



*Thinking Distributed to
Improve Agility*

Jamie Allsop | www.agile-trac.org

Setting the Scene...

- Developing in C++ for over 15 years
- Running teams for a large portion of that
 - from multi-million dollar market data products in Stock Exchanges to specialised DSP systems with global branding
- Distributed Agile teams for over 7 years
 - First experience of real Agility
- Later worked in co-located settings and struggled with agility

Setting the Scene...

- Developing in C++ for over 15 years
- Running teams for a large portion of that
 - from multi-million dollar market data products in Stock Exchanges to specialised DSP systems with global bandwidth
- Distributed systems
 -
- Launched in co-located settings and struggled with agility

The Question is Why??

Challenges Faced by Distributed Teams

- Communication burden is almost unbearable
- Clear communication is compounded by cultural and language differences
- Difficult to build trust among team members
- Hard to share and maintain tacit knowledge
- Synchronisation is often problematic
- Ensuring fair and accessible participation to all team members
- Maintaining a shared vision across all members often a challenge
- Providing visibility into progress for stakeholders both inside and outside of the organisation
- Creating and sustaining a team identity, both within the team and throughout the organisation

Challenges of Distributed Teams not Insurmountable

- Over time these can be overcome
- Spoke about successful distributed agile teams at Agile 2008
- In fact Agile 2008 had a whole track on Distributed Agile
- However the three main takeaways were:
 - Co-location
 - Frequent face-to-face meetings
 - Always have a co-located kick-off

Clearly Co-location is just so much simpler?

- What challenges are faced by co-located teams?
- ...
- In 2007 I started working with co-located teams
- In reality I found it harder to transition to agile and harder to be as agile
- Over time I started to see some issues but had difficulty identifying them

Characteristics of Distributed and Co-located teams

- Communication burden overwhelming
- Sometimes large cultural differences
- Local Offices have differing values
- Feedback slower and constrained

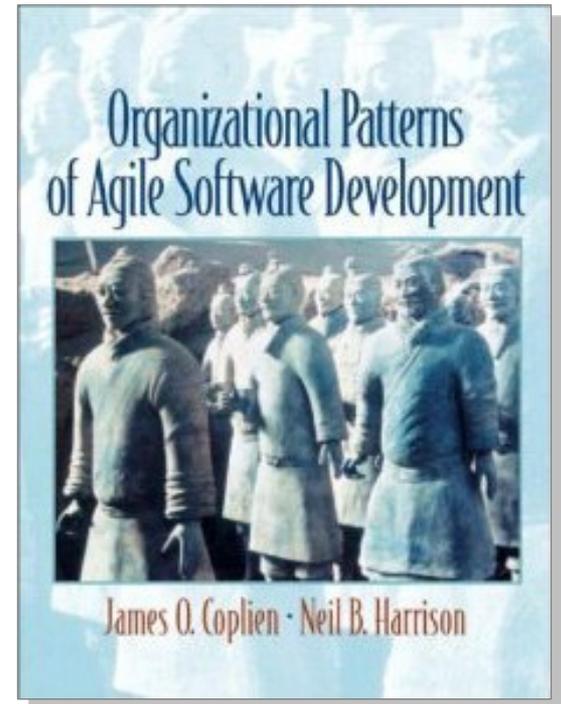
- Rich and diverse methods of communication
- Often cultural similarities
- Office shares common values
- Feedback is often rich and immediate

Why would it be harder transitioning a co-located team to Agile?

- We need to look at organisational structure...
- Many books talk about organisational structure and communication
- In 2005 Coplien and Harrison published, “Organizational Patterns of Agile Software Development”
- Directly relevant to our domain based on many years of study of real software organisations

Organizational Patterns

- Collates observed organizational patterns from the software industry
- Introduces organisational pattern languages
- Relates to culture, process, structure and values
- Case Studies of real companies



Four Organisational Pattern Languages

- Project Management
 - Organisational aspects of managing projects
- Piecemeal Growth
 - How an organisation grows and develops over time
- Organisational Style
 - The general approach to the way the organisation works
- People and Code
 - The ways in which people affect code and vice-versa
- Different views of the same organisation
- Helps understand the structure of an organisation

Key Point

Process, Structure, Values

- Process ← Structure ← Values
- Values are inherent in the individuals that comprise the organisation
 - Values are observed
 - Not the same as the values an organisation professes to have!
- Changing Process alone has minimal effect
 - You must change Structure
 - What about Values?

Changing Structure in Co-Located Setting

- Can be hard
 - Local values and structure predominate
- Tolerance for failure is much higher in the Co-Located setting
 - Not apparent that change is needed
 - Impact of change hard to understand
 - Multiple communication and feedback channels can create noise

Contrast with a Distributed Setting

- Values of the team are typically more varied
- Team is like a virtual sub-organisation
 - Foundational values aligned with members
 - Interfaces with wider organisation discovered
- Changing structure to support new process can be more flexible
 - The team already has looser alignment with the predominant local values
 - Team already forced to cope with differences

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Possibly a better starting point?

Key Point

The Ability to Learn

- Single-loop
 - Changing the *How* but not the *Why*
 - Doing the same thing better
- Double-loop
 - Focus on *Why*: Insightful Learning
 - Increase Knowledge and Understanding
- Triple-loop
 - Understand the organisation's identity
 - Learn how to evolve the organisation

Being forced to learn better

- In a Co-Located setting it is easy to be reactive and see some improvement
 - Also easier not to fail
 - Tends to promote single-loop learning
- In the Distributed setting being reactive is not enough
 - Must be proactive about addressing issues
 - Failure comes quicker
 - Deeper understanding required
 - Promotes second-loop learning

Being forced to learn better

- In a Co-Located setting it is easy to be reactive and see some improvement
 - Also easier not to fail
 - Tends to promote...
- In **Essentially Distributed Teams**
 - Learn to Learn faster
 - ...proactive about addressing issues
 - Failure comes quicker
 - Deeper understanding required
 - Promotes second-loop learning

Key Point

Organisational Patterns & Culture

- Each of the systemic patterns presented are part of a pattern language, the bigger picture
- It is this bigger picture and the interactions of individual patterns that constitutes the organisation's culture
- Difficulty changing structure makes it hard to evolve culture
- If you are *in* a culture it is hard to see the culture
- Makes it easy to miss important cultural roots of failures, again and again

Promoting Culture Good or Bad?

- In the Co-Located setting a strong culture can in fact be a barrier to improvement
 - Hiring to reinforce a perceived good culture can be counter-productive
 - Often see mistakes repeated
 - But it is hard to know any better
- In the distributed setting we are more likely to accept differences and perhaps benefit from them
 - The team culture is likely evolving based on team composition

Promoting Culture Good or Bad?

- In the Co-Located setting a strong culture can in fact be a barrier to improvement
 - Trying to reinforce a perceived good culture can be

Cultural Influences are diluted over distance

- In the distributed setting we are more likely to see concept differences and perhaps benefit from them
 - The team culture is likely evolving based on team composition

Sounds like Coupling and Interfaces

- Organisations and their teams are like systems and components
- The Co-located team is tightly coupled
 - Both Internally and Externally
 - Through many fat interfaces
- The Distributed team, by necessity is loosely coupled
 - Both Internally and Externally
 - Through thinner, better defined interfaces
 - To succeed these interfaces must be understood

Sounds like Coupling and Interfaces

- Organisations and their teams are like systems and components
- The *Step* team is tightly coupled
 - *Step* is a reasonable step
- The *Step* norm to cope
 - Both Internally and Externally
 - Through thinner, better defined interfaces
 - To succeed these interfaces must be understood

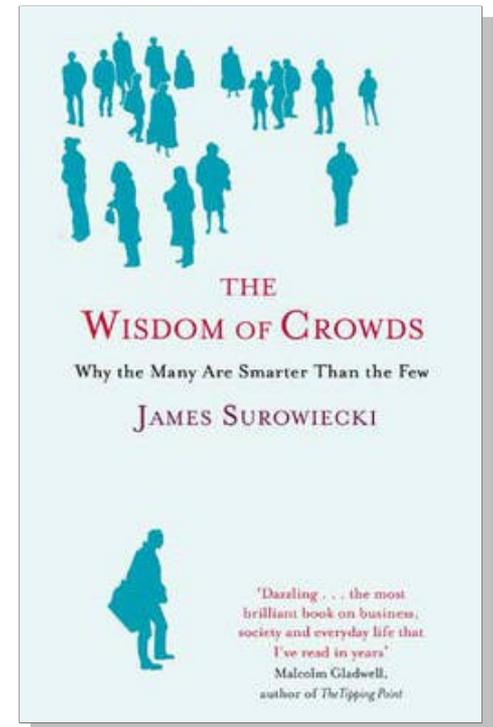
In that context transitioning to Agile is a reasonable step

Why might agility be harder in a Co-Located team?

- We need to understand a little bit more about how groups work together to make good decisions
- In 2004 Surowiecki published, “The Wisdom of Crowds”
- Not a book about software development
 - about how groups of people make decisions
 - and whether those decisions are good ones
- Surowiecki gave the Keynote at Agile 2008

The Wisdom of Crowds

- “Why the many are smarter than the few”
- Premise: How a group (crowd) of people can, *under certain conditions*, reach a smarter decision than the smartest person in the group
- Consider the weight of an Ox...
- LOC in Visual Studio...
- What about dumb crowds?



Key Point

The Elements of a Wise Crowd

- Diversity of Opinion
 - People bring different information
- Independence of Opinion
 - Most weight and trust given to own information
- Decentralisation of Knowledge
 - No-one dictates the expected outcome
- Meaningful Aggregation
 - So that a collective verdict can be reached

Factors which make good group decisions hard

- All people have the same information and experience
- Centralised control over information flow
- Inability to pull needed information from information sources
- Imitation and information cascades
- Emotional reactions to outside pressures can result in herding

Factors which make good group decisions hard

- All people have the same information and experience
- Central control over information flow
- Inability to share information
- Imitation and information cascades
- Emotional reactions to outside pressures can result in herding

Co-located teams are at a disadvantage

Some Implications...

- The best decisions are achieved through competition and disagreement
 - Groups of similar people find it easier to make poor decisions
- In an agile environment we value shared vision and tacit knowledge
 - Sometimes difficult to have a collective view while maintaining independence

Co-located Teams can Struggle

- Shared values and structure result in self-reinforcing behaviour
 - The 'collective wisdom' is often not wise
- Issues are difficult to see
- Peer pressure a real problem
- Lack of Diversity in the team
 - Easy to have ineffectual and inefficient communication
- Easier to iterate without learning
 - Practice makes permanent, not perfect

Distributed Teams can do better

- Varied Values and Structure force looser coupling
- By definition the distributed team is outside the norm
- Greater team diversity offers the chance for greater independence
- Defined interfaces minimise noise and highlight failures faster
- Being reactive is not enough, understanding why things happen is required
- Diversity is inherent in the team

Key Point

Benefits of a Wise Crowd

- Speed of Collaborative Discovery
 - Under the right circumstances it is possible to reach better answers much faster
- Effective Coordination
 - Self-organising coordination can be optimal, out-performing deliberate attempts
- Cooperation through choice
 - Potential for much more productive relationships

Key Point

Benefits of a Wise Crowd

- Speed of Collaborative Discovery
 - Under the right circumstances it is possible to reach better answers
- It looks like there are potential advantages to Distributed Teams
 - ... can be optimal, performing deliberate attempts
- Cooperation through choice
 - Potential for much more productive relationships

Learn to see beyond simple processes and practices

- Not saying that the solution to problematic co-located teams is a distributed team
- However we can learn valuable lessons from the distributed setting that can be usefully applied
- Encouraging characteristics of distributed teams in the co-located setting can really help

Case Study – Setting the scene

- MDD – The NYSE's replacement Market Data Distribution System
 - Vastly over budget, over 6 months late
 - Co-located team engulfed in a strong local culture
 - Conventional wisdom was they needed to do more of the same, only better and faster
 - Quality was unclear, regressions a constant problem
- Drew a line in the sand and started over with a changed team
 - Introduced 3 developers working remotely in the US
 - Varying experiences and backgrounds
 - Encouraged working from home, moved to a more distributed model

How did things change?

- We started to see problems with how we were doing development right away
 - Our discipline was poor but we couldn't get away with that with the distributed team – we had to improve
 - The new team members were able to see problems the existing team had overlooked, or simply tolerated
- The whole team was brought together to re-architect the product
- More effort was put into communication, both how we communicated and when
 - Daily stand-ups became a true heartbeat, not an irritation
 - Changing code *co-pilots* fostered closer relationships and also loosened the culture grip
 - Changes to improve intra-team visibility encouraged better code management practices

What was the result?

- The first phase 2 release was produced after only a couple of months
 - Despite a complete re-architecture
- The first release of the newer Phase 2 system went into production over two years ago
 - Since then there has been only one production incident attributable to a bug in the system
 - It has the best reliability record of any market data system in the NYSE
 - It currently far exceeds initial performance expectations

What was the result?

- The first phase 2 release was produced after only a couple of months

The Distributed team, making use of diversity and knowledge out-performed the original Co-located team

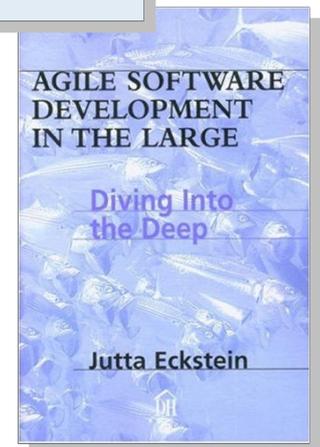
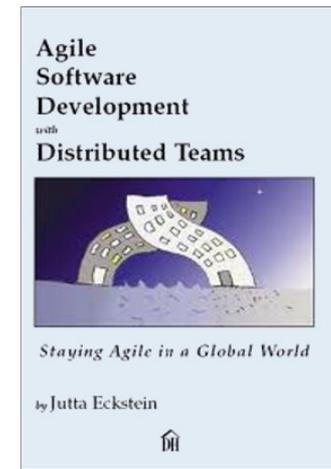
- It has the most advanced architecture
- It has the most advanced data system in the NYSE
- It currently far exceeds initial performance expectations

Some Conclusions

- Embrace diversity in teams and consider introducing it when absent
- Ensure that local culture is not an impediment to change and improvement
- Make an effort to see failures and understand why they occur
- Understand the interfaces that exist within the team
- Understand the interfaces that exist with the rest of the organisation
- Question what they are and why they exist
- Appreciate there are benefits to both co-location and distribution
- The emphasis is usually on emulating co-location at a distance but co-located teams can also learn from distributed teams

Further Reading & Questions

- **Organizational Patterns of Agile Software Development** by James O.Coplien and Neil B. Harrison
- **The Wisdom of Crowds** by James Surowieki
- **Agile Software Development with Distributed Teams** by Jutta Eckstein
- **Agile Software Development in the Large** by Jutta Eckstein
- <http://www.agile-trac.org>



ja11sop@agile-trac.org