

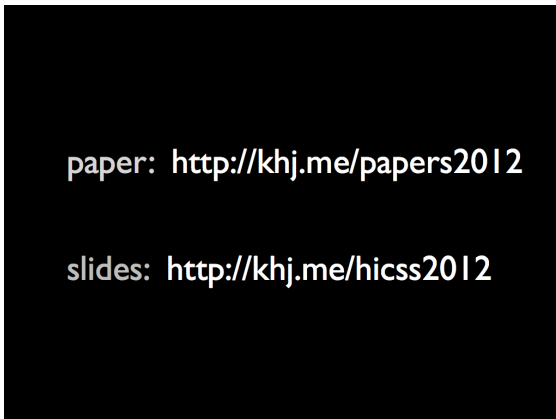
1. **Agile Values, Innovation and
the Shortage of Women Software
Developers**

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<http://judykat.com/ken-judy>



2. **Introduction**



Hello

Thank you for coming. I hope you find the next 90 minutes a worthy use of your time.

This session is based on a paper I presented at the Hawaii International Conference on System Sciences in January. I've put both that paper and my original presentation online. Here are the links. I'll show those URL's up again at the end. Everything I say will be in those notes.

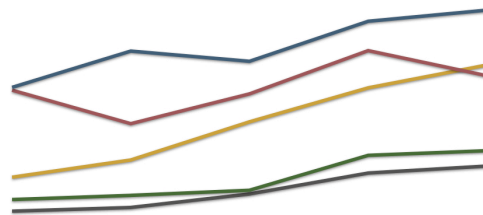
3. **Young field**



Software development is a young field. This is the first “Hello World” example. Any guess when it appeared in print? 1978.

The C language itself is only 40 years old.

4. **Big Problem**



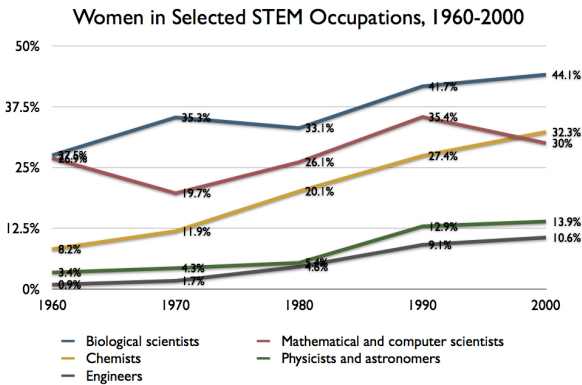
Despite being a modern career, software development suffers from an old problem.

These are plots of the numbers of women in different Science Engineering and Technology fields.

Which of these is Computer Science?

5.

Big Problem



American Association of University Women, "Why So Few Study"

The red line. The numbers are small and declining.

But you might notice the red line is Mathematics and Computer Science. If we isolated software development would the chart be different. It is. I'll show that.

6.

Angel

This session is in the Leadership track but it's leadership with a lowercase "l". Not Innovation and Intrepreneurship as valuable as they are but day to day individual integrity.



It is about what we as practitioners should do and the workplaces we should strive to create around us.

It is about how our embrace of Agile development informs our values and provides us tools to make change happen.

7.

What we're doing here

- Presentation: shortage of women developers (15 min.)
- Table discussion: what "antigens" exist in your workplace? (20-25 min.)
- Presentation: agile principles demand we address the shortage of women developers (15 min.)
- Table discussion: how is your current agile practice failing to address this impediment? (20-25 min.)
- Presentation: change your team to change the world? (5 min.)

(outline of 90 minutes)

8. What I hope you come away with...

Awareness of research establishing the shortage of women developers and the material and cultural factors that contribute to it.



Agreement that a way of working that discourages women from entering our field and drives them out mid-career is not a collaborative, effective, agile way of working.

Belief that agile practice provides a value system and tools that can help us change our workplace to be more tolerant, humane, and creative.

Optimism that we as individual workers can do more than we think to make this happen.

9.

Premise



To state things formally, the premise of my paper is that the lack of women developers in the US is an impediment to value delivery and

product innovation in the software industry.

that, in light of this, Agile principles call on Agile practitioners to confront hostile workplace conditions and call upon Agile enterprises to address the material impediments of pay and advancement.

And, that this beneficial change in teams and companies can incrementally change perceptions of software development in the larger society.

11.

Daughter



I also have an eleven year old daughter who loves technology and attends an all girls math and science school in diverse downtown Brooklyn.

We need to leave them an industry that welcomes their enthusiasm and creativity.

10.

Personal Introduction

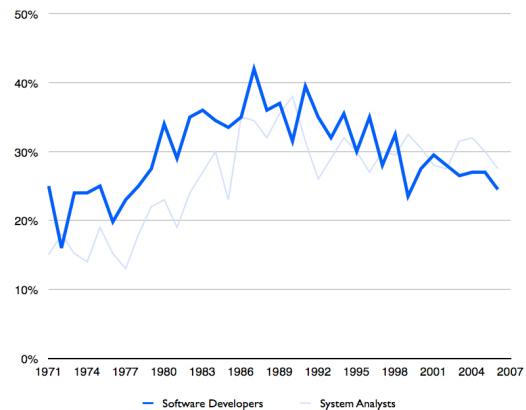
Who am I? Not a thought leader. If this were a superhero movie, I'd be another one of the pedestrians on the street.



I'm a software developer and manager not a consultant or educator. I've studied and applied Agile methods for nine years.

I've spent most of my career in woman run organizations.

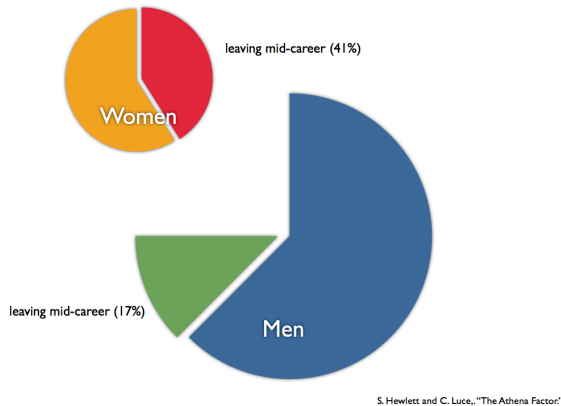
12. Women are underrepresented in CS



US Bureau of Labor Statistics

According to the US Bureau of Labor Statistics, women represent 46% of the workforce but only 25% of software developers. Over two decades the percentage of women developers has steadily declined.

13. Women are leaving mid-career



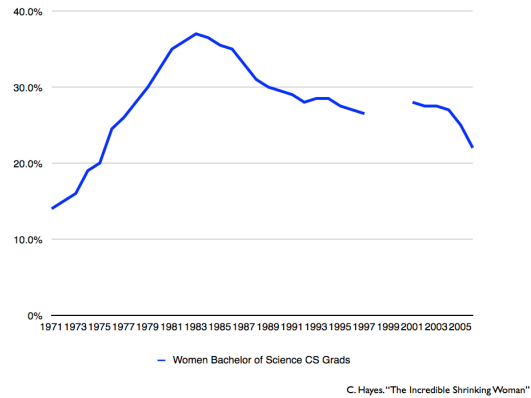
According to research published in the **Harvard Business Review**, 41% of women professionals leave established careers in "high technology" compared to 17% of men. Half of women leaving STEM careers leave the sector completely[4].

14. Women are not studying CS

According to the Commission on Professionals in Science and Technology, in the decade between 1986 and 1995 the number of women earning Computer Science bachelor's degrees dropped 55%. As of 2010, the percentage was still falling[6] despite growing percentages of women graduating from four year colleges[7]. This is not typical of STEM where 49% of bachelor degrees go to women[8].

15. Young Women are disinterested in pursuing high tech

The *Maryland Adolescent Development in Context Study*, a longitudinal study of 1,400 white and african american students found that women were much more likely to have no interest in IT related careers and degrees than men.



16. At what cost to the software industry?



17. At what cost to the software industry?

In the last decade, the U.S. software industry represented \$200B in annual sales and employed 2.2M software professionals.

McKinsey & Co estimates in this decade (over)

18. At what cost to the software industry?

* Demand for mid-career IT professionals will increase by 25% while the available pool will decrease by 15%.

This in a country where (over)

19. At what cost to the software industry?

* 71% of workers are in jobs with low demand or an oversupply of eligible candidates.

And let's also get at the cost of attrition. According to HR magazine, it costs approximately 100-125% of an employee's annual salary to replace them.

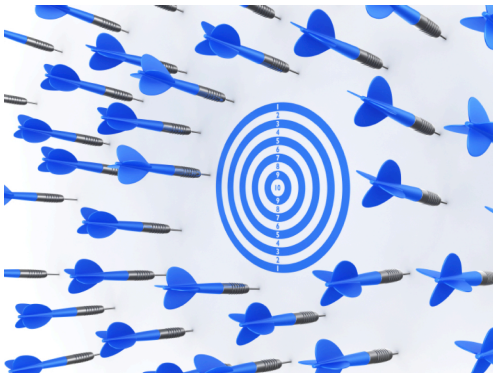
20. The cost of attrition

Retaining one-quarter of the women who leave computer engineering mid-career could represent a ten year savings of \$8B to the industry.

21. Lost opportunity in the software industry (Product)

The lack of women on software teams interferes with our effort to build products that address the needs of our customers and is a loss to product innovation.

22. Women are our customer



Women directly or indirectly influence 61% of U.S. **consumer electronics purchases**[18].

Women are 42% of active game players and 48% of frequent game purchasers. And if you think they're just buying them for their kids, industry research shows (cont)

23. Women in gaming



Women 18 and over are 37% of game players.

* women 18 and over are 37% of game players whereas boys 17 and under are only 13%[19].

24. Women on the internet



Women 18 and over are half the internet population.

Women 18 *and over* are half the internet population. (50.4%). They spend an average of 38 hours per month online. They spend 5% more time than men in online social networking and 20% more time on online shopping. Women account for 58% of internet buyers, 61% of internet transactions and 58% of internet dollars.

Software products are generally designed with no consideration for women as distinct user groups. In "Gender differences in Web Usability", Frank Spillars states, (cont)

25. Women are underserved

...“Gender differentiation is barely present in North American technology product design... let alone Web experiences[22].”

In “Towards Female Preferences in Design.” the authors found differences in the ways men and women perceive and describe software products. (cont)

26. how women perceive and use software

...“The results of this research have revealed female-oriented themes that should... enlarge views of pleasurable product design attributes and language for the genders[23].”

Boston Consulting Group (BCG) highlights three ways companies fail to address women consumers: (cont)

27. three ways companies fail.

Three ways
companies fail

Poor product design.



Boston Consulting Group

Poor product design: failing to tailor products to women’s unique needs and challenges.

28. three ways companies fail.

Three ways
companies fail

Inability to provide meaningful hooks or differentiation



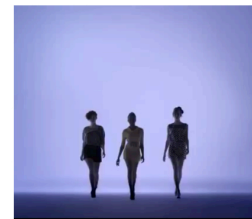
Boston Consulting Group

Inability to provide meaningful hooks or differentiation: considering women indistinguishable from the general customer population or thinking of them as one monolithic segment[24].

29. three ways companies fail.

Three ways
companies fail

Clumsy sales and marketing



Boston Consulting Group

Clumsy sales and marketing: based on outdated images and stereotypes.

30. Why are women avoiding software development?

J. Hunt analyzed a decade of national surveys of college graduates and concluded the significant differentiated causes are lack of equal pay and advancement which she closely correlates to workplaces dominated by men[34]. From Hunt's perspective, fix this and the problem is solved. But lets look at what other studies identify as cultural factors.

What does it mean to have a workplace dominated by men?

31. Athena Antigens

The *Athena Study* identifies "antigens" in STEM cultures. *Hostile macho cultures*: 63% of women experience sexual harassment. *Isolation*: women are alone on teams with no mentors or sponsors. *Mysterious career paths*: 40% of women feel stalled or stuck. *Systems of risk and reward*: the "diving catch" culture disadvantages women who would rather prevent emergencies than save the day. *Extreme work pressures*: unsustainable hours and stress[31].

32. Catalyst study

The Catalyst Study sponsored by IBM adds that women can find themselves excluded from special job assignments, don't understand unwritten norms shared by men, and don't fit the corporate image of a manager[33].

33. Societal factors

The *Why So Few* study by the American Association of University Women (AAUW)[32] adds that girls from a young age are more likely to *doubt* they can succeed in STEM careers. They believe certain STEM careers like software engineering do not have *meaning* or *social purpose*. They have conflicting *family responsibilities*. Finally, they face *gender biases* this despite evidence any statistical cognitive differences between genders can be negated with training or do not correlate to success in STEM.

34. Table Talk

what "antigens" exist in your workplace...

- 5 min. (Individual)
- Identify antigens (people/givens/leadership) in your current or a prior workplace
- one sentence describing the specific way the antigen expresses itself in that workplace
- Use as many cards as you need. one antigen per card.

what "antigens" exist in your workplace...

- hostile male cultures
- isolation
- mysterious career paths
- "diving catch culture"
- extreme work pressures
- exclusion from special job assignments
- unwritten norms shared by men
- not fitting the corporate image of a manager
- lack of equal pay and advancement
- girls doubt they can succeed.
- believe software engineering has no meaning or social purpose.
- conflicting family responsibilities.
- gender biases.

05:00

what “antigens” exist in your workplace...

- 10 min. (Table)
 - go around the table. introduce yourself. read off your card
 - table selects one for future discussion
- 5 min. (Table)
 - one person from each table reads their selected antigen to larger group

10:00

35. Science “It’s a girl thing”

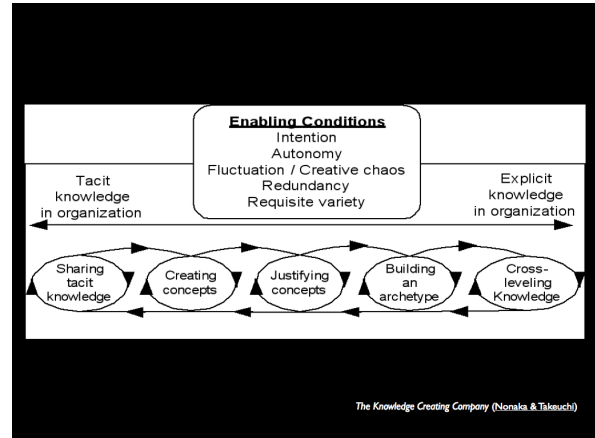
36. How would having women on dev teams help software better address the needs of women

For this, I’ll lean on the research of Nonaka Ikujiro and Takeuchi Hirotaka .

This slide is an illustration of their concept of the product development cycle in serially innovative companies.

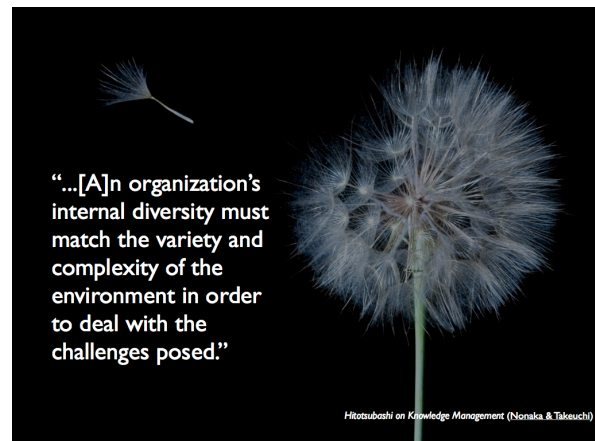
It requires the creation and sharing of two kinds of knowledge within the organization. Explicit knowledge - that which we can explain in words - and tacit knowledge - that which can best be expressed by doing.

This concept of knowledge creation and techniques for forming teams that support it are the roots of the most widely adopted Agile process framework, Scrum[39].



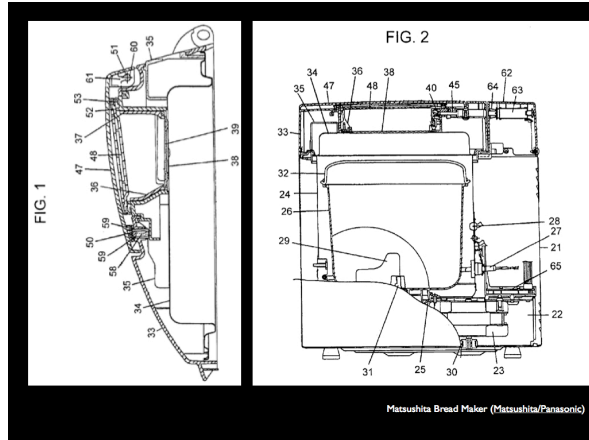
37. How would having women on dev teams help software better address the needs of women

Nonaka and Takeuchi emphasize that an enabling condition for sustained innovation is, requisite variety, having a product team made of members with different



backgrounds, perspectives and motivations. Requisite variety applies to cross-functional teams but also to team members with diverse life experience. Because it is through life experience that we acquire tacit knowledge.

38. Matsushita Example of Tacit Knowledge



The classic example of the incorporation of tacit knowledge into a disruptive product design is the first Matsushita bread machine. It took a hands on experience of baking bread by one of the product engineers (a woman) to crack how to implement the mechanics of kneading dough in a bread maker.

39. Team diversity and delivering value

Women are significant customers and influencers in the buying decision for software and software dependent technology. Statistically, women have different perceptions and preferences for software. It is a competitive advantage to have women individual contributors bring their tacit knowledge to software product development.

40. Agile Software Development

Now let's incorporate Agile Software Development into this. What unites the different agile methodologies is a shared set of values and a shared cause to change the way software is made and delivered to customers. These values are declared in twelve principles and summarized in a four line manifesto...



41. High level principles

We value: Individuals and interactions over processes and tools. Working software over comprehensive documentation. Customer collaboration over contract negotiation. Responding to change over following a plan.

42. Agile values are the foundation of agile practice

“These values are not just something the creators of the Agile Manifesto intended to give lip service to and then forget. They are working values. Each individual agile methodology approaches these values in a slightly different way, but all of these methodologies have specific processes and practices that foster one or more of these values.” - Jeff Sutherland

43. Agile values as a standard of conduct

Agile principles and the ongoing discussion of them form the basis for a normative standard of conduct informing how practitioners should behave towards our work, our peers, our employers, our customers and our end users. They challenge practitioners not to a narrow definition of success on a task but to craft with quality, to collaborate in high trust, to cede authority to individual contributors, and to work with the customer's interests in mind, to make predictable progress at a sustainable pace, and to make problems and opportunities visible.

44. Agile values as a call for beneficial change

Agile principles urge us to inspect our actions, confront impediments, and drive towards beneficial change. And the means to this is, as Alistair Cockburn suggests, we “...value agile principles over the agile practices[38] Or as Bob Martin says, Not simply to execute but to take care.”

45. What Agile principles demand we



confront this problem?

So if Agile practitioners recognize the shortage of women in our shops is an impediment to value delivery - that it is an obstacle to our mission as agilists - then we will work to remove this impediment. The question becomes “What Agile principles demand we confront this problem?”

46. Antidote to hostile workplace and the alpha geek



“Alpha male techies have minimal social skills and can be awkward around women, but this awkwardness coexists with enormous arrogance[45].”

47. Problem statement

As an example, at a recent Ruby on Rails conference, a presenter contrasted using particular document oriented database to performing like a porn star:

In reaction to the controversy Martin Fowler wrote:

“The nub is that whatever the presenter may think, people were offended... It doesn't matter whether or not you think the slides were pornographic. The question is does the presenter, and the wider community, care that women feel disturbed, uncomfortable, marginalized and a little scared.”

63% of women in tech report they experience sexual harassment

48. Value statement

Agilists should be a voice in opposition to the alpha male in their midst and here's why:

“The best architectures, requirements, and designs emerge from self-organizing teams.” Not chest thumping individuals.

49. Description of self organization

Self-organization is a fundamental value in Agile. A performing Agile team organizes *itself* around the work collaborating in high trust according to a set of mutually arrived at expectations and norms of behavior.



50. What does self-organization feel like?

Another quote from Jeff Sutherland:

“Team members share a sense of purpose, vision, and passion for their work. Teams that recognize that we are not simply individuals working in close proximity, but a team where we must all be engaged with one another’s work. (Jeff wrote He) tells teams looking to achieve amazing results that each member of the team must care as much about their neighbor’s work as they do their own.”

51. Enterprise support for self-organization is also an Agile value

“Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.”

52. Practices that support self-organization

In emphasizing Agile values, I’m not saying the practices are not important. They support the values. A company instilled with the value of self-organization should:

keep team size between 5-9 people, provide communal workspace, rely on the team to do its own estimates and form it’s own iteration commitments.

The team must frequently and consistently reflect on what it can do and what it must ask of the organization to make itself more effective. They must drive incremental improvements into the organization based on this.

53. How is self-organization an antidote to alpha geeks?

A self-organized team will not tolerate a hostile or demeaning attitude towards co-workers or the business people upon which it depends for work. They will deal with each other with respect and a great deal of honesty. They have difficult conversations with each other and they address their own bad behaviors in order to fit into the norms of the team in order to maximize team performance.

So, the ultimate answer for the alpha male who breaks the cohesion of the team, is he either modifies his behavior based on frequent and regular feedback from his peers and coaching from his leads or he is off the team

what principles demand you confront your impediment...

Team (5 min.)

Identify one or two agile principles that counter the “antigen” your table chose in the previous exercise.

what principles demand you confront your impediment...

- satisfying the customer
- early and continuous delivery
- working, valuable software
- welcome changing requirements
- deliver working software frequently
- cross-functional teams
- motivated individuals
- team-friendly environment and support
- trust them to get the job done
- daily collaboration
- face-to-face conversation
- sustainable pace
- technical excellence
- self-organizing teams
- retrospection/continuous improvement
- collective ownership

05:00

what principles demand you confront your impediment...

- 👉 Retro (10 min.)
 - 👉 Retro questions next slide.
- 👉 Report to room (5 min.):
 - 👉 What one thing could you do starting tomorrow to begin addressing this impediment?

Retrospective (thought exercise or coaching):

- 👉 How is your current agile practice failing to address this impediment? Blind spot in agile practices, leaders or team? Too soon? Intractable? A given?
- 👉 What is the first, measured step you could personally take to change this?

10:00

54. Agile values in an enterprise context

But let's talk about how Agile teams instill Agile values into the enterprise.

As a development team matures impediments become consistently rooted in the surrounding organization. Continuous improvement becomes an effort directed out into the larger company.

Where an organization fails to support a team adopting an agile practice, the teams needs to drive for these changes in the organization by first building trust and influence by producing results in spite of their impediments and then using that success to win support for removing the obstacles that lay in their path.

55. Agile values in an enterprise context

In response the larger organization will begin removing impediments to team performance by, for example, adopting a retrospective type review process, rewarding collective over individual performance, compensating for span of influence over span of control.

56. How values create change from small networks to large

How can change within companies produce large order changes across an industry or society?

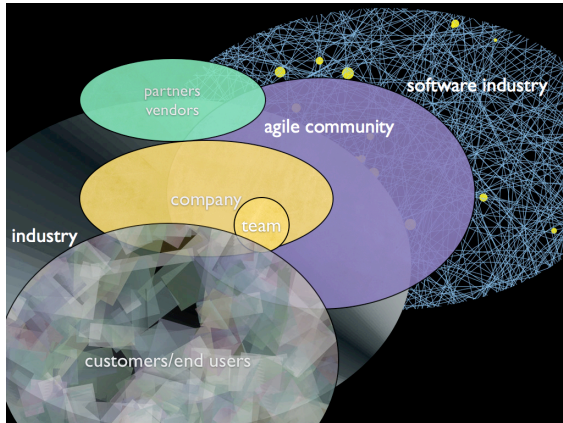
57. Ba



To model this, I'll use Nonaka's concept of Ba, or "a shared context in motion, in which knowledge is shared, created and utilized[65]."

Sectors that thrive off innovation do so by sharing knowledge across direct and extended-relationships among people. Each set of relationships exists within a physical or virtual space. Each of these spaces at any given moment in time is Ba.

58. Ba in knowledge work



Knowledge workers interact within their local communities, interest groups. They graduate from school and change jobs. Companies are distributed across locales. Consultants travel among companies and conferences bring individuals together from across the industry. In sharing, creating and synthesizing knowledge one Ba influences the other, fostering change on the small scale to the large and back. The broad adoption of Agile practices is itself an example of knowledge occurring first within individuals and teams and then spreading across an industry.

48. The challenge

But widespread Agile adoption has been a mixed blessing for principled agilists. Agile values are not permeating as well as the practices themselves.

To invert Alistair Cockburn's dictum, the industry is valuing agile practices over agile principles.



49. Snowbird

This threat is on the minds of prominent Agile thought leaders. Enough so that the notes from the 10 year reunion of the initials signers of the Agile Manifesto contains "four things the community **needs to do** in the next 10 years": demand technical *excellence*, promote *individual change* and lead *organizational change*, organize *knowledge* and improve *education*, and maximize value across the *entire process*[66].

50. Conclusion

Agile is not about doing "Agile" things. It is about continually improving ourselves, our teams and our organizations to create better software for our customers and our end users.

If we embrace that on a wide scale, we will recognize we are driving away an incredibly valuable source of talent and an incredibly valuable contribution in our effort to create products relevant to our end users.

We can use the principles underlying Agile practice to guide our efforts to remove this impediment..

Successful embrace of agile principles within teams will instill a more social and engaged view of the software developer role that can shift companies and the larger industry, driving beneficial change into academic institutions and the perceptions of the greater public.

This change in our workplaces, in the common perception of our work, and in the institutions that educate software developers would encourage more girls to pursue computer science and help the industry recruit and retain larger numbers of talented women.

51.

Thank you



Judy, K.H.; , "Agile Values, Innovation and the Shortage of Women Software Developers," *System Science (HICSS)*, 2012 45th Hawaii International Conference on , vol., no., pp.5279-5288, 4-7 Jan. 2012
doi: 10.1109/HICSS.2012.92

Abstract: The percentage of women software developers in the U.S. has declined from 42% in 1987 to less than 25% today. This is in a software/internet marketplace where women are online in equal numbers to men, directly or indirectly influence 61% of consumer electronics purchases, generate 58% of online dollars, and represent 42% of active gamers. Women avoid careers in software due to hostile environments, unsustainable pace, diminished sense of purpose, disadvantages in pay, and lack of advancement, peers or mentors. Agile Software Development is founded upon values that challenge such dysfunction in order to build self-organizing, collaborative and highly productive teams. In a high functioning Agile practice, developers engage each other, product owners and sponsors in a shared concern for quality, predictability and meeting the needs of end users. Can Agile values and practice drive changes in the workplace to better attract and retain women software developers?

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6149534&isnumber=6148595>