

Software Development Challenges for the 21st Century

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I. Writing: The 1st Information Technology Revolution

Writing Invented

- » 3300 BC Egypt, Mesopotamia, China
- » 800 BC Greek Alphabet



Tomb of Queen Amonherkhepsef

In ancient Egypt, scribes used hieroglyphs to record state documents and important historical events. Hieroglyphs with religious purposes also were painted on tomb walls and wooden coffins, such as these hieroglyphs from the tomb of Queen Amonherkhepsef, located in the Valley of the Queens.

Drucker, Peter F. Management Challenges for the 21st Century. HarpberBusiness. NY, NY. 1999.

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Monday, February 18, 2008

II. Books

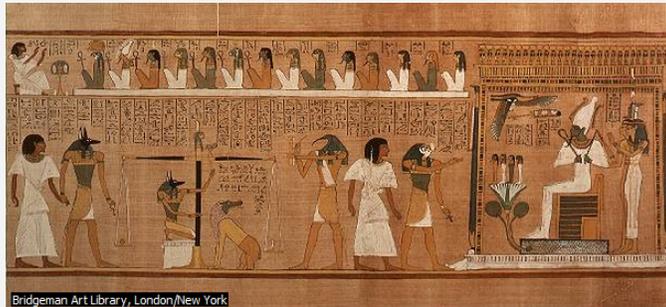
Writing Invented

- » 3300 BC Egypt, Mesopotamia, China
- » 800 BC Greek Alphabet



Books Invented

- » 1300 BC China
- » 500 BC Greece



Bridgeman Art Library, London/New York

Section of the Egyptian Book of the Dead
 The Egyptian Book of the Dead was a text containing prayers, spells, and hymns, the knowledge of which was to be used by the dead to guide and protect the soul on the hazardous journey through the afterlife. Beginning in the 18th Dynasty, the Book of the Dead was inscribed on papyrus. This section of one such book, from the early 19th Dynasty, shows the final judgment of the deceased (in this case Hu-Nefer, the royal scribe) before Osiris, god of the dead. Hieroglyphs as well as illustrations portray the ritual of weighing the deceased's heart to determine whether he can be awarded eternal life.

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III. Movable Type & Printing Press

Writing Invented

- » 3300 BC Egypt, Mesopotamia, China
- » 800 BC Greek Alphabet



Books Invented

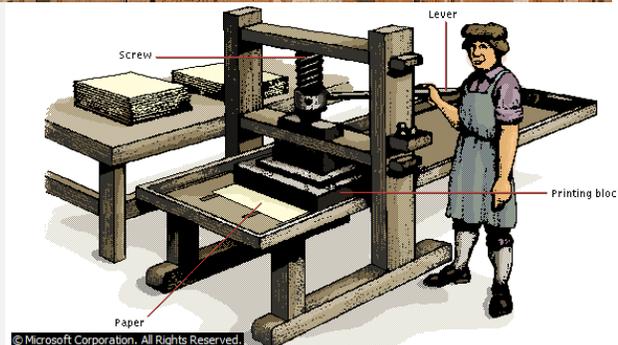
- » 1300 BC China
- » 500 BC Greece



Printing Press

- » 1450 to 1455

Early Printing Press
 Invented by Johannes Gutenberg around 1450, the printing press made the mass publication and circulation of literature possible. Derived from the presses farmers used to make olive oil, the first printing press used a heavy screw to force a printing block against the paper below. An operator worked a lever to increase and decrease the pressure of the block against the paper.



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IV. Computers and The Internet

Writing Invented

- » 3300 BC Egypt, Mesopotamia, China
- » 800 BC Greek Alphabet

Books Invented

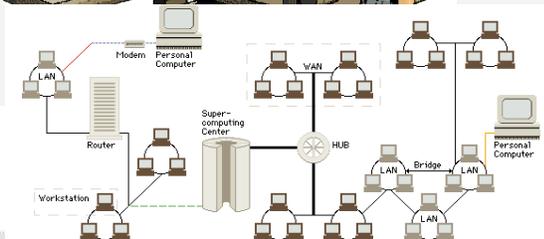
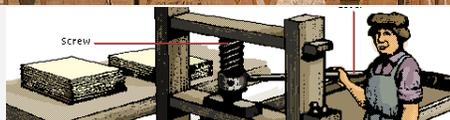
- » 1300 BC China
- » 500 BC Greece

Printing Press

- » 1450 to 1455

Computers and the Internet

- » 2nd half of 20th Century



Internet Topology
Connecting individual computers to each other creates networks. The Internet is a series of interconnected networks. Personal computers and workstations are connected to a Local Area Network (LAN) by either a dial-up connection through a modem and standard phone line or by being directly wired into the LAN. Other modes of data transmission that allow for connection to a network include T-1 connections and dedicated lines. Bridges and hubs link multiple networks to each other. Routers transmit data through networks and determine the best path of transmission.

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The 4th Information Technology Revolution brought...



... a computer in every device!

THE SOFTWARE PROBLEM!

The methods we use to create software are not able to keep up with the increasing demand.

Agenda

What have we tried so far?

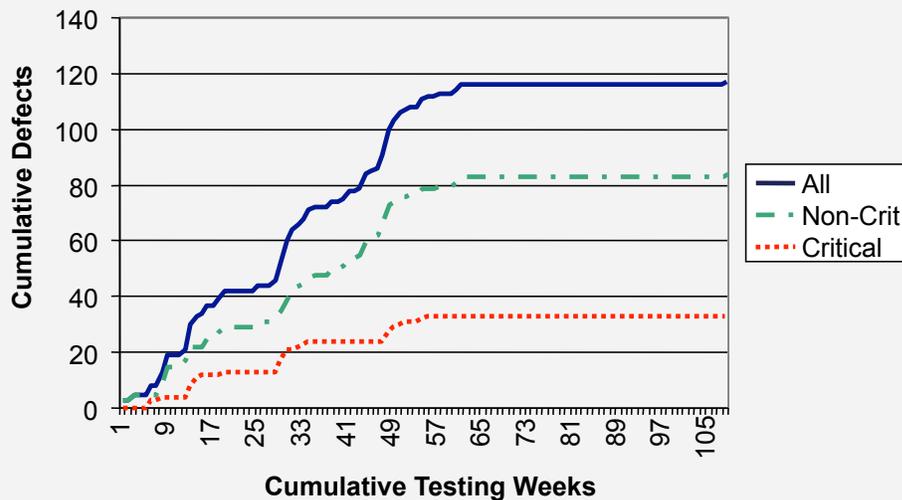
A Strategy for the 21st Century:

- » The Century of the **Knowledge Worker**
- » Knowledge Worker **Performance**
- » Personal **Mastery**

What Have We Tried?

“We tried to get the defects out in testing...”

Voyager Spacecraft Total Defects in System Test



Developers, Managers, & Gurus just Kept on Trying...

- » PSP/TSP/CMM/CMMI
- » ISO 9001/9000-3
- » FDD (Feature Driven Development)
www.featuredrivendevelopment.com
- » Rational Unified Process www.ibm.com
- » SCRUM www.controlchaos.com
- » Extreme Programming
www.extremeprogramming.org
- » OPEN (Object-oriented Programming and Notation)

The Winner Is:

Code 'n Fix!

(by a wide margin)

A Strategy for the 21st Century

THE 21st CENTURY SOFTWARE CHALLENGE:

PEOPLE

NOT TECHNOLOGY!

Why People? Why Not Technology?

1. Technology has evolved rapidly
2. Organization effectiveness is lagging.

Therefore: We need to create business organizations that enable large groups of knowledge workers to cooperate effectively.

*Starts with the individual knowledge worker: **you!***

The Century of the Knowledge Worker

Perform As Told

“It wasn’t that long ago that we referred to the workers at my father’s factory as ‘hands’.”

“They hired me from the neck down.”

The 21st Century “Capital Assets”

“The most valuable asset of a 21st-century institution, whether business or non-business, will be its knowledge workers and their productivity.”

Peter F. Drucker

Drucker, Peter F. Management Challenges for the 21st Century. HarperBusiness. NY, NY. 1999.

Cost vs. Assets

“Economic theory and most business practice sees manual workers as a *cost*. To be productive, knowledge workers must be considered a *capital asset*.”

“*Costs* need to be controlled and reduced. *Assets* need to be made to grow.”

Drucker, Peter F. Management Challenges for the 21st Century. HarperBusiness. NY, NY. 1999.

The Information Supply Chain

All knowledge workers must answer these questions:

1. What information do I owe to the people with whom I work and on whom I ***depend***?
 - a. In what form?
 - b. And in what time frame?
2. What information do I need ***myself***?
 - a. From whom?
 - b. In what form?
 - c. And in what time frame?

Knowledge Worker Performance

LOW PRODUCTIVITY KILLS!

“However low its wages, a business [...] is unlikely to survive, let alone prosper, unless it measures up to the standards set by the leaders in its field, anyplace in the world.”

Peter F. Drucker

The Lessons of a Long-ago Disaster...

What do you know to be important but are unable to measure?

» As of October 1707: **longitude**

Longitude: How far east or west you are?

» Admiral Cloudisley Shovell misjudged longitude.

» 4 warships and 2,000 lives were lost

What is Your Software Development Performance?

Have you been thinking about it before?

» Do you know your “batting average?”

Software Development Performance is the complexity of all activities that an individual or team does in order to create software.

Knowledge Worker Productivity

“The most important, and indeed the truly unique, contribution of management in the 20th century was the fifty-fold increase in the productivity of the MANUAL WORKER in manufacturing.

“The most important contribution management needs to make in the 21st century is similarly to increase the productivity of KNOWLEDGE WORK and the KNOWLEDGE WORKER.”

Personal Mastery

What is the Knowledge Worker's Currency?



Monday, February 18, 2008

**“In every human activity
the law of the farm
governs.”**

**“There is no cramming
on the farm.”**



Corn Granary, Eastern Europe, 2007

Stephen R. Covey

Covey, Stephen R. First Things First. Free Press. 1996.

Create Continuous Learning Environments

Crawl, walk, run!

An accomplished walker doesn't think about the mechanics of the steps anymore.

Learning Dilemma

We learn best from experience but we never directly experience the consequences of many of our most important decisions.

Senge, Peter. The Fifth Discipline. Pg. 23. Currency Doubleday. New York, NY. 1990.

Examine How You Acquire Knowledge

0th Order of Ignorance: Lack of Ignorance.
You know.

1st Order of Ignorance: Lack of knowledge.
You know the question. Uncertainty.

2nd Order of Ignorance: Lack of awareness.
This is a real problem: not only you don't know the answer, you don't even know what the question is.
Ambiguity.

3rd Order of Ignorance: Lack of process.
You don't have a process to find out what it is that you don't know.

4th Order of Ignorance: *Meta Ignorance.* You don't know about the orders of ignorance. You are past this. 😊

Armour, Phillip G. The Five Orders of Ignorance. Comm. of the ACM. Vol.43. No.10. Oct. 2000.

Focus on Your Talents

What is a talent?

“A talent is a recurring pattern of thought, feeling, or behavior that can be productively applied.”

Every role performed **at excellence** requires talent.

“Michelangelos of housekeeping.”

Buckingham, Marcus, Curt Coffman. First, Break All The Rules. Simon & Schuster. NY, NY. 1999.

Peters, Thomas J. The Circle of Innovation. Random House. New York, NY. 1997.

Make Your Non-Talents Irrelevant

“People don’t change that much. Don’t waste time trying to put in what was left out. Try to draw out what was left in. That is hard enough.”
- wisdom from great managers

Team up with people with **complimentary** talents.

Buckingham, Marcus, Curt Coffman. First, Break All The Rules. Simon & Schuster. NY, NY. 1999.

Focus on Yourself

You are **special!**

Think of yourself as:

Me, Inc.

Even if you happen to be on somebody’s payroll at the moment!

Peters, Thomas, J. Brand You 50:Fifty Ways to Transform Yourself from an “Employee” into a Brand that Shouts Distinction, Commitment, and Passion. Knopf/Random House, 1999.

That's different! That's crazy!

“We should do something when people say it is crazy. If people say something is ‘good,’ it means someone else is already doing it.”

» Hajime Mitarai, president, Canon

Peters, Thomas J. The Circle of Innovation, You Can't Shrink Your Way To Greatness. Vintage Books. New York, NY, 1997.

DISTINCT ... OR EXTINCT!

“If there is nothing very special about your work, no matter how hard you apply yourself, you won't get noticed and that increasingly means you won't get paid much, either.”

Michael Goldhaber, Wired

Conclusion

Remember...

- ✓ There is plenty of technology. We need to use what we have.
- ✓ Our organizations are staying in the way of the people's effectiveness.
- ✓ Going from manual work to knowledge work must change the organization.
- ✓ You need to know your own performance.
- ✓ **Brand out from the crowd.**

Become Familiar with Other Domains

“Expose yourself to the best things humans have done and then try to bring those things into what you are doing.”

Steve Jobs, President, Apple

Your Letters Are Welcome!

Steven Teleki

» teleki@computer.org

Visit: <http://steven.teleki.net/>

- » Software development reading list
- » Slides from this and other talks