SEng 5852
Software Quality Management & Process Improvement

Spring 2022 – Session 6

UNIVERSITY OF MINNESOTA
Driven to Discover℠

Session Agenda

- **Building the case for process improvement**
- People & change – what every change agent should know
  - Rogers Technology Adoption Curve
  - Bridges Transition Model
  - Satir Change Model
  - Moore Crossing the Chasm
- Process improvement models – a process for process change
  - ASQ general process improvement model
  - SEI IDEAL model
- Next Steps
  - Preparing for the Process Forum – Team Case Study Part (a)

Building the Case for Process Improvement

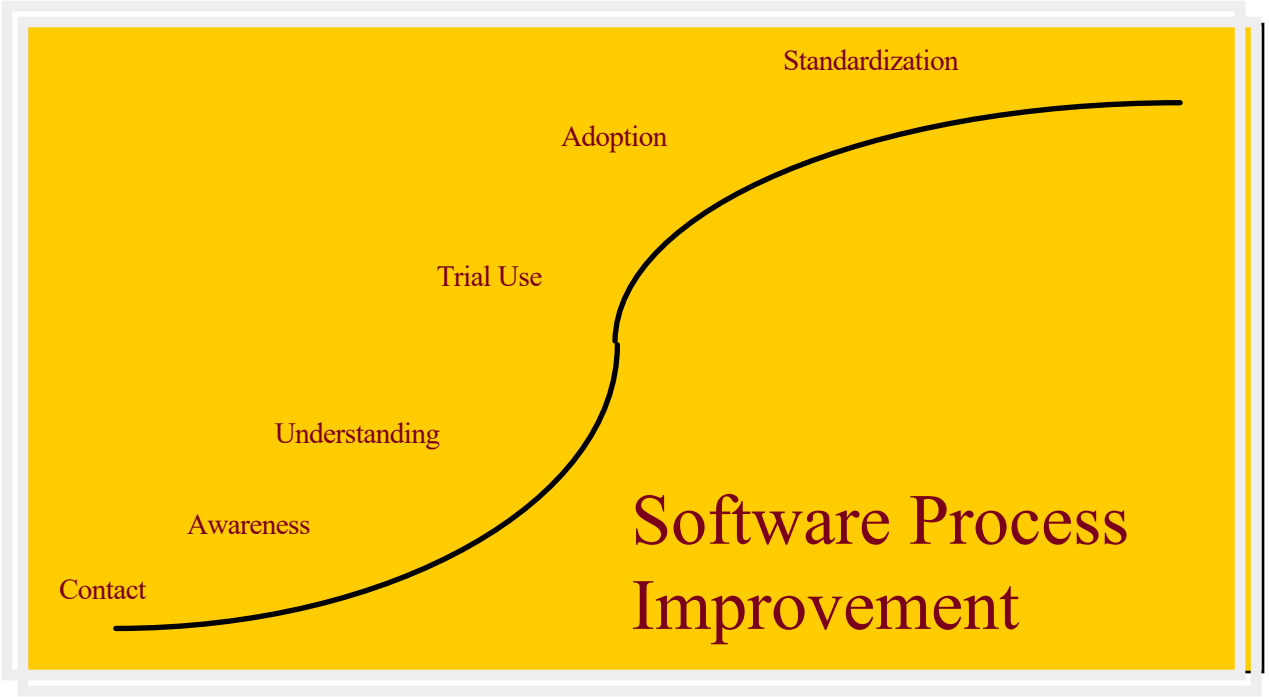
What is software process improvement?

- Provide leadership in advancing the state of the practice of software engineering to improve the quality of systems that depend on software.

- The process of organizing, executing, and supporting activities that lead to the adoption and standardization of new technologies, methods, or approaches such that they become a routine part of doing business.

Adapted from Myers, Maher, Deimel “Managing Technological Change” SEI Seminar 1992.

Software Process Improvement (SPI)
An Investment in the Future



Adapted from Myers, Maher, Deimel "Managing Technological Change" SEI Seminar 1992.

Process Improvement Characteristics

- SPI is a journey
- Goal is to improve the way the organization works:
  - analyze current practices
  - focus on activities you do well or want to do well
  - establish training and tools to help the team
  - look for additional improvements
- Individuals & Leadership are key (all providing support, knowledge, experience, and insight)

Adapted from Persse, “Process Improvement Essentials” O’Reily 2006 and
R. Hedger , “Software Process Improvement: Where to Start”, unpublished, 2013

We don't need process improvement…or do we?

"Isn't it enough to hire good people and let them do their best?"

"Our auditors tell us when we have problems, can't we just fix them and move on?"

"We work best under pressure; it brings out our best effort."

"All these rules keep me from being creative!"

"We know how to do this? What good is a defined process? Just let us do it!"

"We just DON'T HAVE TIME FOR THIS!!!"

Adapted from Persse, "Process Improvement Essentials" O'Reily 2006

Building the Case – Success Factors

- Clear problem statement and business rationale
- Participants are working toward a shared vision
- Appreciate value each party brings to the table
- Common understanding of the end destination and a belief in the plan that's been designed to get there

Adapted from Persse, "Process Improvement Essentials" O'Reily 2006

What has been your experience?

People & Change

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Why don't people just do what the theory says?

- Because people are complicated
  - The study of organizational behavior, human behavior, human decision making, etc., are their own disciplines
- People will experience the improvement as a change or a transition
  - Logic does not prevail in this mode – necessary but not sufficient
  - Bad ideas should not go forward, but often good ideas suffer considerable resistance
- Role of the change agent
  - Understand the assignment – the people side of change is part of the job if you want to effect change – embrace it
  - Success depends on getting buy in and managing the organizational behavior
- Fortunately, there are some well accepted models to lean on

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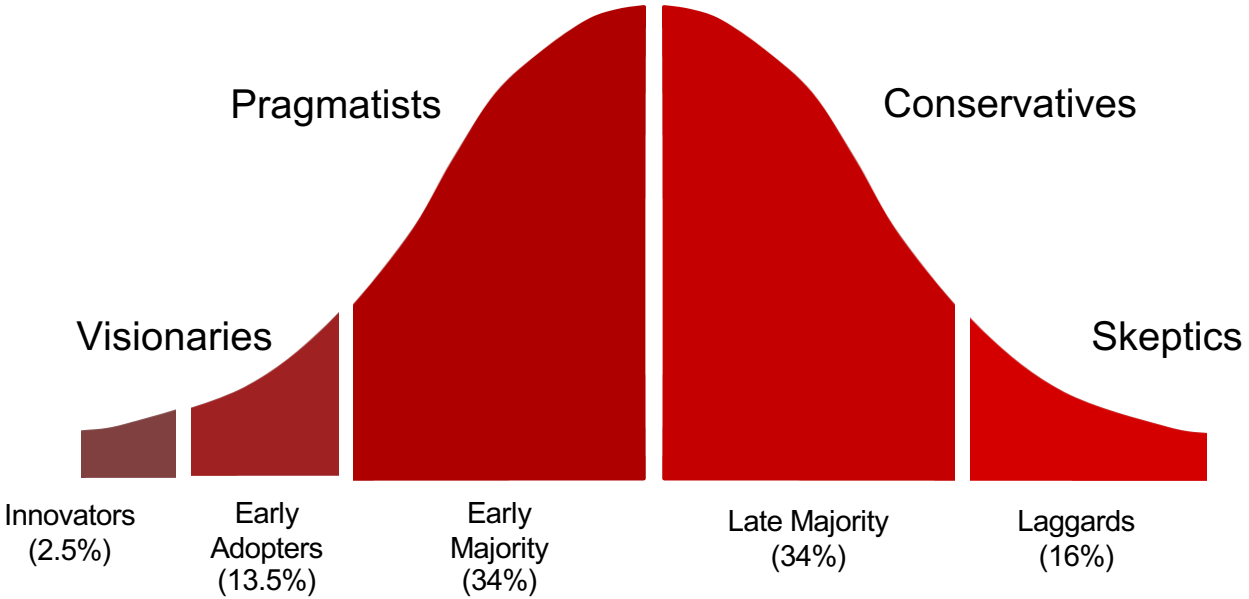
Rogers' Technology Adoption Curve



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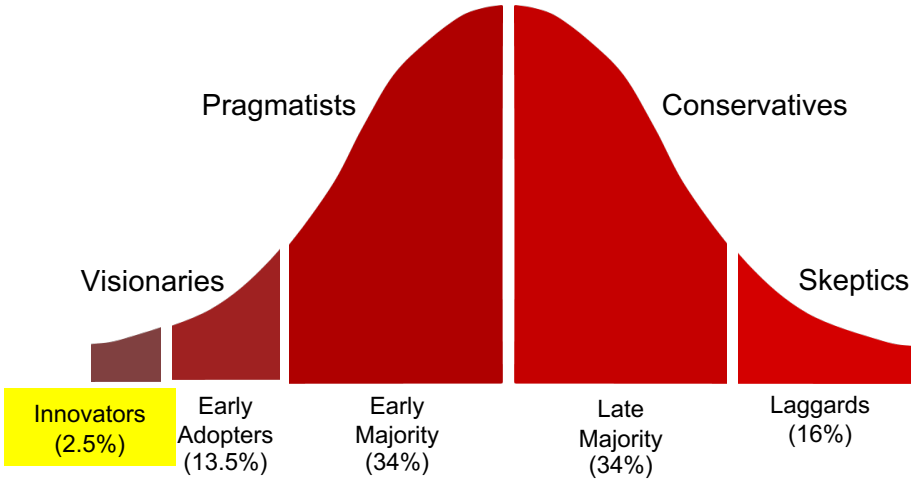
Technology Adoption - Innovators

- motivated by
  - knowledge/learning for its own sake
- characteristics
  - high technical aptitude
  - risk-taking
  - highly social
- impact
  - will help improve product
  - brings in new ideas
- challenges (wants)
  - access to top technical people
  - no-profit pricing (preferably free)



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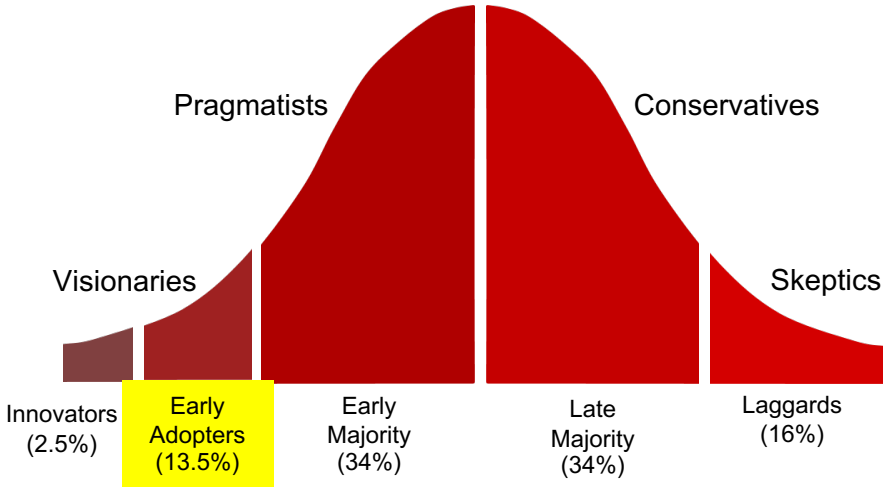
Technology Adoption – Early Adopters

- motivated by
  - competitive advantage through *revolutionary* change
- characteristics
  - high opinion leadership
  - risk-taking
  - vision for strategic applications
- impact
  - fund development
  - local "missionary" / role-model
- challenges (wants)
  - rapid time-to-market
  - high-degree of support and customization



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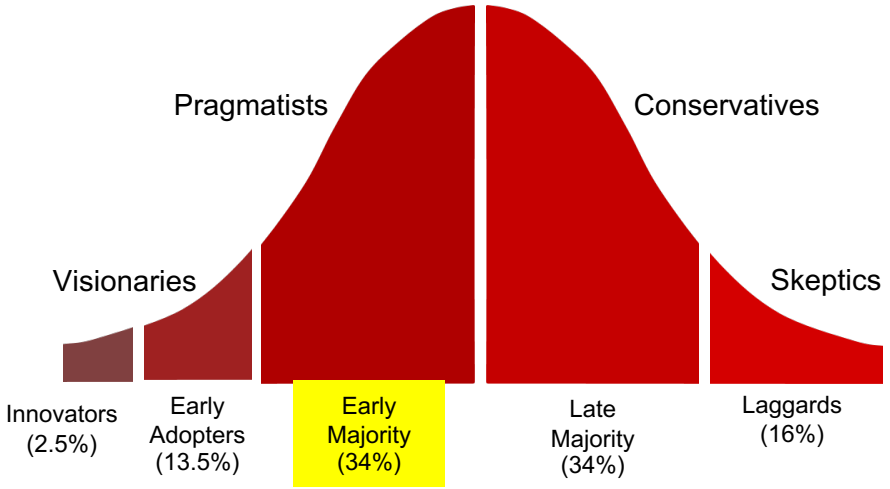
Technology Adoption – Early Majority

- motivated by
  - improvements through *evolutionary* change
- characteristics
  - low opinion leadership
  - deliberate
  - "let someone else find the bugs"
- impact
  - final "defense" before market permeation
- challenges (wants)
  - trusted references **(not from early adopters)**
  - evidence of stability/scalability



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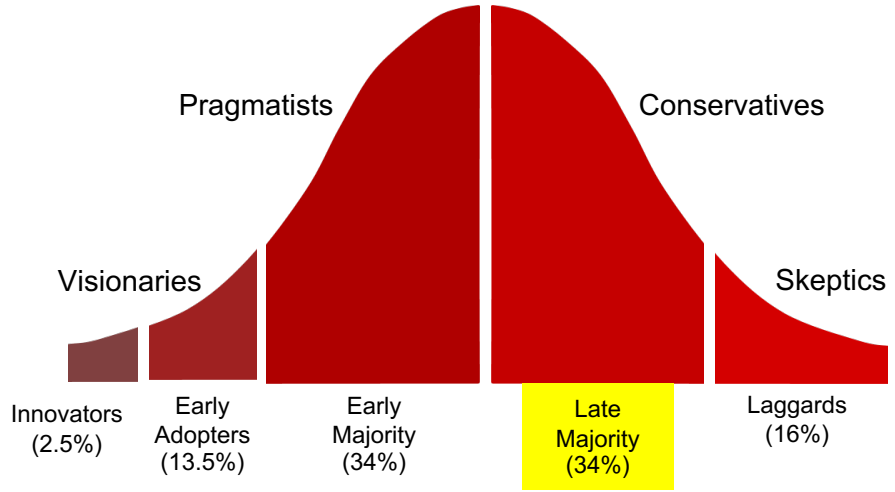
Technology Adoption – Late Majority

- motivated by
  - peer pressure
- characteristics
  - cautious (risk-averse)
  - low opinion leadership
  - price-sensitive
  - better with people than technology
- impact
  - extend product life-cycle
- challenges
  - wants pre-assembled solutions
  - benefits from add-on services but unwilling to pay



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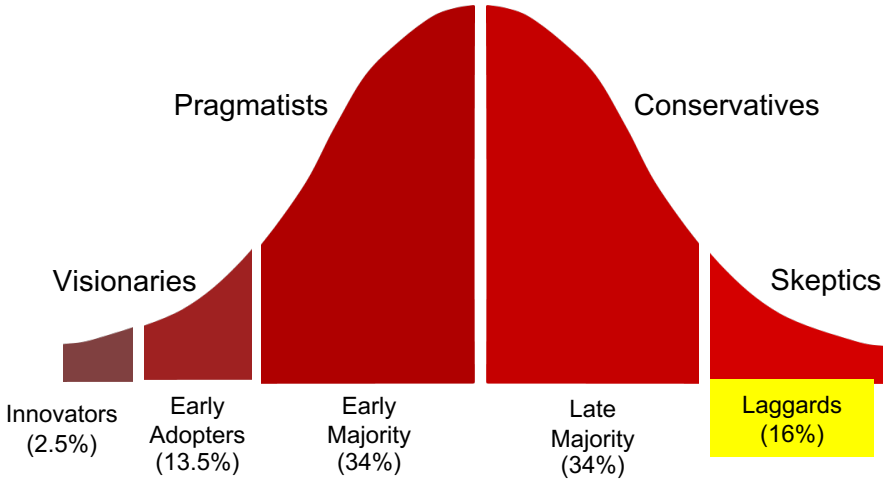
Technology Adoption – Laggards

- motivated by
  - "tradition" (maintaining the status quo)
- characteristics
  - no opinion leadership
  - socially isolated
  - risk-averse
- impact
  - slow/halt change
  - good at debunking marketing hype
- challenges
  - opposition to early adoption



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Adoption Effort

adopter type	learning curve	effort required	continued support of effort	adopter retention
innovator	rapid learners	no recruiting effort	may be low	steadfast
early adopters	rapid learning	minor effort	moderate; in spurts	dependable
early majority	reasonable learning curve	substantial effort	higher and continuous	fickle
late majority	trainable but slow	major effort	highest continuous support	brittle
laggards	typically uninterested	typically uninterested	not feasible	not likely

Adopted from E. Rogers, "Diffusion of Innovations"
5th ed, Free Press, 2003.

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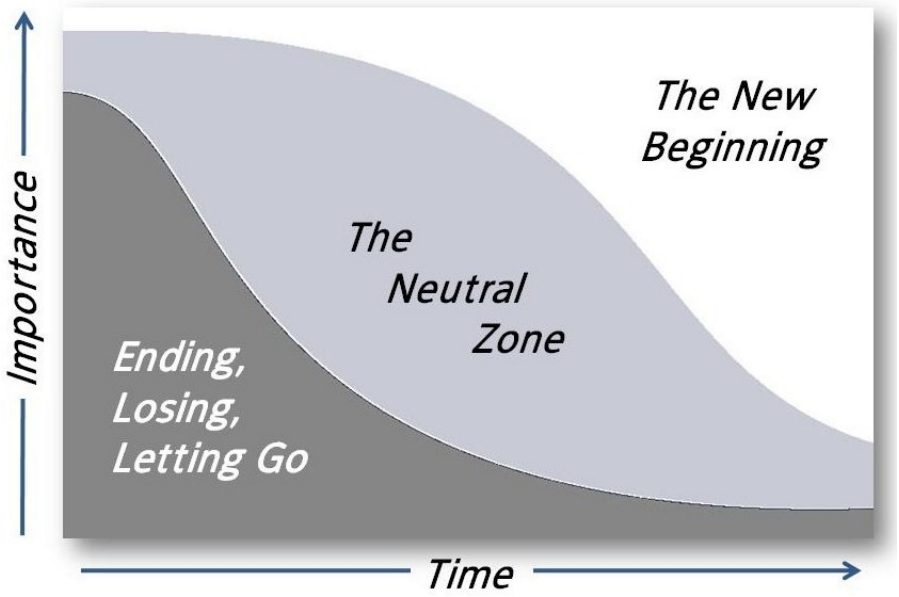
Bridges Transition Model

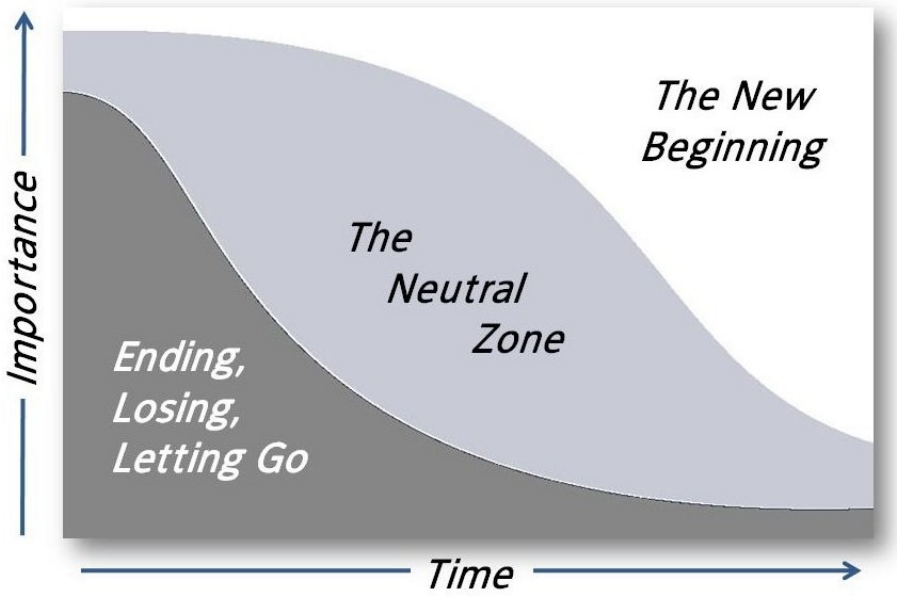
- William Bridges, professor & organizational consultant
- Transition is the psychological step of adapting to change – change is external, transition is internal
- Stage 1 – Ending, Losing, Letting Go
  - old behavior, major point of resistance
- Stage 2 – The Neutral Zone
  - left the old ways but are not sure of the new way – uncomfortable point but most innovation
- Stage 3 – The New Beginning
  - starting to operate with the new ways



Bridges, William "Managing Transitions, Making the Most of Change" Addison-Wesley Publishing: Reading, Massachusetts, 1991

Bridges Transition Model – The Marathon Effect

- Key to Bridges' philosophy – transitions are like a marathon
- Leaders are first to transition because they may have been planning the change
- Once a change is announced, each individual will begin at the start and proceed through the transitions, at their own pace
- It's up to the change leader(s) to manage the org through the transitions until everyone is done



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Bridges Transition Management Process

1. Communicate with the org about why the change is needed.
2. Collect information from those affected by the change to understand its impact on them. Gain their investment in the outcome.
3. Audit the org's transition readiness.
4. Educate leaders about how the change will affect individuals in the org to manage the transition effectively.
5. Monitor the progress of individuals as they go through the 3 stages of transition.
6. Help individuals understand how they can positively contribute to the change and the importance of their role in the org.

https://wmbridges.com/about/what-is-transition/ (Accessed Feb 2022)

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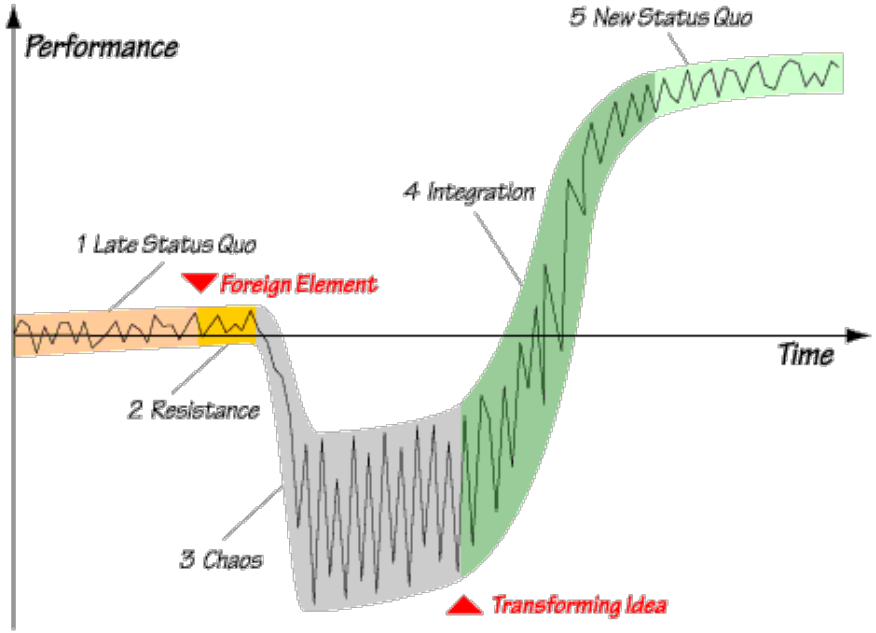
Satir Change Model

- Developed by family therapist Virginia Satir
- Satir Model supports improvement is always possible
  - Change patterns observed in dealing with therapy for families
  - Applicable to any group of people confronted by change
  - Understand how to help a team make a successful transition from the old status quo to the new status quo
- Change happens one person at a time!

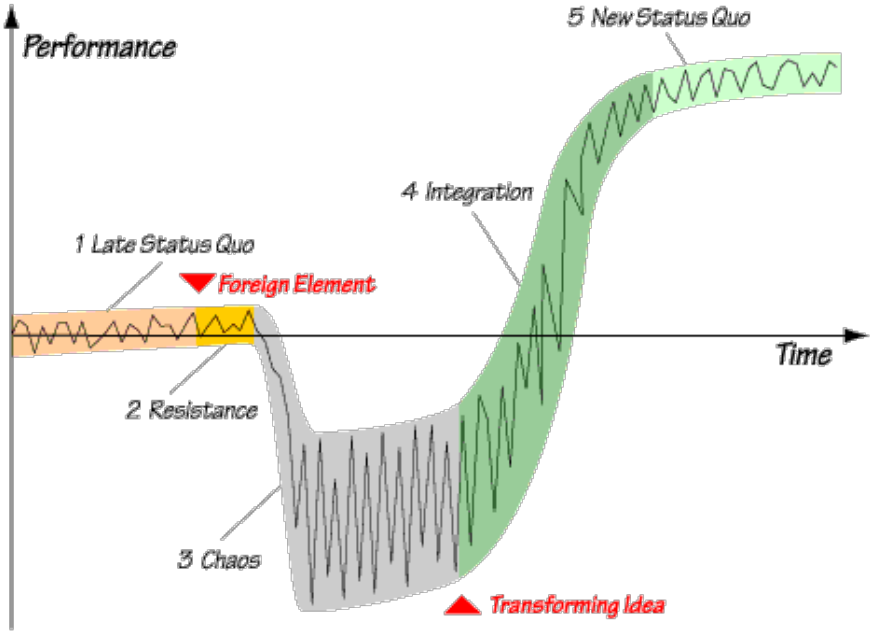


Satir Stage 1, Late Status Quo

- stable system
  - predictable
  - familiar
  - comfortable
- consistent performance
- Stable relationships
  - Know what to expect, how to react, how to behave

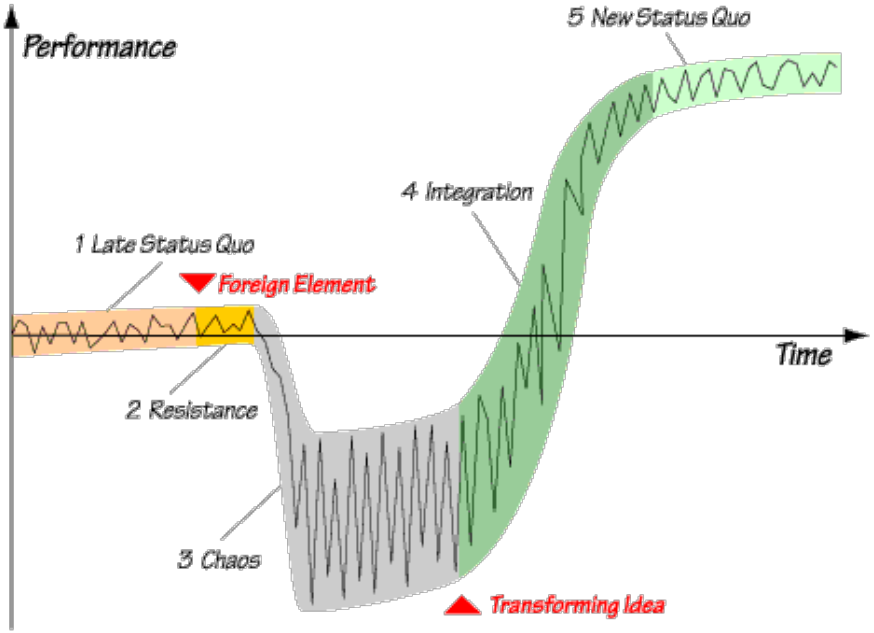
→ *The Foreign Element is introduced*

- some information or need that requires a response from the team
  - Examples:
    - negative market survey results
    - significant customer quality complaints



Satir Stage 2, Resistance

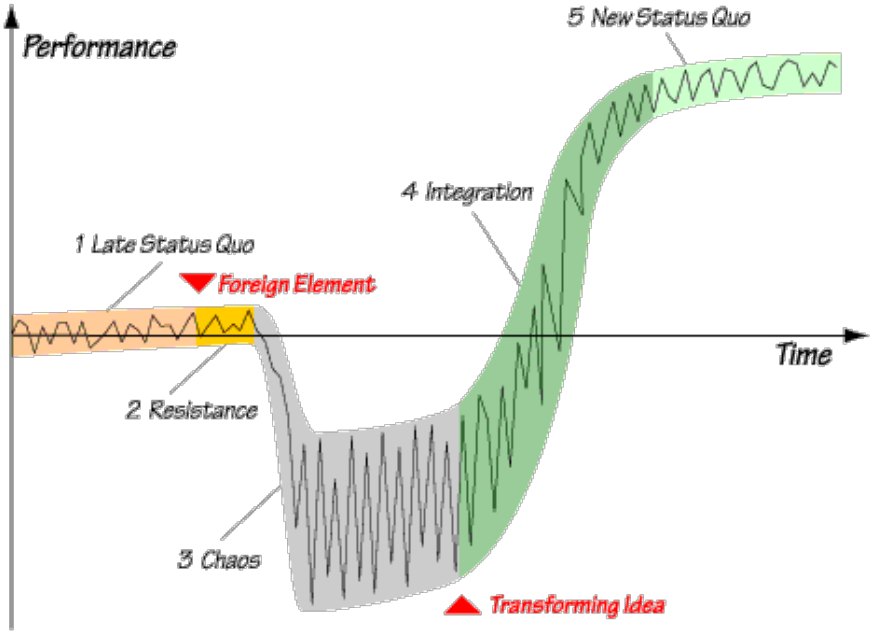
- team confronts need for change
  - denial
    - neutralization
    - rejection
  - avoidance
    - ignoring/delaying
  - find someone to blame
  - physiological
- your response
  - help the team
    - overcome denial or blaming
    - open up and communicate
    - become aware of the underlying issues



Satir Stage 3, Chaos

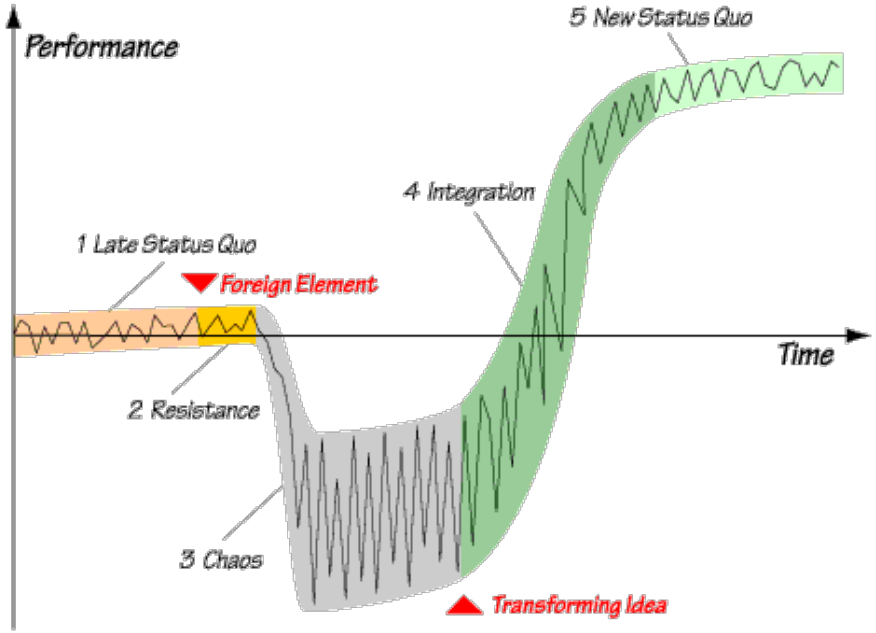
Chaos is required and unavoidable in transformation – this will continue until a Transforming Idea is introduced – where team sees the benefit

- team discomfort
  - anxiety/vulnerability from identity loss
  - former expectations invalidated
  - random/childish behavior
  - relationships strained/shattered
- your response
  - expect poor/erratic performance
  - resist trying to bypass using “magic solutions”
  - help the team
    - focus on feelings
    - acknowledge fears
    - leverage their support systems



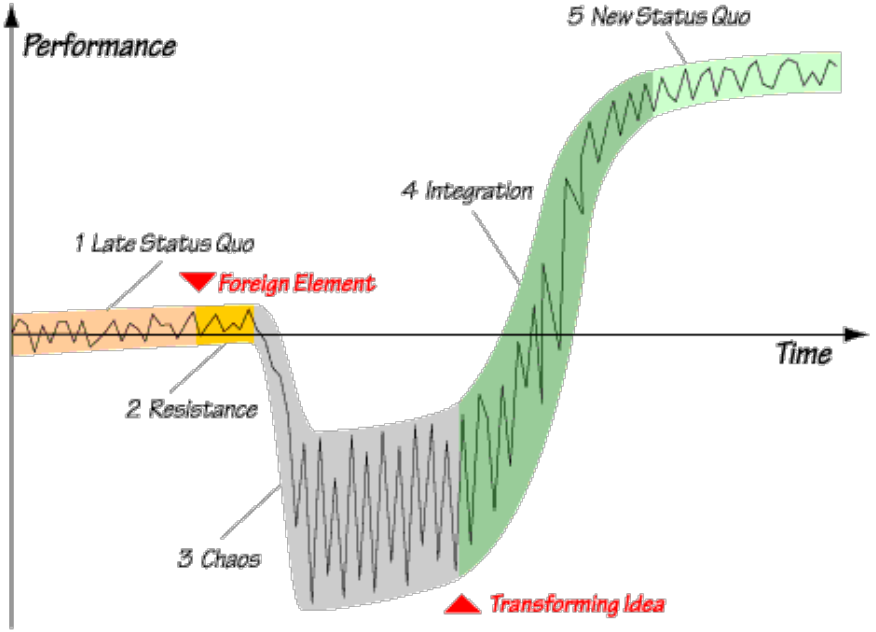
Satir Stage 4, Integration

- team is
  - excited
  - learning, but easily frustrated
- reduced productivity, but improves rapidly
- your response
  - reassurance
  - support



Satir Stage 5, New Status Quo

- if done right, higher performance
- team is
  - alert and calm
  - focused
  - less resistant to change
- your role
  - encourage
    - team
    - communication
  - make people feel safe



Satir Change Model - Summary

Phase	How To Help
Old Status Quo	Encourage people to seek improvement information and concepts from outside the group.
Resistance	Help people to open up, become aware, and overcome the reaction to deny, avoid or blame.
Chaos	Help build a safe environment that enables people to focus on their feelings, acknowledge their fear, and use their support systems. Help management avoid any attempt to short circuit this stage with magical solutions.
Integration	Offer reassurance and help finding new methods for coping with difficulties.
New Status Quo	Help people feel safe so they can practice.

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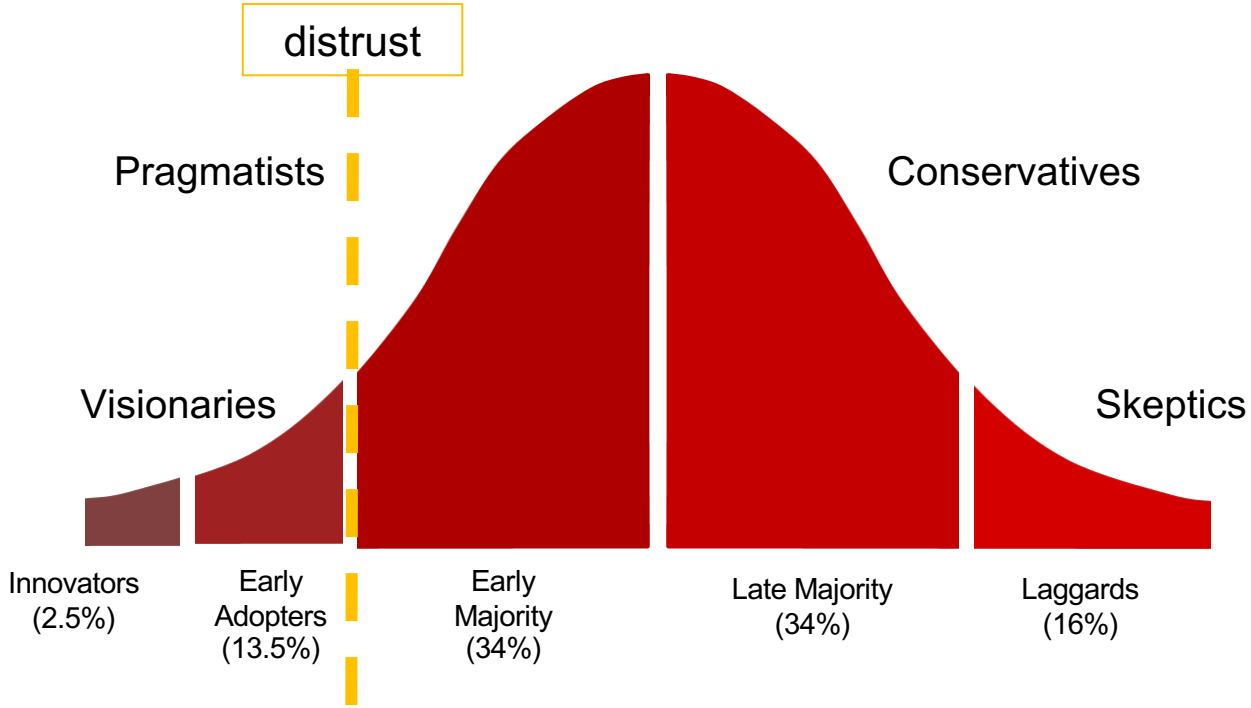
Geoffrey A. Moore – There's a Problem



Adapted from "The 4 Customer Segments of Technology Adoption," on Digital Marketing.
http://www.ondigitalmarketing.com/learn/odm/foundations/5-customer-segments-technology-adoption.

The Problem – Visionaries vs. Pragmatists

Early Adopters (visionaries)

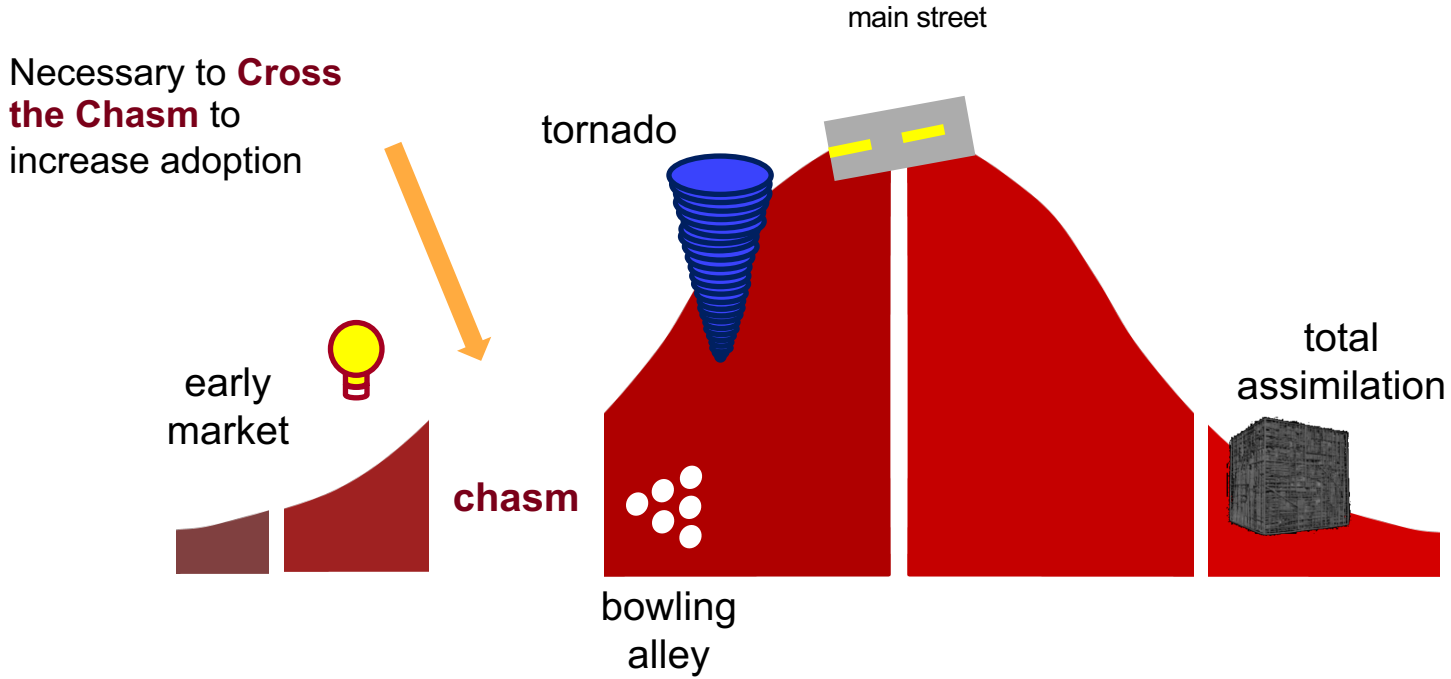
- adventurous
- early buy-in
- big-picture thinking
- spend big
- perception: pragmatists are pedestrian
- already late to the party

Early Majority (pragmatists)

- prudent
- cautious
- manage expectations
- spend to budget
- perception: visionaries are dangerous
- not enough burn-in to trust new technology

Adapted from Life-Cycle Marketing, Chasm Group, unpublished, 1999.

Moore's Crossing the Chasm Model



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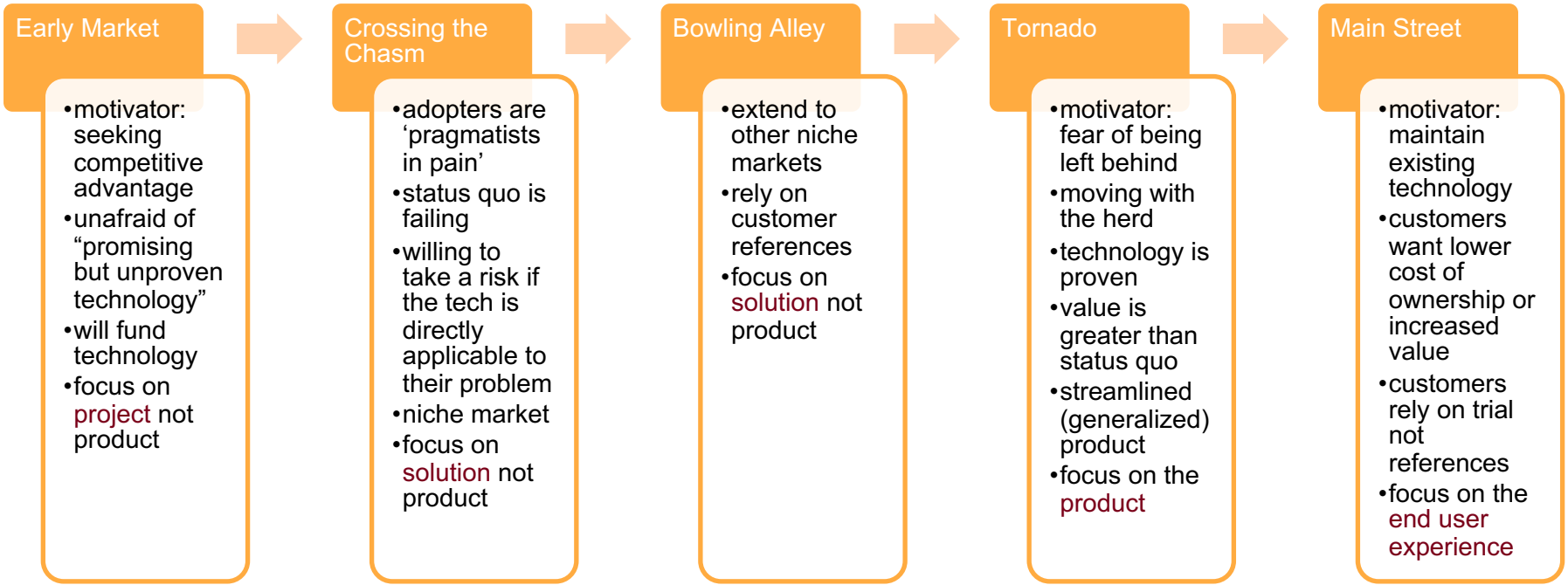
Available: https://www.thingiverse.com/thing:1306358

Crossing the Chasm (to Total Assimilation)



Process Improvement Models

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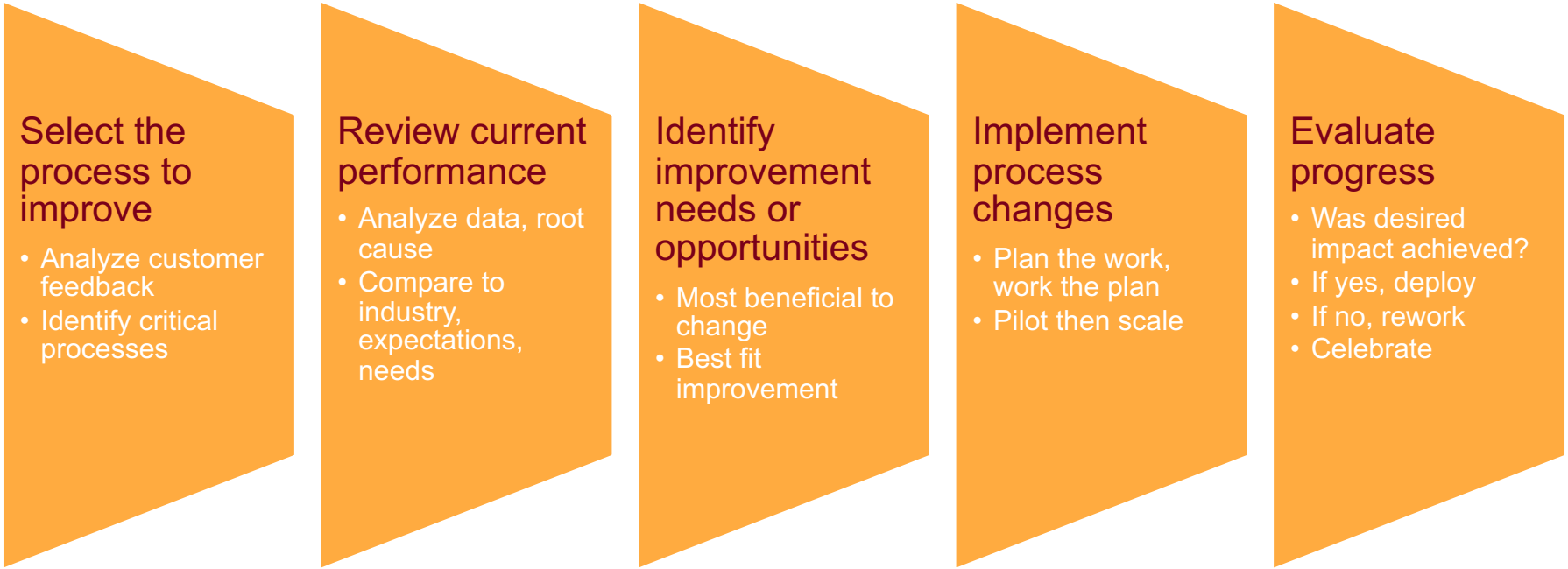
Process Improvement – ASQ general model



Adapted from: Furterer, Sandra L. and Douglas C. Wood, ed. *The ASQ Certified Manager of Quality/Organizational Excellence Handbook*. (5th ed., ASQExcellence, 2021)

Process Improvement – Steps for Success

Leadership oversight/sponsorship

Strategic net gain

Customer orientation

Involvement by the process doers

Process mindset/ approach

Data driven decisions

Prevent process errors

Adapted from: Furterer, Sandra L. and Douglas C. Wood, ed. *The ASQ Certified Manager of Quality/Organizational Excellence Handbook*. (5th ed., ASQExcellence, 2021)

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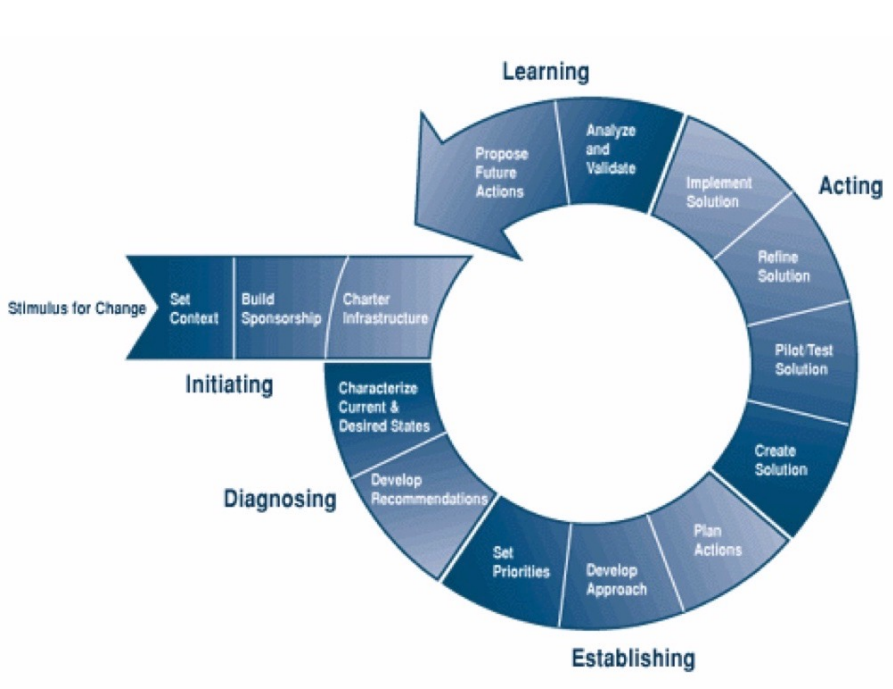
SEI IDEAL℠ Organizational Improvement Roadmap

Phase	Purpose
Initiating	Commit initial resources, build process infrastructure.
Diagnosing	Establish current levels of process maturity, process descriptions, metrics, etc. Initiate action plan development.
Establishing	Establish goals and priorities, complete action plan.
Acting	Research and develop solutions to process problems. Expand successful process improvements to entire organization.
Leveraging	Prepare for next cycle through the IDEAL model. Apply lessons learned to refine the SPI process.



Adapted from: B. McFeeley, "IDEAL(sm): A User's Guide for Software Process Improvement", CMU SEI, 1996, and J. Gremba & C. Myers, "The IDEAL(sm) Model: A Practical Guide for Improvement," CMU SEI 1997.

IDEAL – Developing an Improvement Plan

- Establish Process Action Teams
- Work with Subject Matter Experts (SME) to design and develop process artifacts
  - Use what exists
  - Include improvements
- Document process
  - Socialize
  - Review and Approve
- Pilot - Measure
- Publish - Update process from Pilot lessons learned
- Train
- Roll Out
- Monitor for improvements

IDEAL – Change Leaders

- **Coach**
  - Provide implementation support
  - Active and continued management support
  - Consider dedicated implementers or process owners
- **Change Agents**
  - Professional Readiness
  - Open Communications
  - Ear for Feedback
  - Active Participation
  - Coaching and Mentoring
  - Patience not Perfection
  - Visible Executive Interest - MBWA

Be An Agent for Change

- Be positive
- Own the change and your reactions to the change
- Choose battles carefully
- Be tolerant of mistakes
- Keep your sense of humor
- Be open to learning
- Don't let strengths become weaknesses
- Practice stress management
- Support management

Based on R. Hedger, "Software Process Improvement: Where to Start," unpublished, 2013.

Remember…

Defining change is easy.

Transition is hard because it is personal.

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Case Study Part (a)

- You will have 20 minutes plus 10 minutes Q&A
  - Each team member should present
  - Audience will ask questions, including instructors
- Convince us that your process improvement idea has merit
  - What is the process and how does it fit into the organizational process (context)
  - Why make the change – what's the problem you want to solve and what impact is it having
  - What are your next steps – how will you evaluate the problem and identify the solution, what are the challenges
- Use PowerPoint or similar, save as PDF, upload in Canvas
  - Anyone planning to be remote?

Next Steps

- Before next session:
  - Read Fenton & Bieman: Chapter 9
  - Research Paper & Team Project
    - Case 1 Part (a) Presentations due next week
    - Looking Ahead: Case 1 Part (b) Reports due after Spring Break