

Seminar "Beiträge zum Software Engineering"

Innovation as language action

Lutz Prechelt

Freie Universität Berlin, Institut für Informatik

<http://www.inf.fu-berlin.de/inst/ag-se/>

- Innovation
- Innovation vs. invention
- Characteristics of innovations
- Innovation is difficult
 - but some (few!) people make it work regularly
- Frameworks for understanding innovation
- A generative framework: Personal foundational practices

- Peter J. Denning, Robert Dunham:
"Innovation as language action",
Communications of the ACM 48(5), May 2006, pp.47-52



Peter Denning



Innovation is a hot topic

- Lists of top innovations in magazines
- Numerous innovation awards
- Amazon.com: 11800 books with "innovation" in title
- Several famous bestselling books on innovation:
 - Christensen: The innovator's dilemma
 - "disruptive technologies"
 - Foster, Kaplan: Creative destruction
 - Sustained competitiveness requires continuous re-construction and hence innovation
 - Rogers: The diffusion of innovation
 - innovators, early adopters, early majority, late majority, laggards

Definition "innovation"

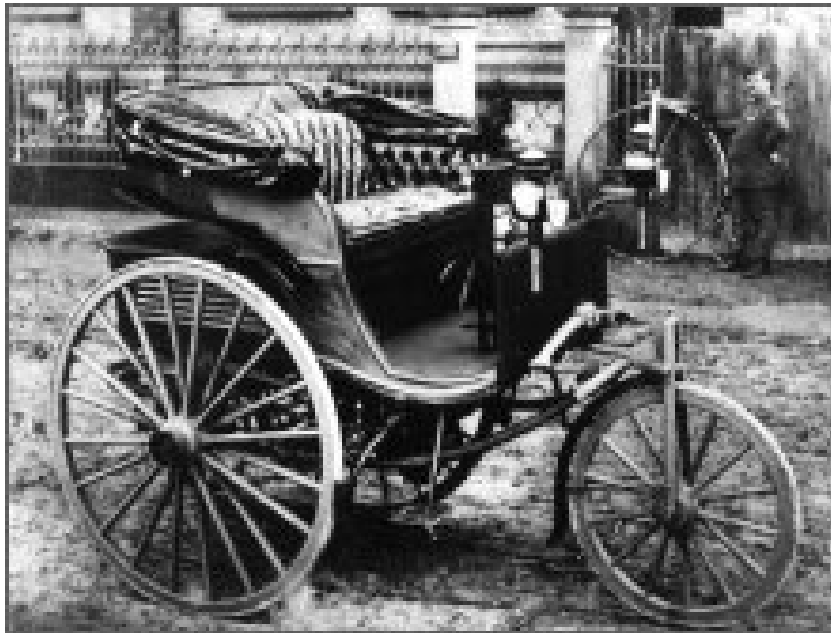
- Definition:
Innovation means that a group adopts a new practice
- Conforms to the usage by important authors,
e.g. Everett Rogers, Peter Drucker, Harold Evans
- This definition is operational:
 - observable
 - executable
- "Practice" refers to
 - habits, routines, and other forms of embodied recurrent actions
 - that are chosen and performed without conscious thought.

Innovation vs. invention

- Invention is different from innovation.
 - Invention means to create something new,
 - but does not require that anyone accept or adopt it.
- Most inventions never become (or lead to) innovations
- Many innovations are not brought about by the inventor

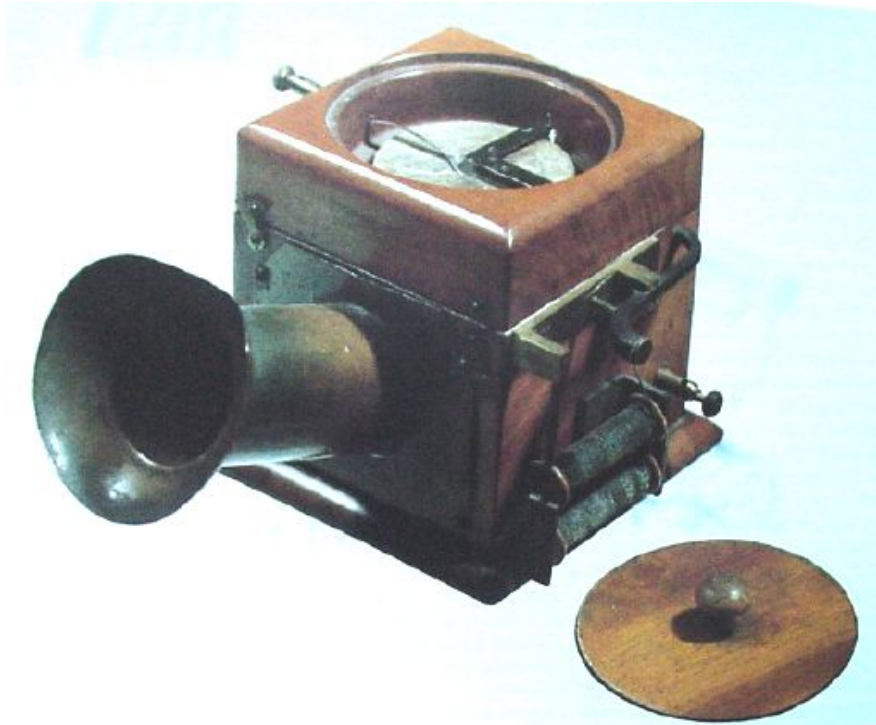
Invention vs. innovation

- Carl Benz's first car was an invention
- but only Henry Ford's Model T brought the innovation
 - it was sufficiently cheap, reliable, available



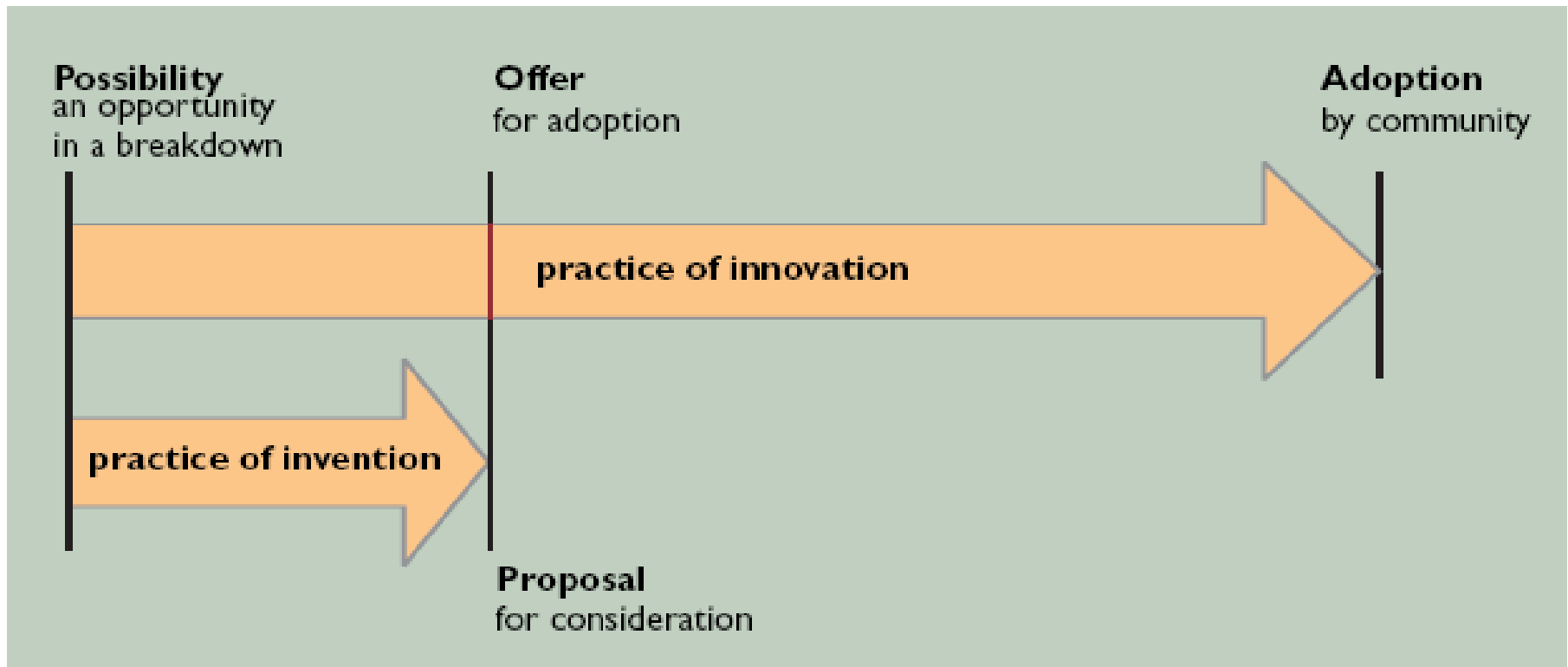
Invention vs. innovation

- Johann Philipp Reis invented the telephone 1860
 - others followed soon: Elisha Gray, Antonio Meucci
- Alexander Graham Bell did it again 1876, but then founded the Bell Telephone Company



Innovation goes beyond invention

- An inventor turns a possibility into an idea, artifact, or process
 - and proposes that others consider it.
- An innovator turns the possibility into an offer for adoption
 - and then follows it through to adoption.



Characteristics of innovations

- Most innovations are not unusual, good, big, fast, or radical
- Usualness:
 - Most innovation comes from everyday attempts at improving things
- Size (number of adopters):
 - All sizes are common
 - e.g. a workgroup of 4 adopting a new email practice or a town of 40.000 adopting a new system of one-way streets
 - Look for innovations half the size and you find 4 times as many
- Speed (how many adopt how fast):
 - People have very different adoption speeds
 - Rogers: early adopters, early majority, late majority, laggards
 - Depends on many attributes of the innovation itself and of the reason for adoption
 - e.g. economic advantage, self-esteem, lifestyle, survival, reputation

Characteristics of innovations (2)

- Radicalness:
 - Only very few innovations are truly radical
 - e.g. language, religion, settledness, enlightenment/nation-states, theory of infection, electricity, internet

Innovation is difficult

- Despite the advice from ten thousand authors, 96% of innovation initiatives fail
 - *Business Week*, Aug. 1, 2005, "Get Creative"
- Only 1 in 100 patents ever recover the patent fees, only 1 in 500 recover all invention costs
 - Peter Drucker
- Many people attempting innovation are unsatisfied with existing advice
- However, there are people who are regularly successful at innovation
 - What is the secret of their success?

- Successful innovation is performed by following certain practices
- These practices can be trained and learned
 - presented in the form of a generative framework
- Technical capabilities are not at the heart of these practices

- Theoretical frameworks
 - describe what factors might drive innovation and how they might interact
 - e.g.(?) Peter Drucker's Principles of Innovation
- Empirical frameworks
 - describe what appears to happen during innovation processes
 - e.g. Everett Roger's diffusion model
- Generative frameworks
 - describe what to do to make innovation happen
 - how to learn it, what skills to build, etc.
 - e.g. the framework by Denning/Durham presented here, called "Personal Foundational Practices"

Basis: Language-action philosophy

- The theoretical basis for the framework
- A branch of linguistic philosophy (started around 1940)
- Central claim:
 - Purposeful actions and interpersonal coordination are the results of commitments people make in conversations.
 - includes verbal and non-verbal interaction
- Consequence:
 - To achieve certain outcomes, we only have to adapt communication practices accordingly: language action
 - Note: ~90% of the cues to which people respond are non-verbal, even in active dialogues (Mehrabian: *Silent Messages*. Wadsworth, 1971).

- For identifying language action that facilitates innovation, the authors analyzed narrative stories of innovators
 - as published in books of Billington, Evans, Rogers, Tedlow, etc.
- They ignored differences
 - e.g. in personality, style, humor, character, charisma, extroversion, optimism/pessimism
- and concentrated on identifying recurring practices

The generative framework: "Personal Foundational Practices"

- 1 to 3:
invention
- 4 to 6:
adoption
- Not sequential steps!
 - more like parallel processes
- Each practice has both verbal and non-verbal aspects



1 Sensing possibilities

- Key aspects:
 - Sensing and articulating opportunities and their value in a community.
 - Seeing possibilities in breakdowns.
 - Being sensitive to disharmonies.
- Characteristic breakdowns:
 - Blindness. Inability to move from sensing to articulation, to hold the thought, or to see opportunities in disharmonies.
- Example:
 - In the 1980s, Tim Berners Lee sensed a disharmony between the actual direction of the Internet (email and file transfer) and its promise (sharing of all human knowledge).

Tim Berners Lee

- born 1955
 - http://en.wikipedia.org/wiki/Tim_Berners-Lee
- Proposed WWW at CERN in 1989
 - then developed HTML, HTTP, browser, editor, httpd
 - <http://www.w3.org/History/19921103-hypertext/hypertext/WWW/TheProject.html>
 - <http://info.cern.ch/> went online 1991



2 Envisioning new realities

- Key aspects:
 - Speculating about new worlds in which an opportunity is taken care of and about the means to get there.
- Characteristic breakdowns:
 - Inability to tell vivid, concrete, compelling stories or to design plans of action.
- Example:
 - Tim Berners Lee envisioned a system wherein anyone could hyperlink any document to any other; a mouse-click would cause the system to retrieve a linked document from any location.

3 Offering new outcomes

- Key aspects:
 - Proposing new rules and strategies of play that produce the new outcomes.
 - Listening to concerns then modifying proposals for better fit.
 - Establishing credibility in one's expertise to fulfill the offer.
- Characteristic breakdowns:
 - Missing awareness of and respect for customers.
 - Inability to listen, to enroll people, to articulate value, or to see people as fundamental in the process.
 - Unwillingness to modify proposals in response to feedback.
- Example:
 - Berners Lee offered to build such a system at CERN in 1990

4 Executing plans and tools

- Key aspects:
 - Building teams and organizations.
 - Carrying out action plans for reliable delivery.
- Characteristic breakdowns:
 - Failure to manage commitments, satisfy customers, deliver on time, or build trust.
- Example:
 - Berners Lee executed in 1991 by putting together programming teams to develop good Web software and make it available for anyone to use.

5 Adopting new practice

- Key aspects:
 - Demonstrating value of proposed adoption.
 - Becoming aware of power structures and community interests.
 - Aligning action plans for coherence with existing practices, concerns, interests, and adoption rates.
 - Recruiting allies. Overcoming resistance.
- Characteristic breakdowns:
 - Failure to anticipate opposition and differing adoption rates
 - Failure to articulate and demonstrate the value.
- Example:
 - Berners Lee stimulated adoption by visiting many sites and conferences to tell people about his system
 - In 1993, this inspired UIUC student Marc Andreessen to write Mosaic, the first graphical browser. The WWW spread like mad.

6 Sustaining integration into surroundings

- Key aspects:
 - Developing supporting infrastructure.
 - Aligning new practices with environment, standards, incentives.
 - Assessing related innovations for negative consequences.
 - Abandoning bad innovations.
 - Discontinuing after end of useful life.
- Characteristic breakdowns:
 - Failure to plan for support and training, to change enabling tools and systems, or to align incentives with the new practices.
- Example:
 - In 1994, Berners Lee founded the World Wide Web Consortium (W3C) to support *sustainable integration* of the Web in systems worldwide and to preserve the Web in the public domain by creating open software and standards.

7 Leading with care, courage, value, power, focus, destiny, and speech act fluency

- Key aspects:
 - Declaring new possibilities in ways that people commit to them.
 - Moving with care, courage, value, power, focus, sense of larger purpose (destiny), fluency of speech acts.
- Characteristic breakdowns:
 - Inability to listen for concerns, offer value, work with power structures, maintain focus, operate from a larger purpose.
 - Inability to perform speech acts skillfully.
- Example:
 - Berners Lee recruited ever-larger numbers of followers.
 - He articulated a small set of guiding principles for Web development and stuck with them.
 - He refused to let the Web "go private" or to become wealthy from his own invention, considering the cause as too important.

- Key aspects:
 - Working with the non-verbal aspects of communication and commitment.
 - Ascending the ladder of competence.
 - Connecting with people. Producing trust.
 - Developing an open and inviting "presence."
 - Blending with concerns, energies, and styles of others.
- Characteristic breakdowns:
 - Inability to read and respond to body language, gesture, etc.
 - Failure to recognize and overcome one's own conditioned tendencies.
 - Failure to engage in regular practice in the other practice areas.
- Example:
 - Meet any successful innovator and watch out for these features.

- Innovation occurs when a group adopts a new practice
- Invention and innovation are different things
 - and require different skill sets
- Innovation comes about by communication (language action)
- The language-action framework helped identify seven practices that constitute the innovation skill set
 - Sensing possibilities
 - Envisioning new realities
 - Offering new outcomes
 - Executing plans and tools
 - Adopting new practice
 - Sustaining integration into surroundings
 - Leading with care, courage, value, power, focus, destiny, and speech act fluency

Thank you!