<ul style="list-style-type: none"> <li>●Mobile workers</li> <li>●Customer relationship management (CRM)</li> </ul>			
<b>Integrated</b>	<ul style="list-style-type: none"> <li>●Mobile workforce</li> <li>●Frequent collaboration</li> <li>●Real-time management</li> </ul>			
<b>Pervasive</b>	<ul style="list-style-type: none"> <li>●Routine collaboration</li> <li>●Process automation</li> <li>●Real-time operation</li> <li>●Flexible processes</li> </ul>	<b>Collaborative</b>	<b>Mobile/Distributed</b>	<b>Heterogeneous</b>



# Future Trends

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- Pervasive IT driven by
  - IP-based unified communications
  - Ubiquitous / consumerized wireless services & devices
- Emergence of context tools
  - Workers / tasks / projects
  - Who / when / what / how?
  - Agents to manage tasks, communications, repositories
- Virtual work portals
- Video integration into virtual work
- Knowledge ontologies and multimedia KM
- Discontinuous change impacts investment life cycles

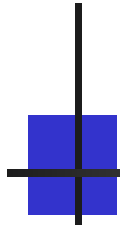


# Future Opportunities

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- “Consider a future device for individual use ... a sort of mechanized private file and library.”
- “... a device in which an individual stores all his books, records, and communications ...”
- “... an enlarged intimate supplement to his memory.”
- “Wholly new forms of encyclopedias ... with a mesh of associative trails running through them ...”

Vannevar Bush, *Atlantic Monthly*, 1945



# Discussion...

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