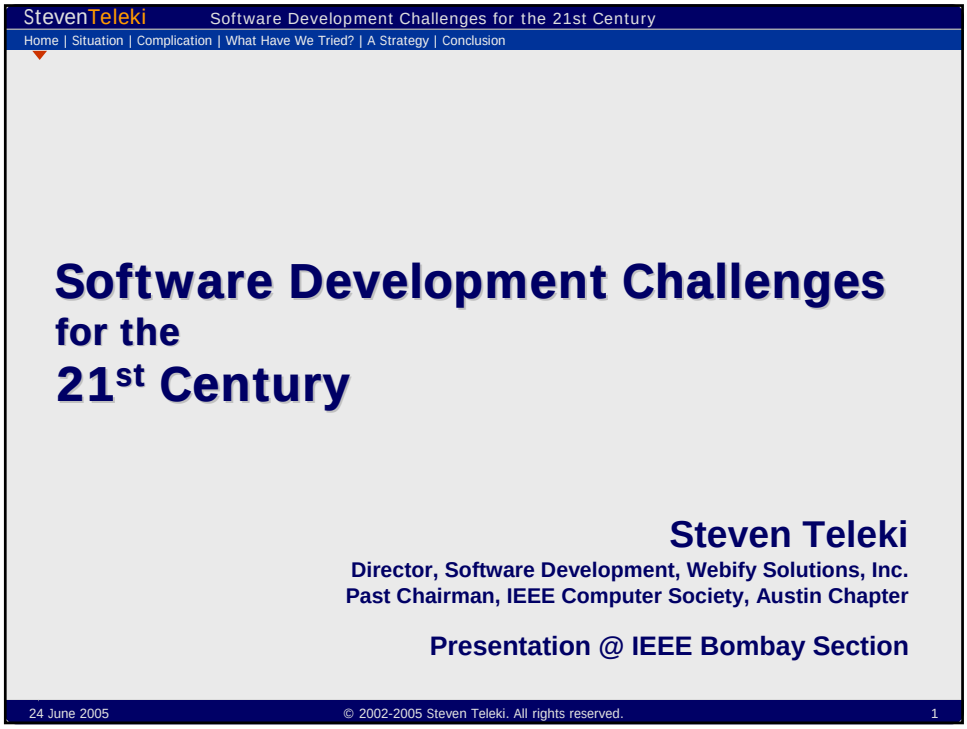
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for the
21st Century
Steven Teleki
Director, Software Development, Webify Solutions, Inc.
Past Chairman, IEEE Computer Society, Austin Chapter
Presentation @ IEEE Bombay Section
24 June 2005
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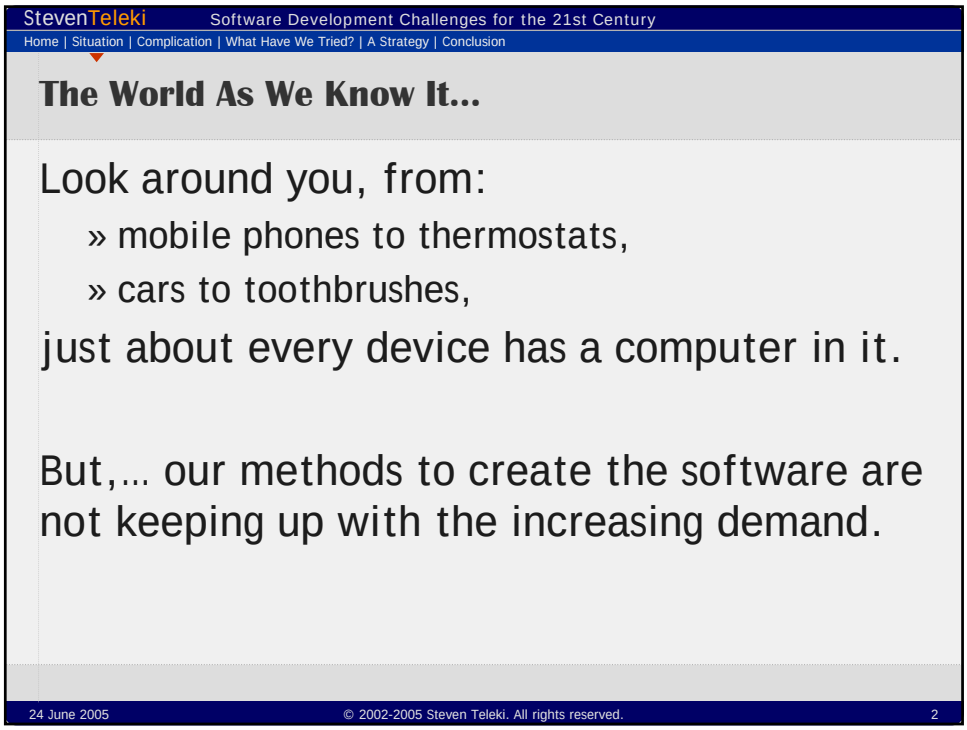
1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The World As We Know It...
Look around you, from:
» mobile phones to thermostats,
» cars to toothbrushes,
just about every device has a computer in it.
But,... our methods to create the software are not keeping up with the increasing demand.
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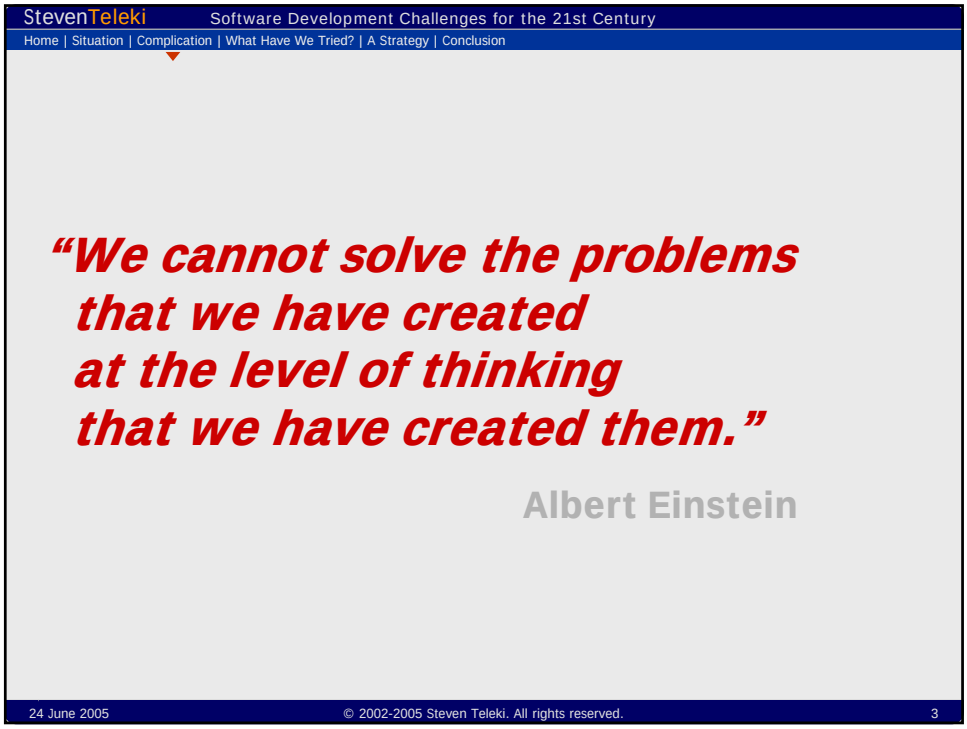
2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"We cannot solve the problems that we have created at the level of thinking that we have created them."
Albert Einstein
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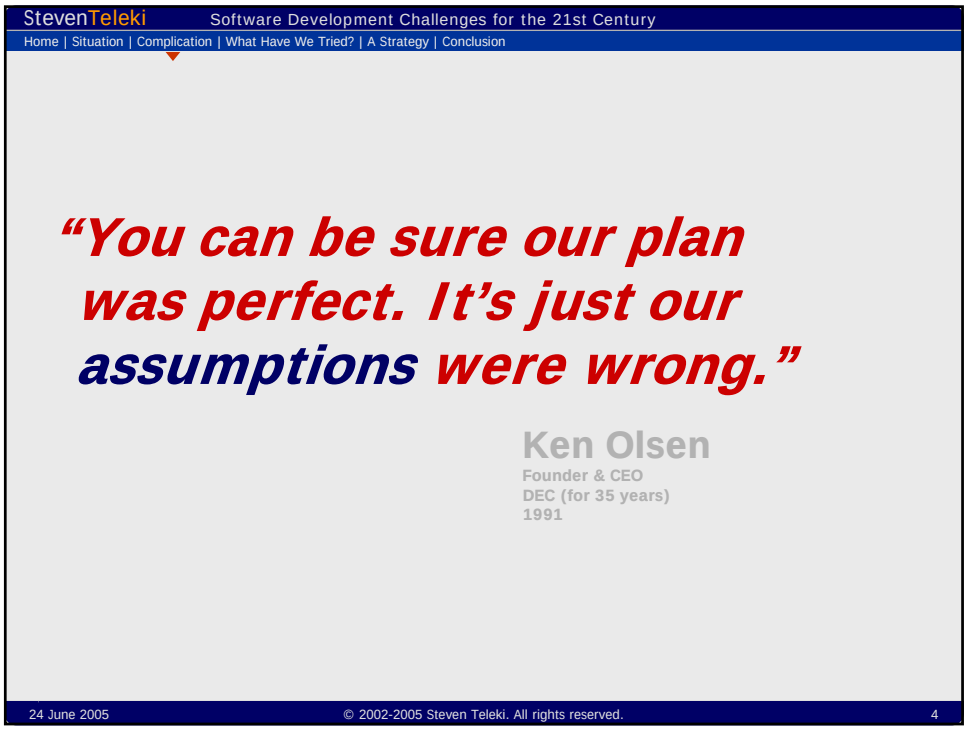
3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"You can be sure our plan was perfect. It's just our assumptions were wrong."
Ken Olsen
Founder & CEO
DEC (for 35 years)
1991
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4

## Assumptions, Assumptions, Assumptions...

"A discipline's basic assumptions about reality determine what it focuses on. [...] For a social discipline [...] the assumptions are a great deal more important than are the paradigms for a natural science. [...]

"A social discipline [...] deals with the behavior of people [...]. Practitioners will therefore tend to act and behave as the discipline's assumptions tell them to."

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

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## I. Writing

Writing Invented around:
- » 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.

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## II. Books

Writing Invented around:
- » 3300 BC Egypt, Mesopotamia, China
- » 800 BC Greek Alphabe

Books Invented
- » 1300 BC China
- » 500 BC Greece

**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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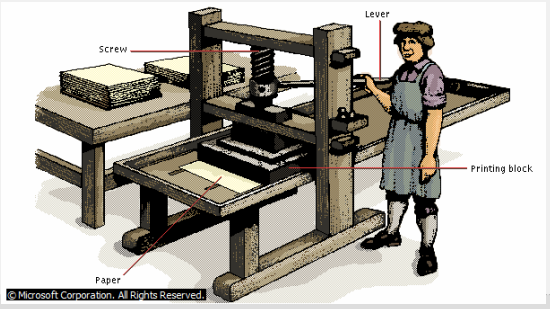
## III. Movable Type & Printing Press

Writing Invented around:
- » 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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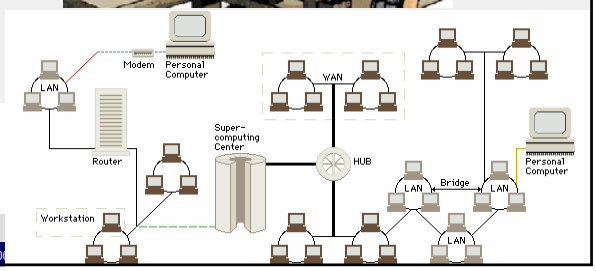
## IV. Computers and The Internet

Writing Invented around:
- » 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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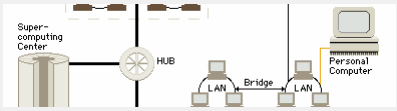
## Four Information Technology Revolutions

Writing Invented around:
- » 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




**The IT industry is at an inflection point!**

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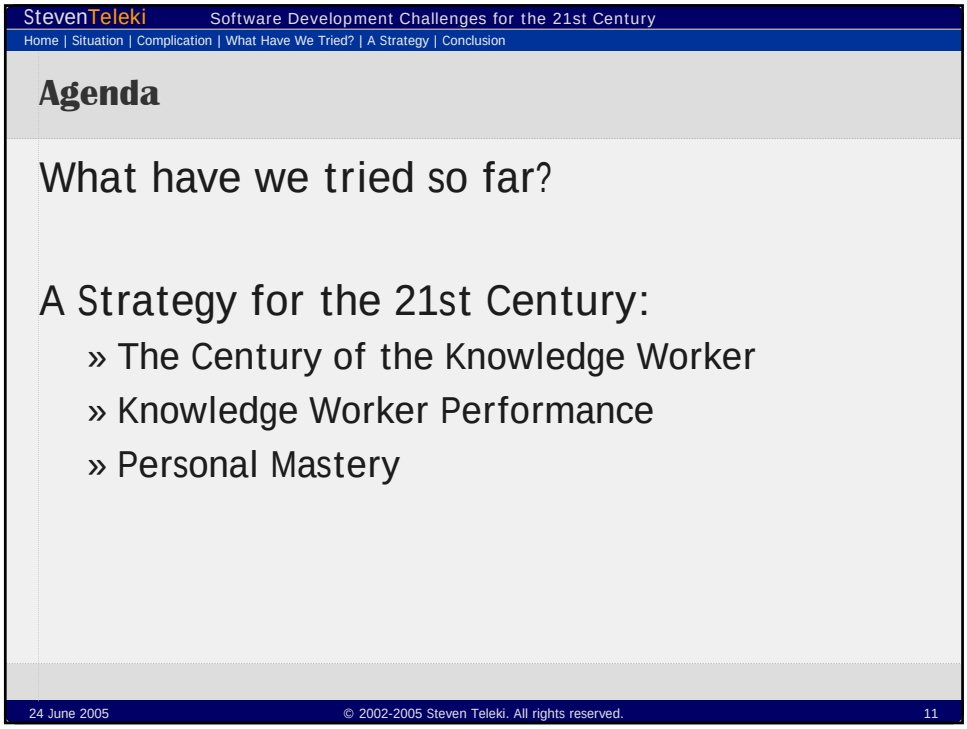
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Agenda
What have we tried so far?
A Strategy for the 21st Century:
» The Century of the Knowledge Worker
» Knowledge Worker Performance
» Personal Mastery
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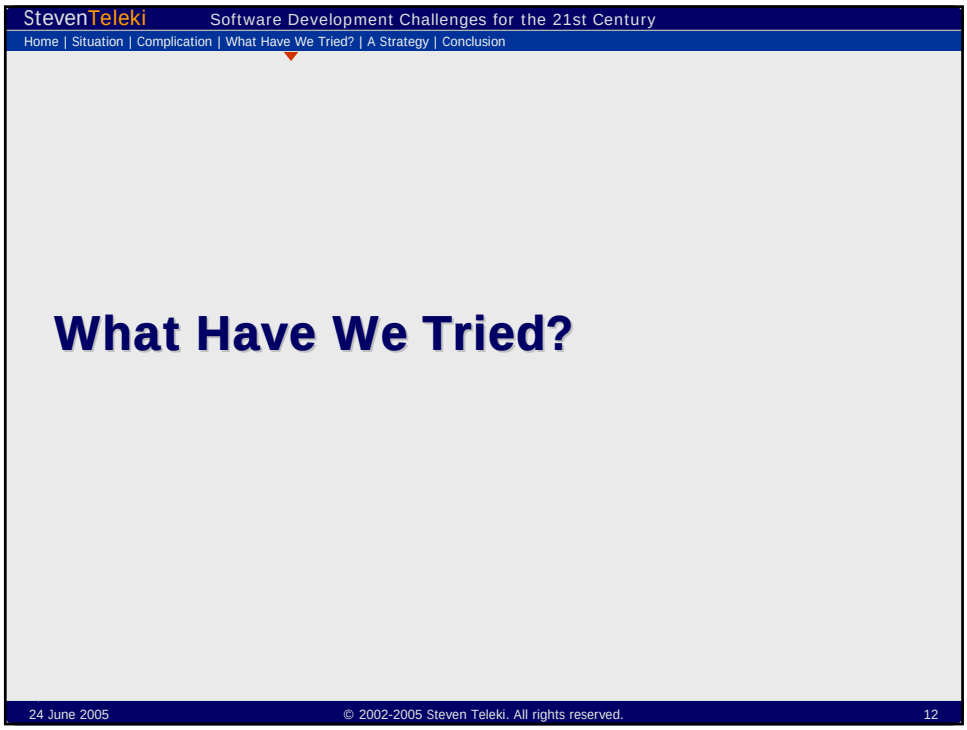
11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What Have We Tried?
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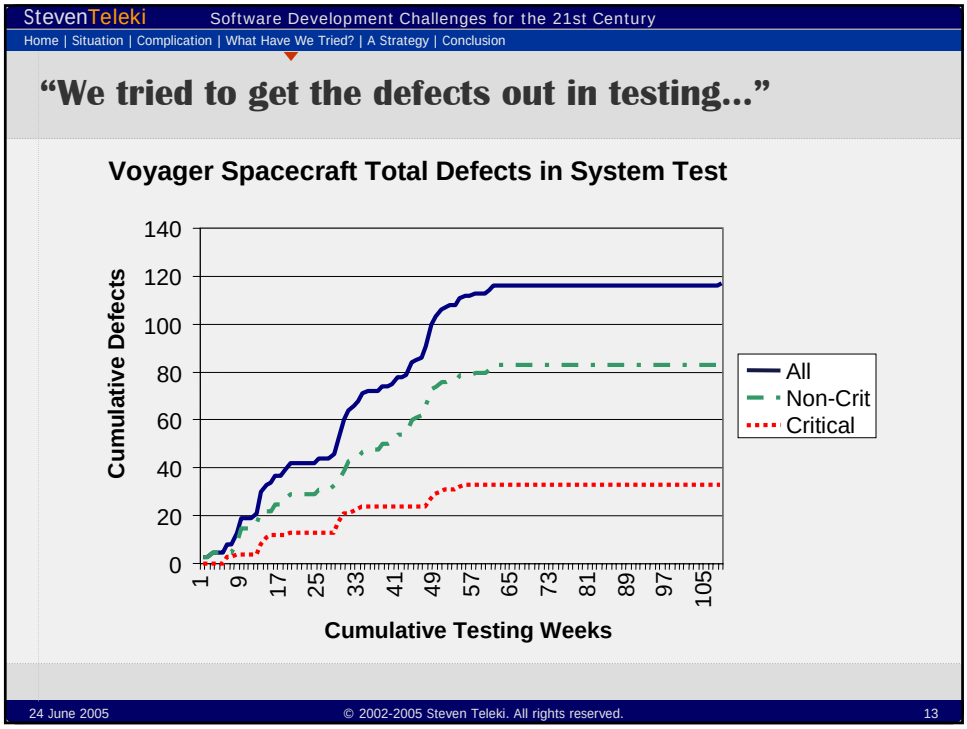
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"We tried to get the defects out in testing..."
Voyager Spacecraft Total Defects in System Test
Cumulative Defects
0
20
40
60
80
100
120
140
1
9
17
25
33
41
49
57
65
73
81
89
97
105
Cumulative Testing Weeks
All
Non-Crit
Critical
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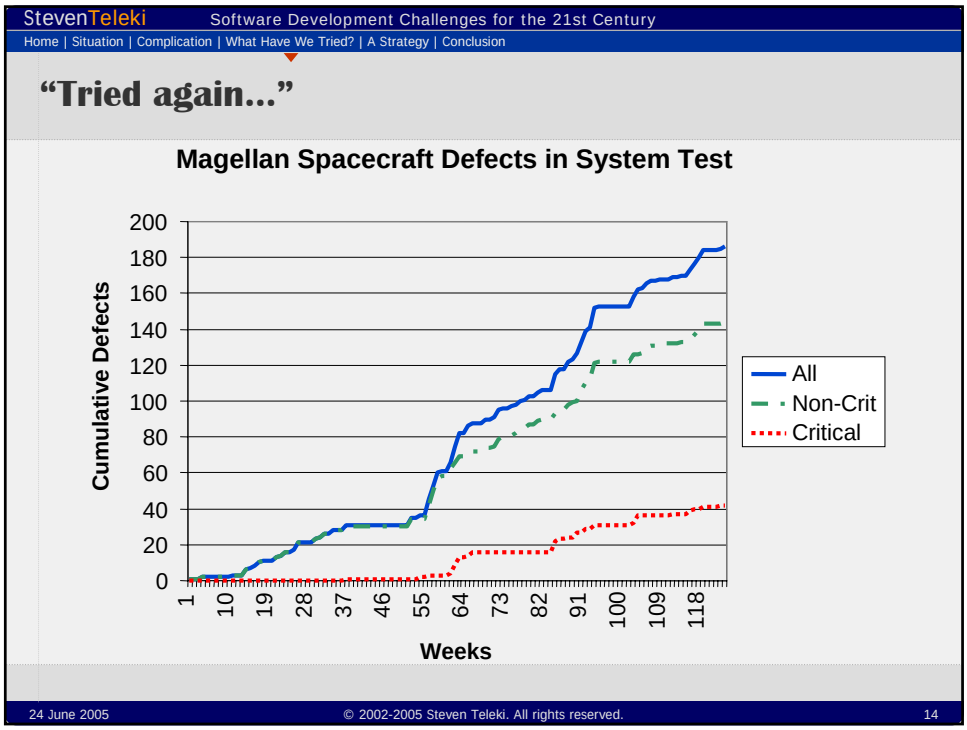
13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"Tried again..."
Magellan Spacecraft Defects in System Test
Cumulative Defects
0
20
40
60
80
100
120
140
160
180
200
1
10
19
28
37
46
55
64
73
82
91
100
109
118
Weeks
All
Non-Crit
Critical
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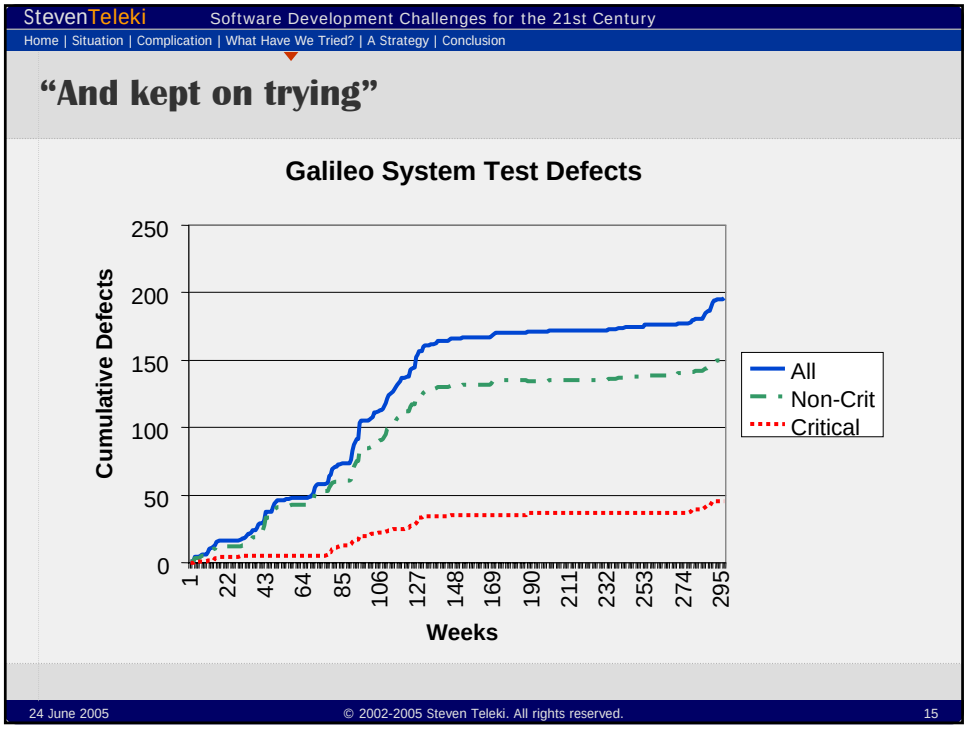
14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"And kept on trying"
Galileo System Test Defects
Cumulative Defects
250
200
150
100
50
0
1
22
43
64
85
106
127
148
169
190
211
232
253
274
295
Weeks
All
Non-Crit
Critical
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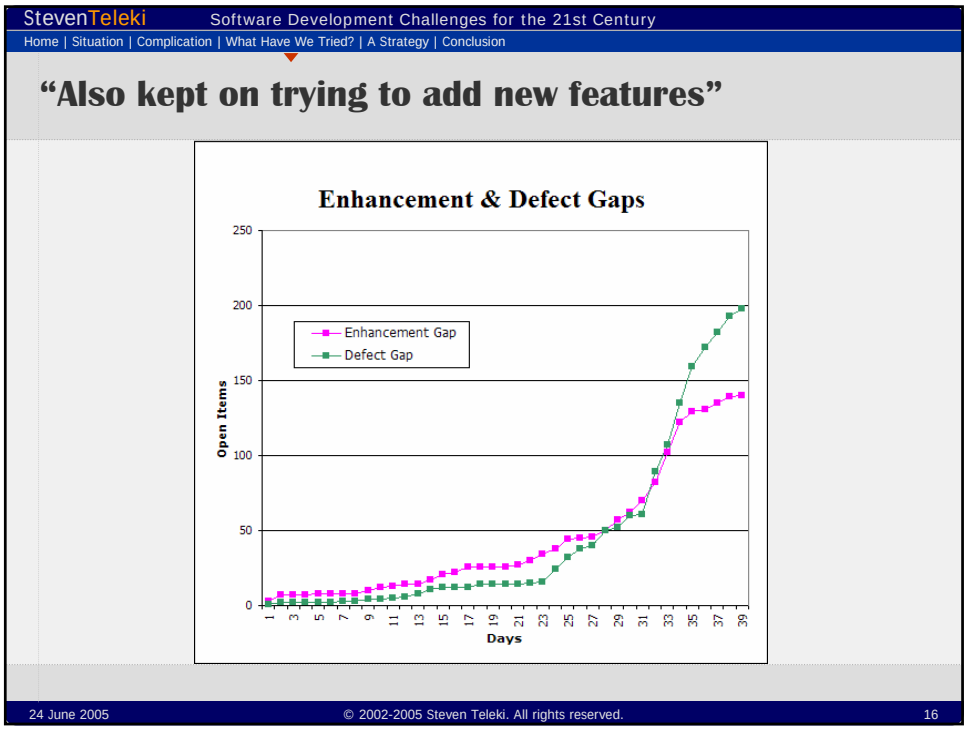
15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"Also kept on trying to add new features"
Enhancement & Defect Gaps
Open Items
250
200
150
100
50
0
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
Days
Enhancement Gap
Defect Gap
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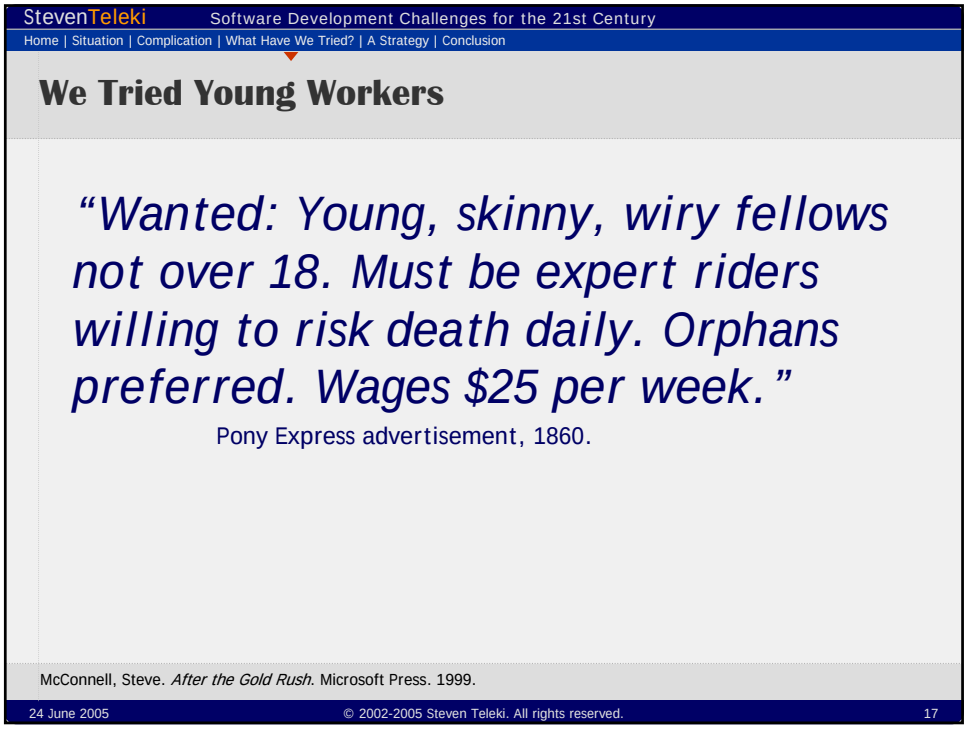
16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We Tried Young Workers
"Wanted: Young, skinny, wiry fellows not over 18. Must be expert riders willing to risk death daily. Orphans preferred. Wages $25 per week."
Pony Express advertisement, 1860.
McConnell, Steve. After the Gold Rush. Microsoft Press. 1999.
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We Tried Better Compensation
"We realize the skills, intellect and personality we seek are rare, and our compensation plan reflects that. In return we expect TOTAL AND ABSOLUTE COMMITMENT to project success—overcoming all obstacles to create applications on time and within budget."
Software Developer Advertisement, Seattle Times, 1995.
McConnell, Steve. After the Gold Rush. Microsoft Press. 1999.
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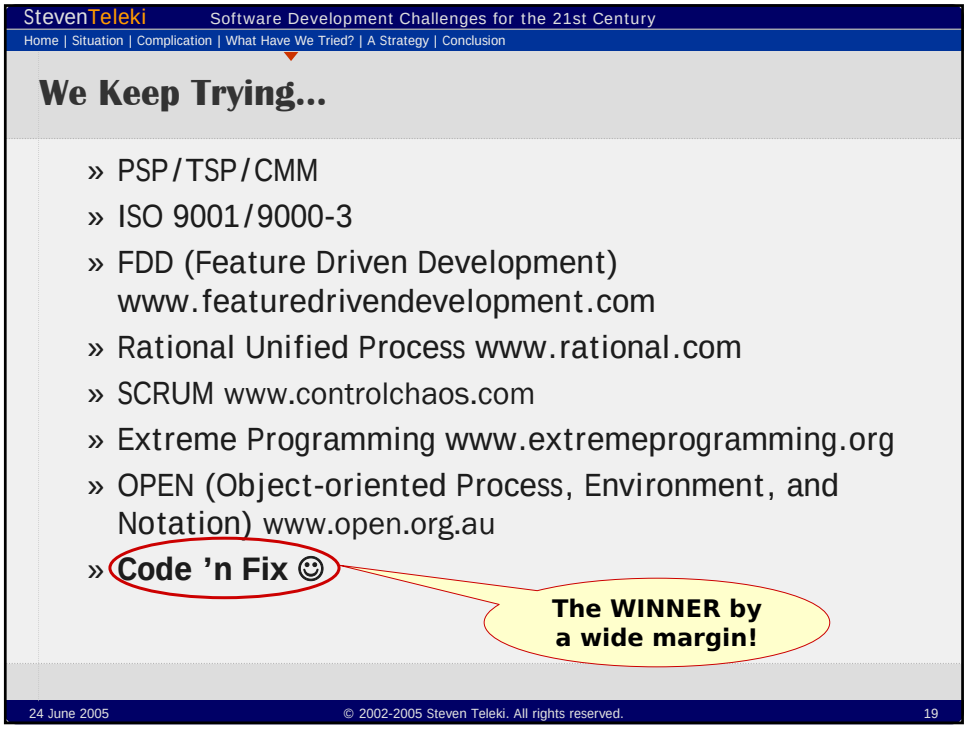
18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We Keep Trying...
» PSP/TSP/CMM
» ISO 9001/9000-3
» FDD (Feature Driven Development) www.featuredrivendevelopment.com
» Rational Unified Process www.rational.com
» SCRUM www.controlchaos.com
» Extreme Programming www.extremeprogramming.org
» OPEN (Object-oriented Process, Environment, and Notation) www.open.org.au
» Code 'n Fix ☺
The WINNER by a wide margin!
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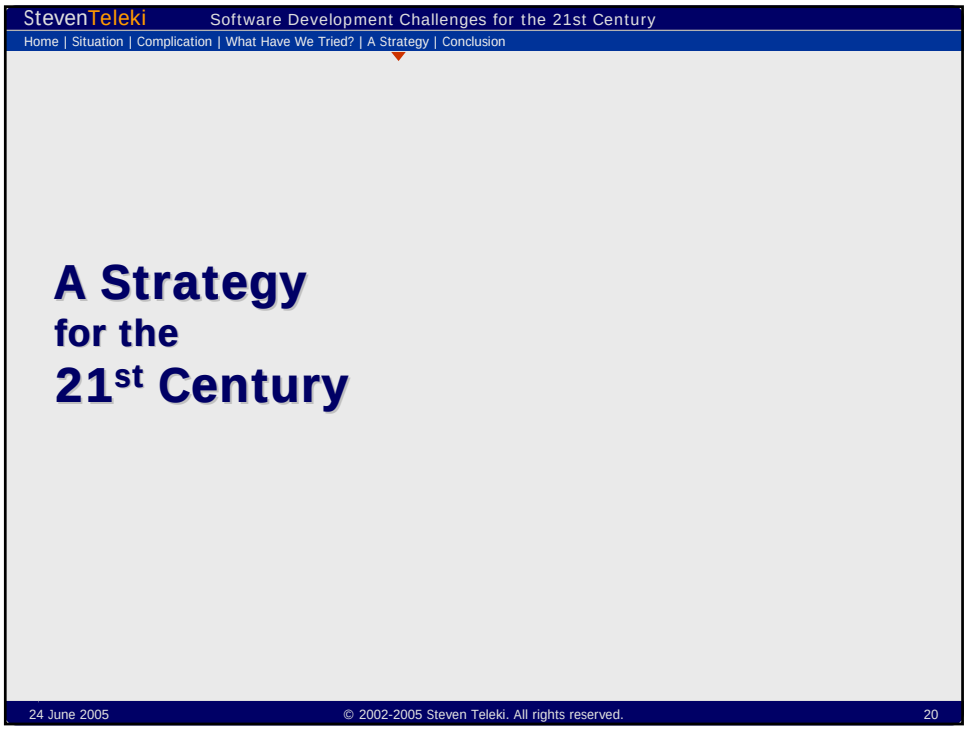
19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A Strategy
for the
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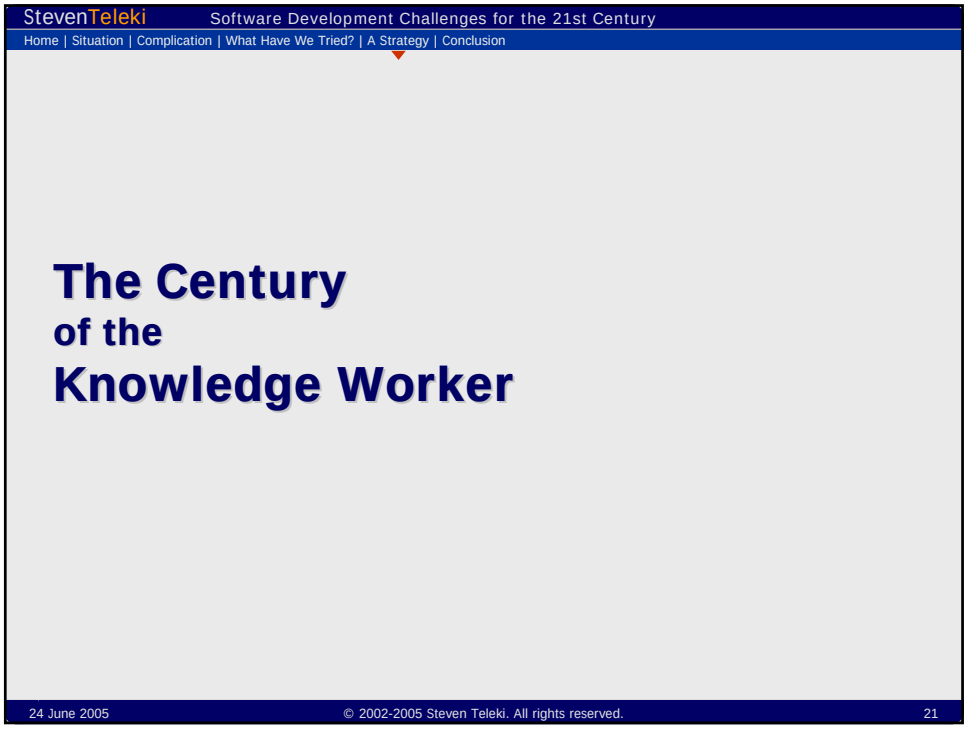
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The Century
of the
Knowledge Worker
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Back To The Farm
"In every human activity, the *Law of the Farm* governs."
"There is no cramming on the farm."
Covey, Stephen R. *First Things First.* Free Press. 1996.
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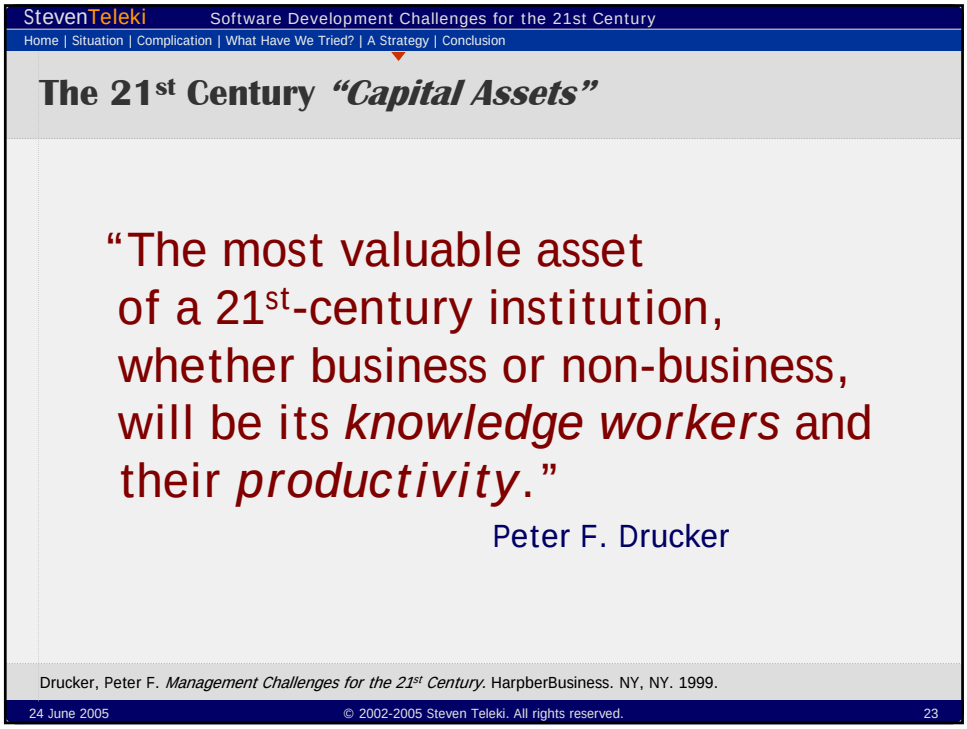
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The 21st Century "Capital Assets"
"The most valuable asset of a 21st-century institution, whether business or non-business, will be its knowledge workers and their productivity."
Peter F. Drucker
Drucker, Peter F. Management Challenges for the 21st Century. HarpberBusiness. NY, NY. 1999.
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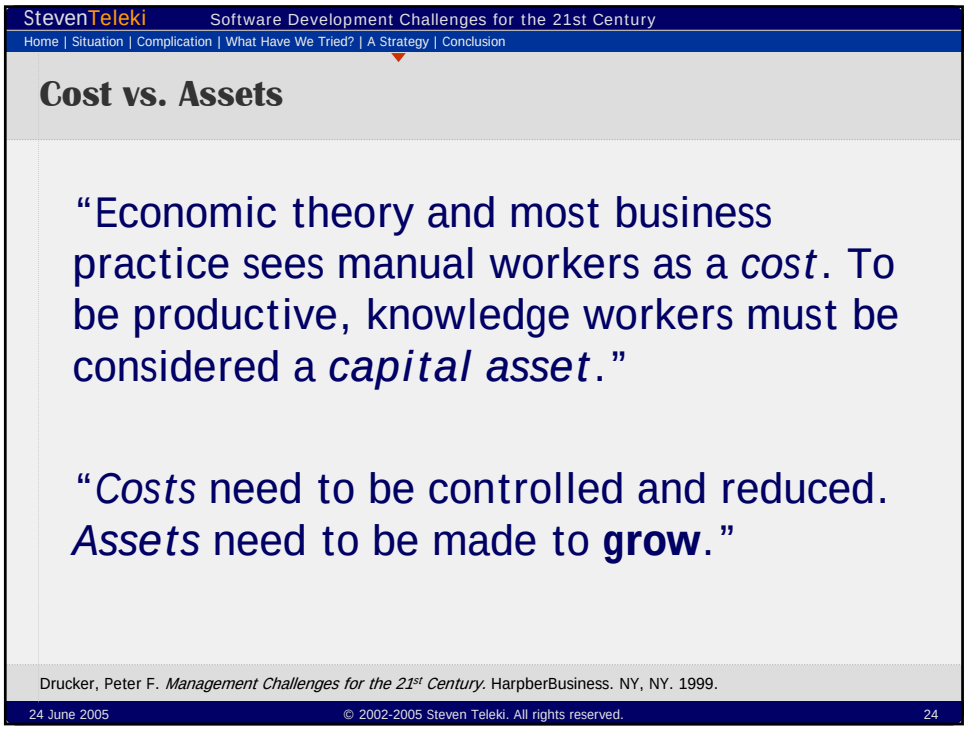
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Cost vs. Assets
"Economic theory and most business practice sees manual workers as a cost. To be productive, knowledge workers must be considered a capital asset."
"Costs need to be controlled and reduced. Assets need to be made to grow."
Drucker, Peter F. Management Challenges for the 21st Century. HarpberBusiness. NY, NY. 1999.
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## 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.

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## 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.

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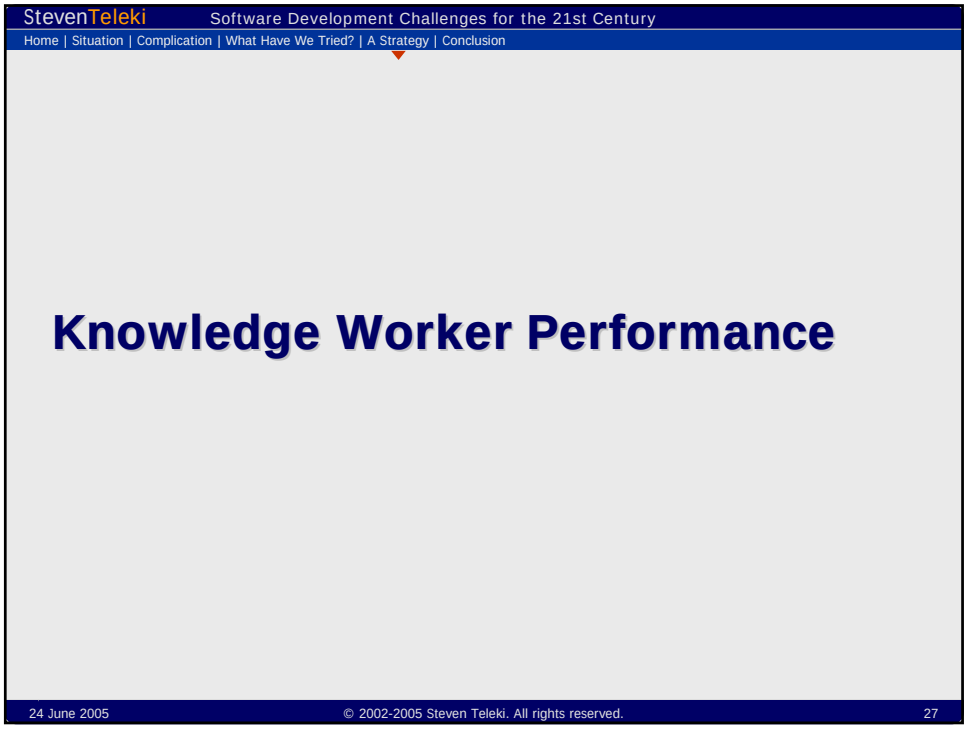
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Knowledge Worker Performance
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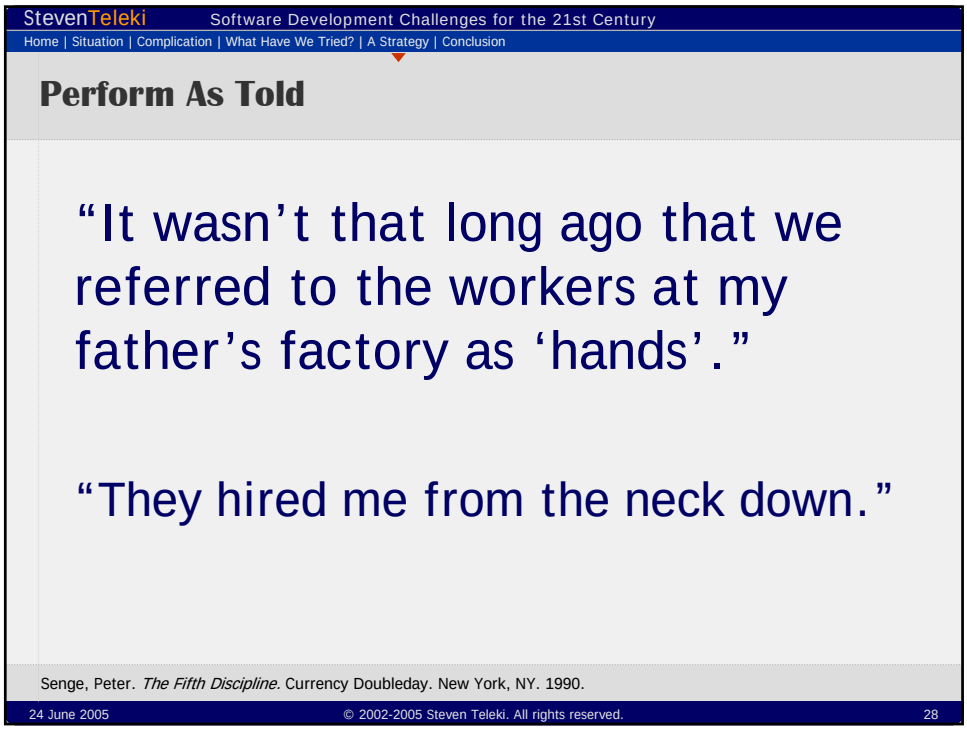
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Perform As Told
"It wasn't that long ago that we referred to the workers at my father's factory as 'hands'."
"They hired me from the neck down."
Senge, Peter. The Fifth Discipline. Currency Doubleday. New York, NY. 1990.
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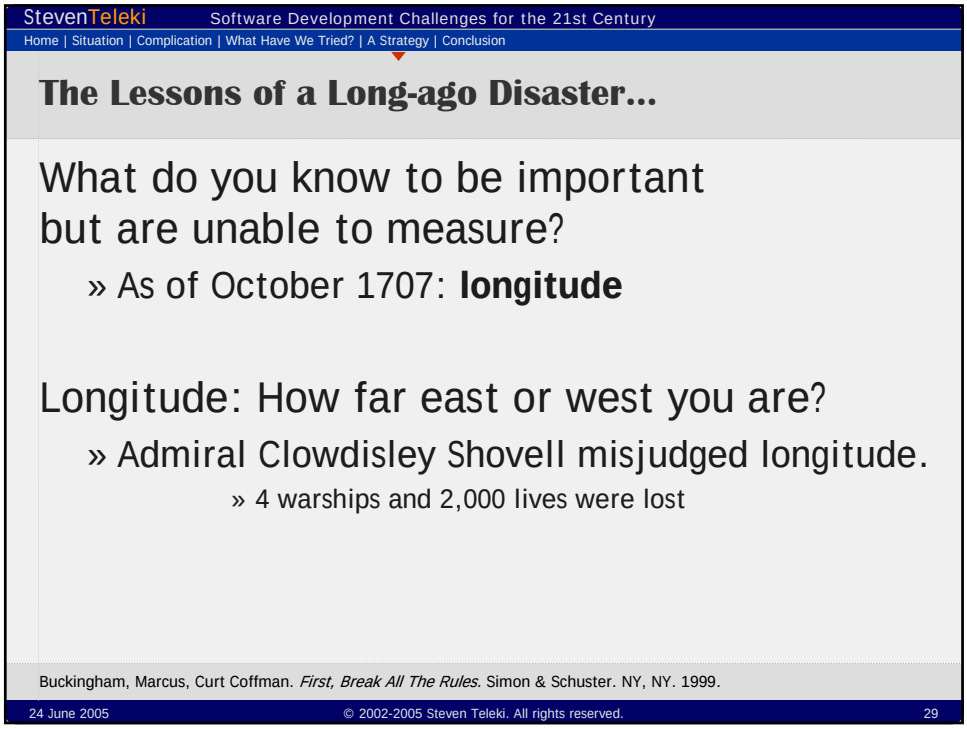
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The Lessons of a Long-ago Disaster...
What do you know to be important but are unable to measure?
» As of October 1707: longitude
Longitude: How far east or west you are?
» Admiral Clowdisley Shovell misjudged longitude.
» 4 warships and 2,000 lives were lost
Buckingham, Marcus, Curt Coffman. First, Break All The Rules. Simon & Schuster. NY, NY. 1999.
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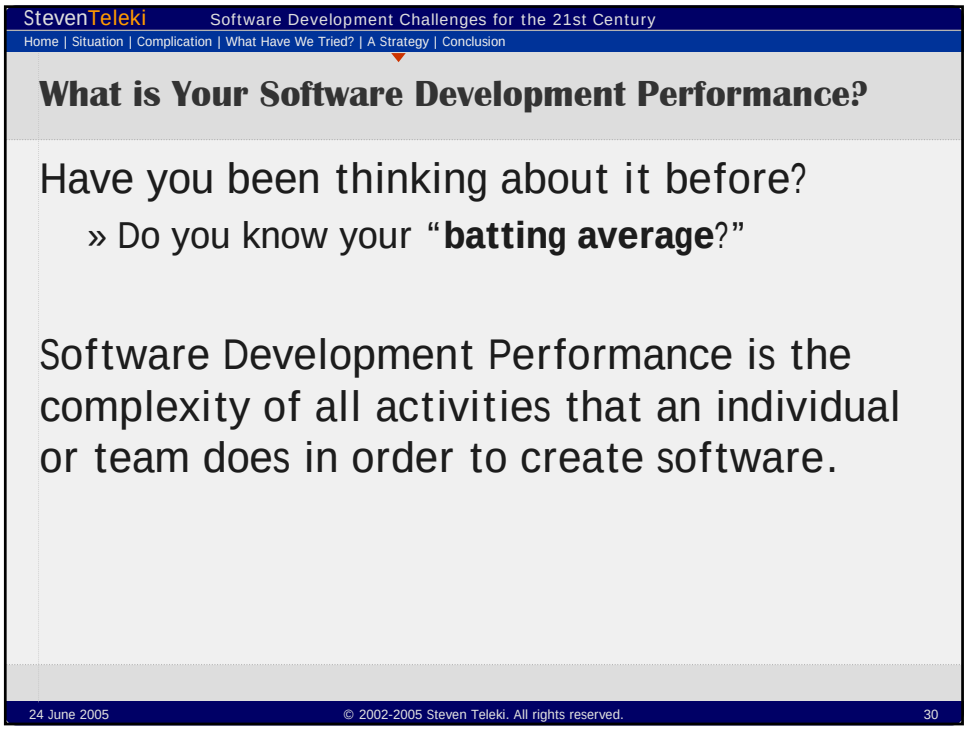
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What is Your Software Development Performance?
Have you been thinking about it before?
» Do you know your "batting average?"
Software Development Performance is the complexity of all activities that an individual or team does in order to create software.
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## 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

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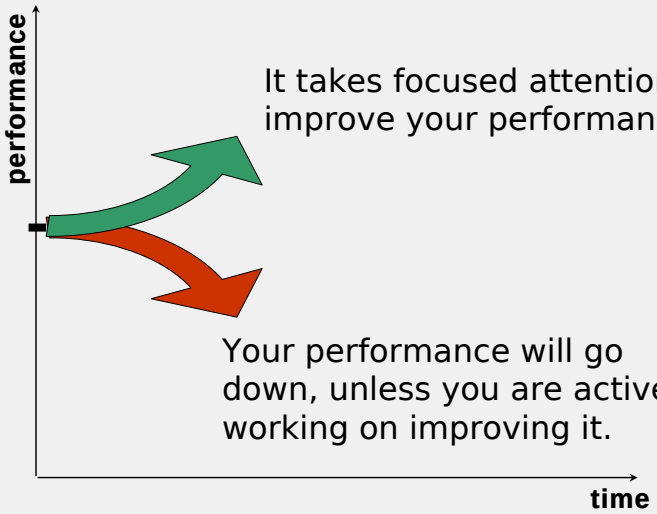
## There Is NO Constant Performance!




It takes focused attention to improve your performance.

Your performance will go down, unless you are actively working on improving it.

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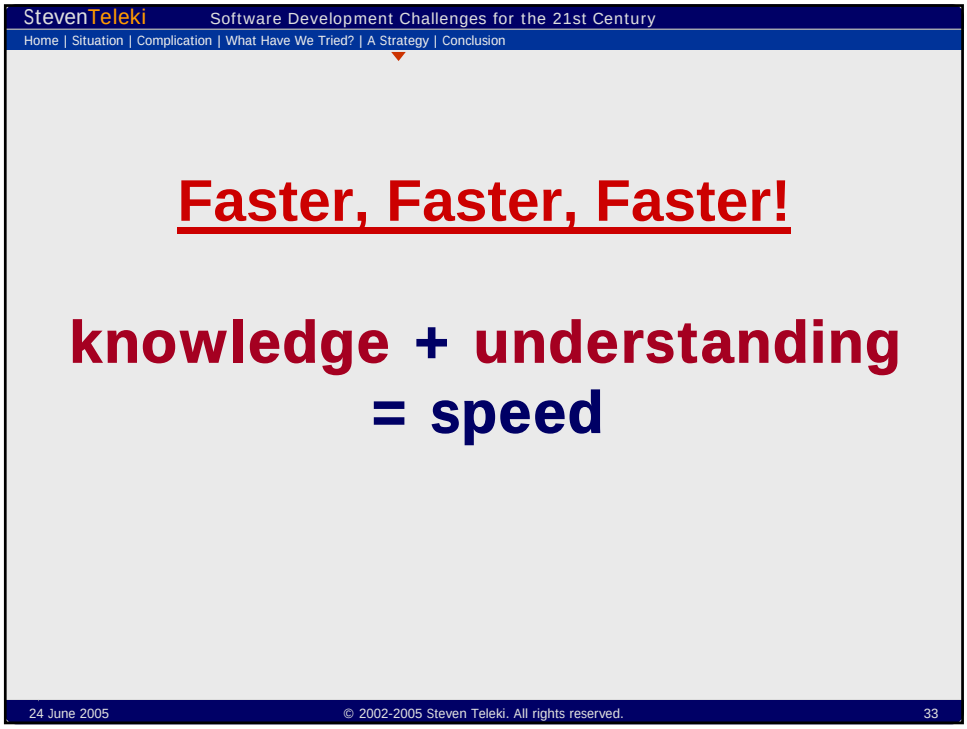
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Faster, Faster, Faster!
knowledge + understanding
= speed
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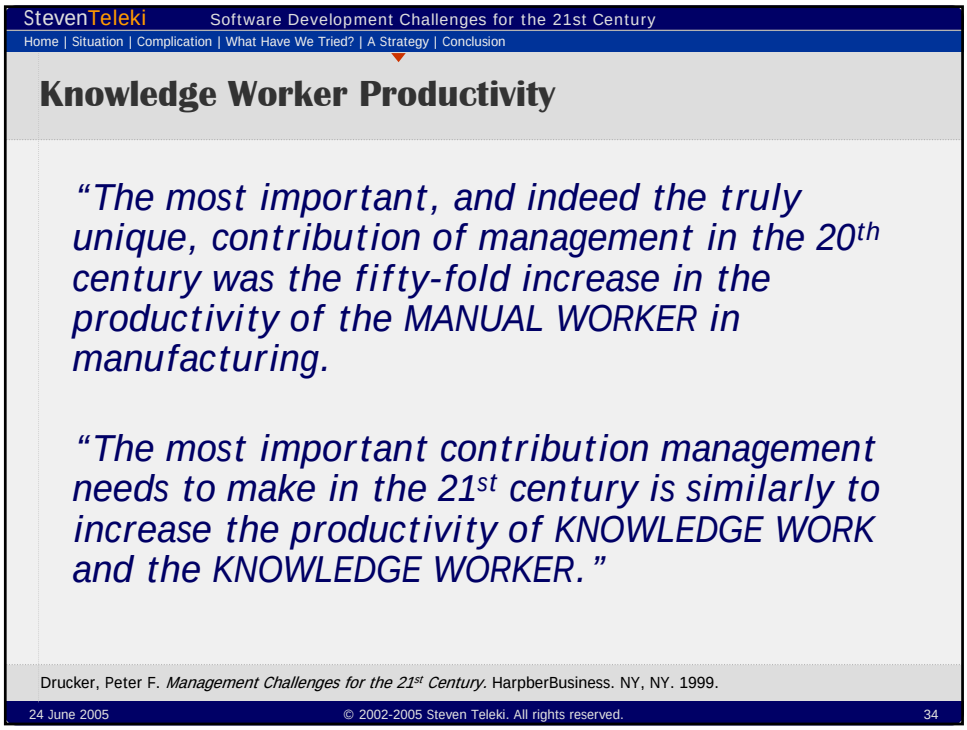
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Knowledge Worker Productivity
"The most important, and indeed the truly unique, contribution of management in the 20th century was the fifty-fold increase in the productivity of the MANUAL WORKER in manufacturing.
"The most important contribution management needs to make in the 21st century is similarly to increase the productivity of KNOWLEDGE WORK and the KNOWLEDGE WORKER."
Drucker, Peter F. Management Challenges for the 21st Century. HarpberBusiness. NY, NY. 1999.
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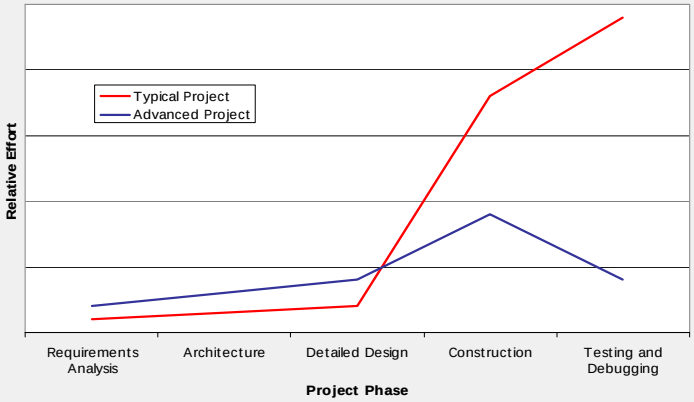
## Performance Indicators

**Relative Effort on a Typical vs. an Advanced Project**




Advanced software development approaches require more work during the early stages of the project to eliminate enormous amount of unnecessary work in the later stages of a project.

McConnell, Steve. *After the Gold Rush*. Microsoft Press. 1999.

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## Personal Mastery

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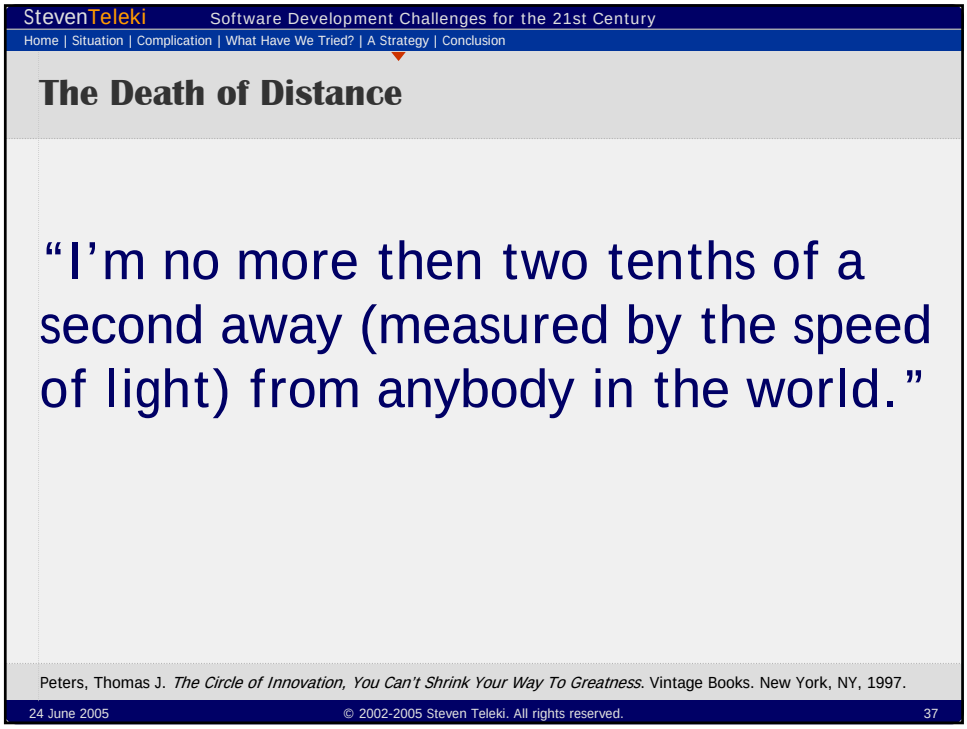
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The Death of Distance
"I'm no more then two tenths of a second away (measured by the speed of light) from anybody in the world."
Peters, Thomas J. The Circle of Innovation, You Can't Shrink Your Way To Greatness. Vintage Books. New York, NY, 1997.
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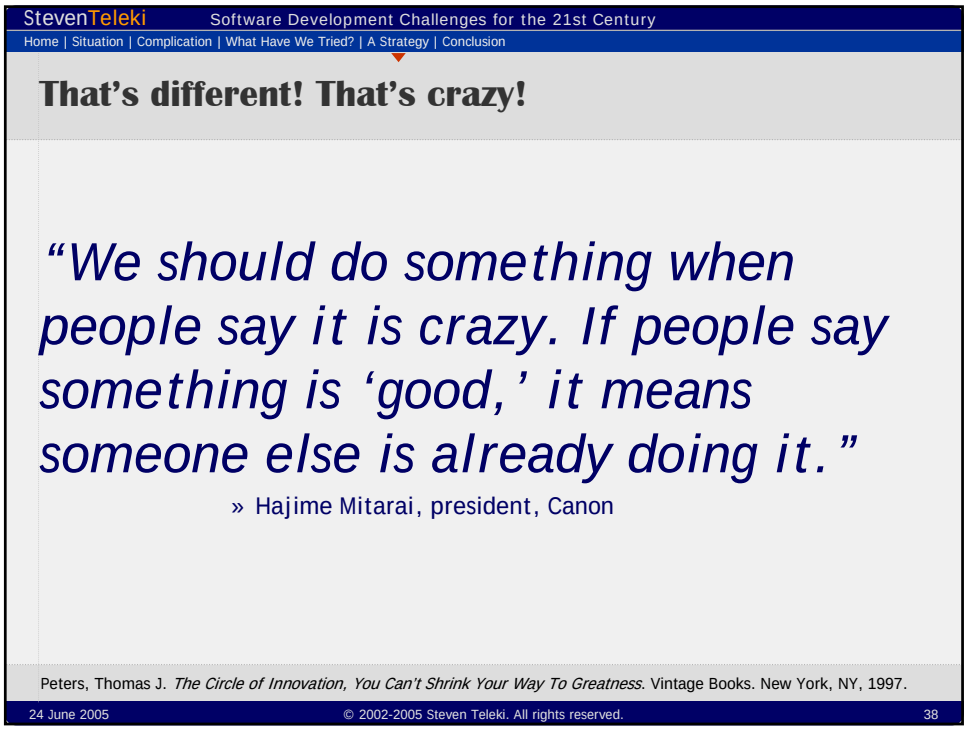
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That's different! That's crazy!
"We should do something when people say it is crazy. If people say something is 'good,' it means someone else is already doing it."
» Hajime Mitarai, president, Canon
Peters, Thomas J. The Circle of Innovation, You Can't Shrink Your Way To Greatness. Vintage Books. New York, NY, 1997.
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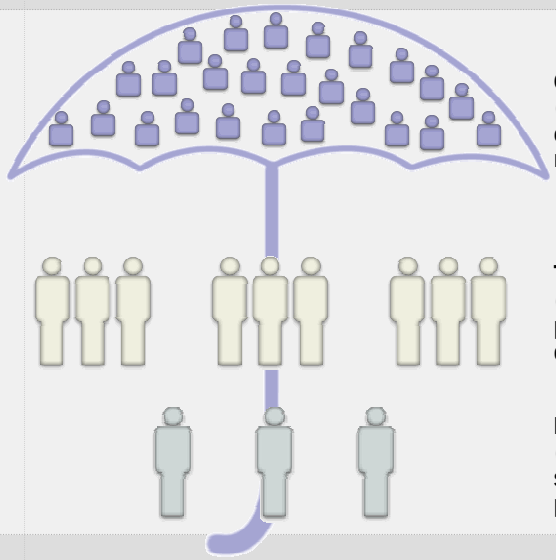
## Success Hinges On The Individual



**Capability Maturity Model (CMM):** Focuses on the organization's capability; management actions.

**Team Software Process (TSP):** Focuses on team performance; product development.

**Personal Software Process (PSP):** Focuses on individual skills and discipline; entirely personal.

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## 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.

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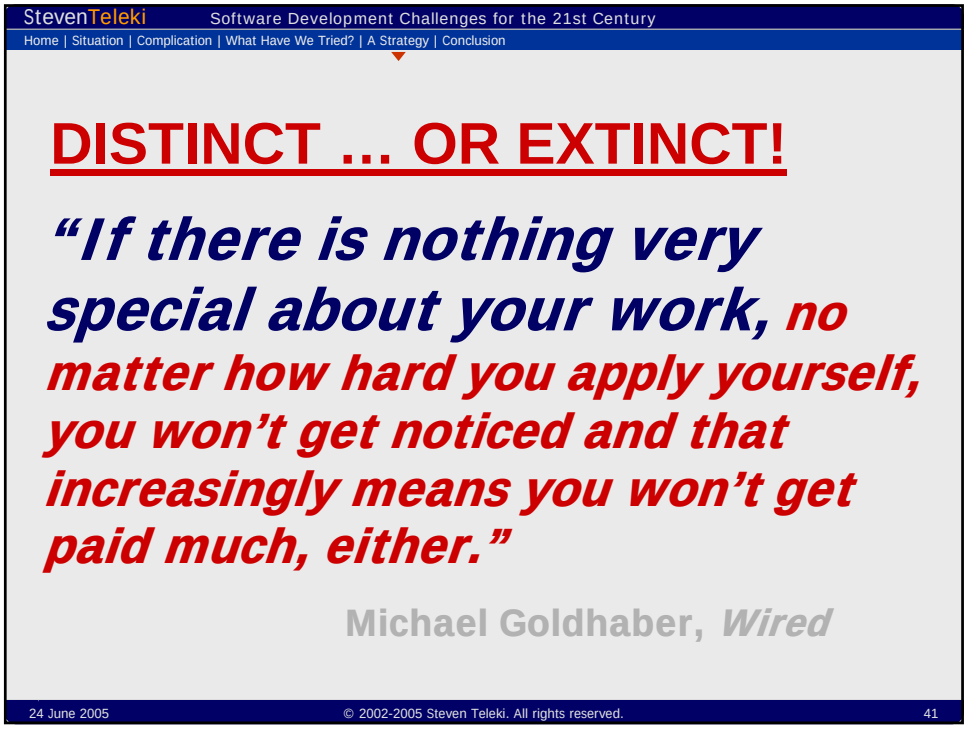
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DISTINCT ... OR EXTINCT!
"If there is nothing very special about your work, no matter how hard you apply yourself, you won't get noticed and that increasingly means you won't get paid much, either."
Michael Goldhaber, Wired
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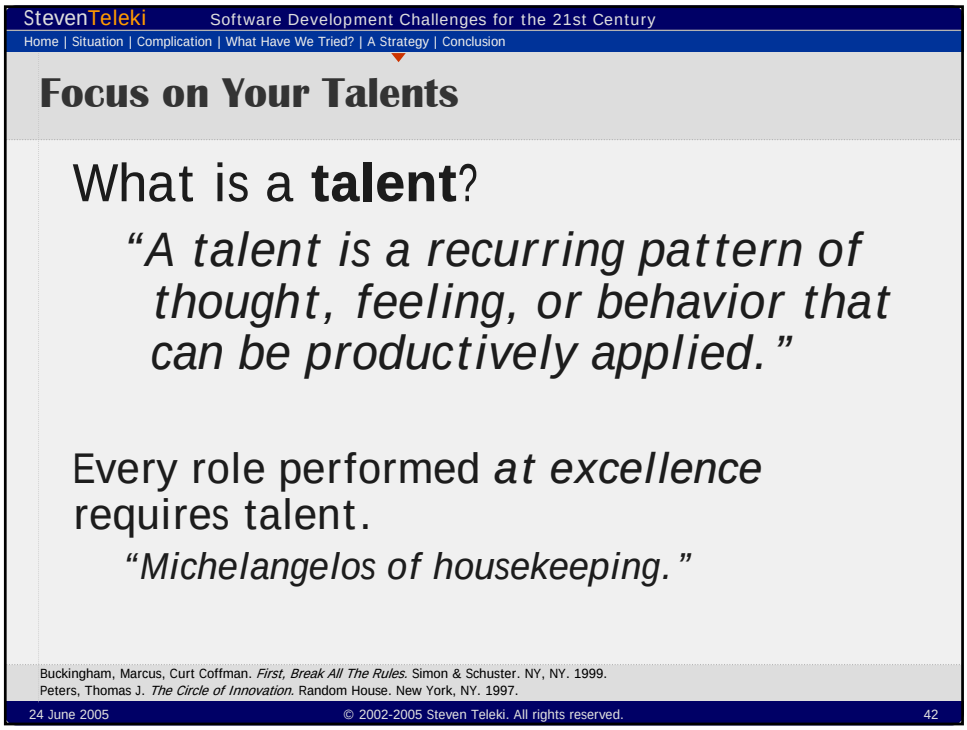
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Focus on Your Talents
What is a talent?
"A talent is a recurring pattern of thought, feeling, or behavior that can be productively applied."
Every role performed at excellence requires talent.
"Michelangelos of housekeeping."
Buckingham, Marcus, Curt Coffman. First, Break All The Rules. Simon & Schuster. NY, NY. 1999.
Peters, Thomas J. The Circle of Innovation. Random House. New York, NY. 1997.
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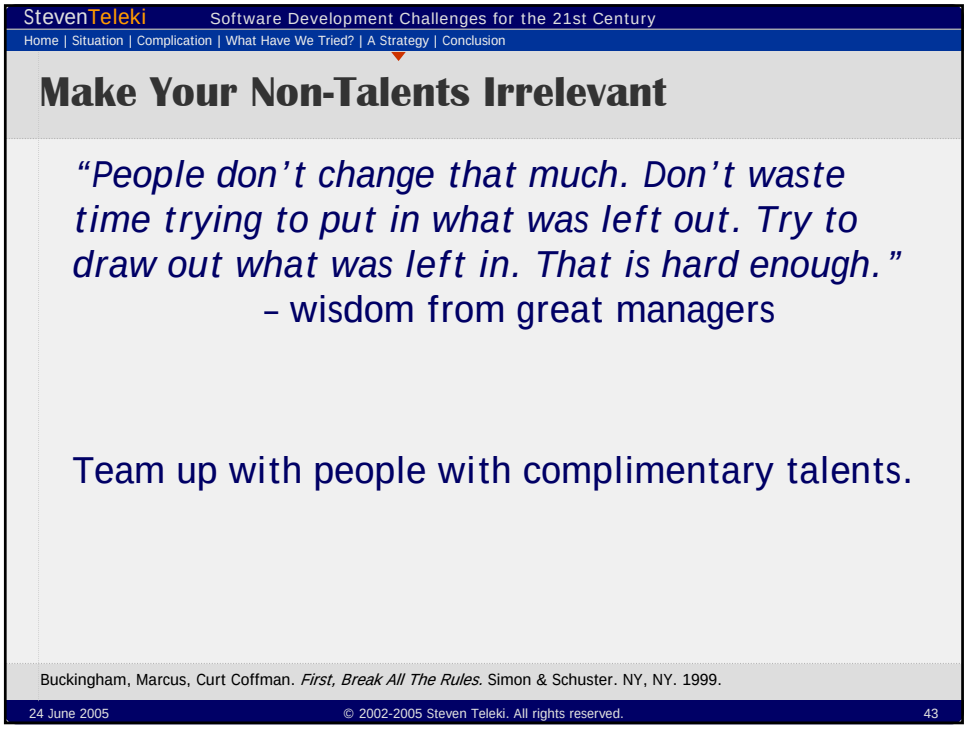
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Make Your Non-Talents Irrelevant
"People don't change that much. Don't waste time trying to put in what was left out. Try to draw out what was left in. That is hard enough."
– wisdom from great managers
Team up with people with complimentary talents.
Buckingham, Marcus, Curt Coffman. First, Break All The Rules. Simon & Schuster. NY, NY. 1999.
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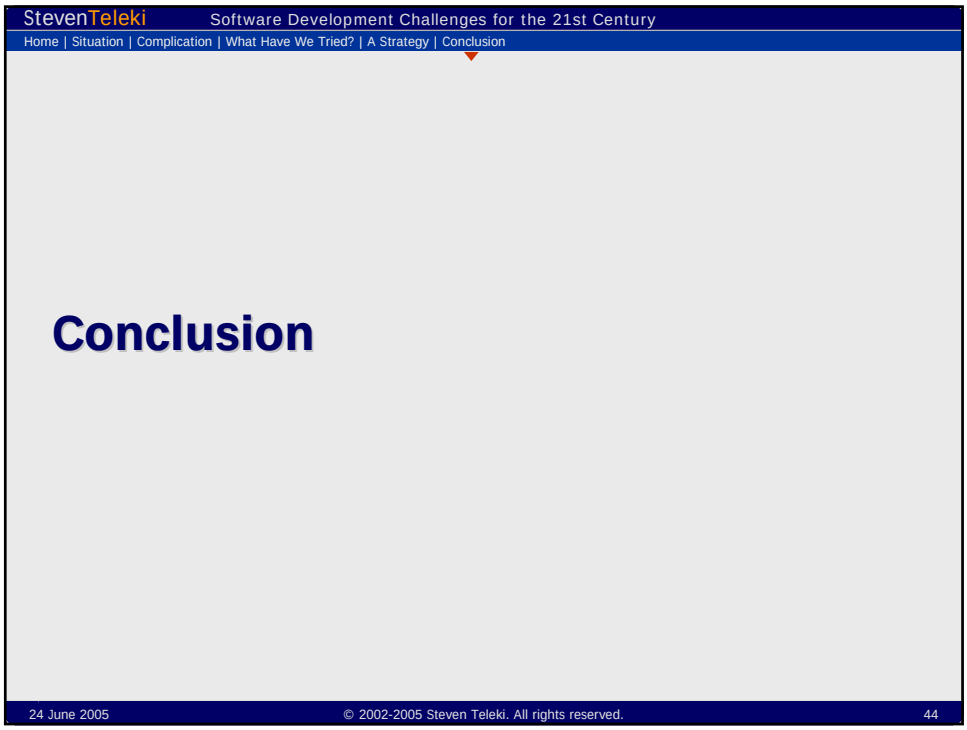
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Conclusion
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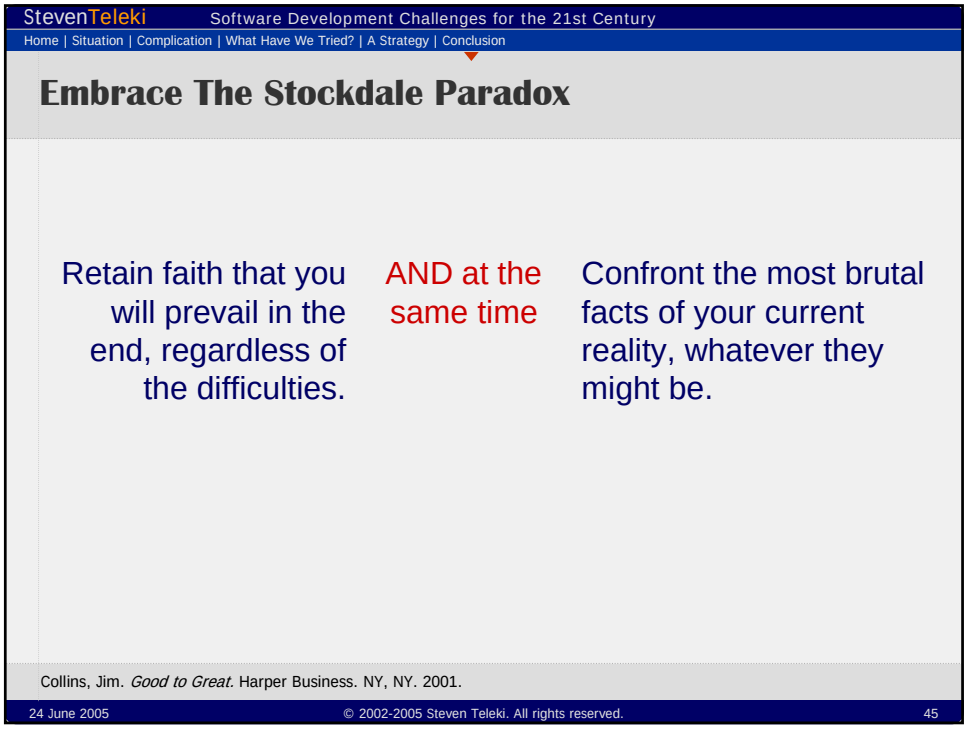
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Embrace The Stockdale Paradox
Retain faith that you will prevail in the end, regardless of the difficulties.
AND at the same time
Confront the most brutal facts of your current reality, whatever they might be.
Collins, Jim. Good to Great. Harper Business. NY, NY. 2001.
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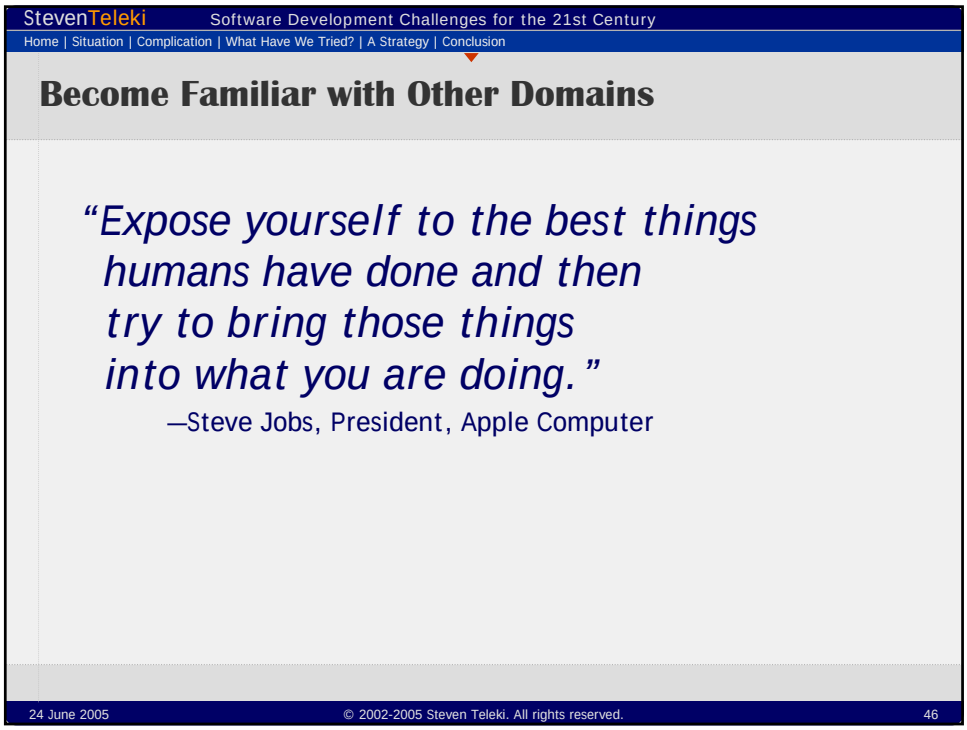
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Become Familiar with Other Domains
"Expose yourself to the best things humans have done and then try to bring those things into what you are doing."
—Steve Jobs, President, Apple Computer
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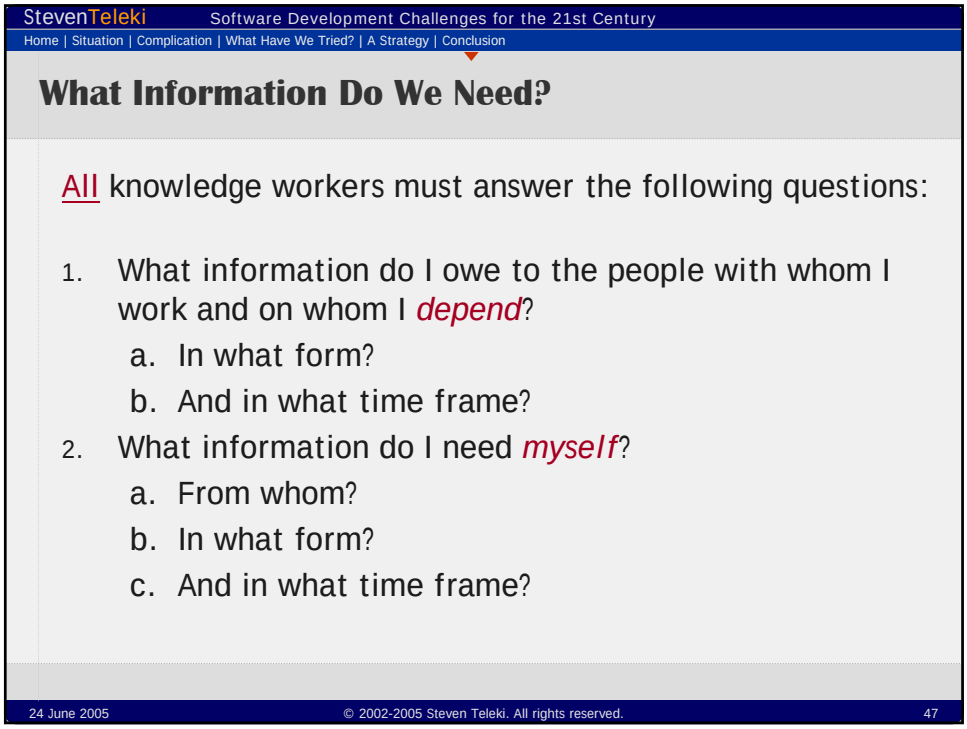
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What Information Do We Need?
All knowledge workers must answer the following questions:
1. What information do I owe to the people with whom I work and on whom I depend?
a. In what form?
b. And in what time frame?
2. What information do I need myself?
a. From whom?
b. In what form?
c. And in what time frame?
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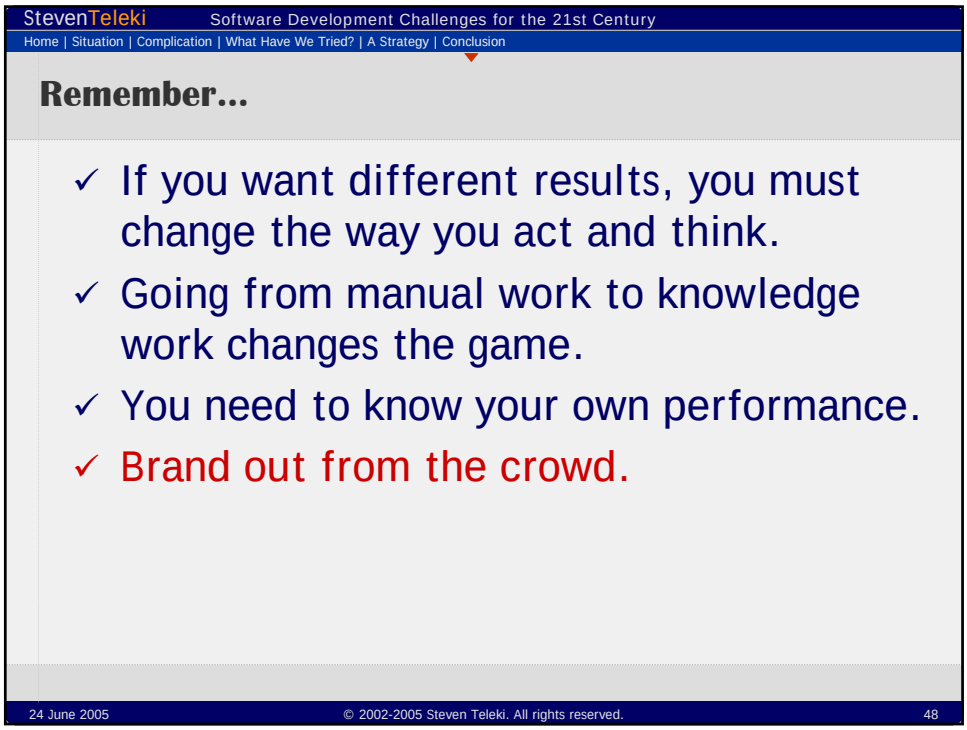
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Remember...
✓ If you want different results, you must change the way you act and think.
✓ Going from manual work to knowledge work changes the game.
✓ You need to know your own performance.
✓ Brand out from the crowd.
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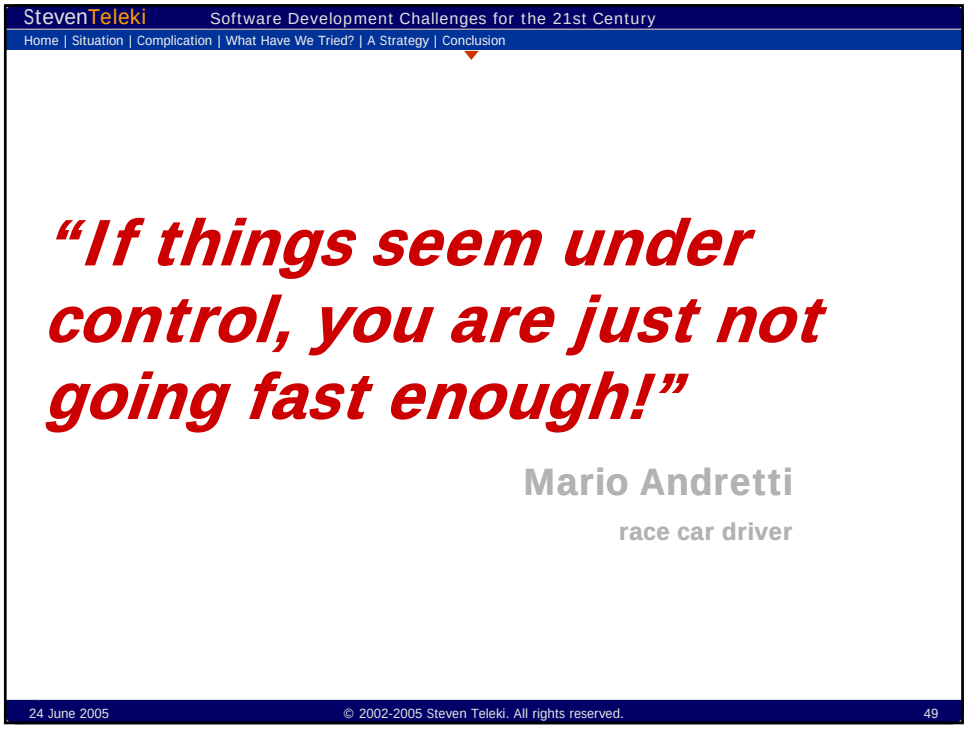
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“If things seem under control, you are just not going fast enough!”
Mario Andretti
race car driver
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Your Letters Are Welcome!
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teleki@computer.org
For a software development reading list visit: http://pseng.net/reading/
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