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*Your Catalyst to Enhanced Awareness ► Process ► Technology ► Results*

# Tulips, Potatoes, Apples, ISO 9001 and the CMMI ©

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# Topics



- ▶ Influence – Enabling Successful Improvement
- ▶ Not Just Man Over Nature
- ▶ Influence and Process Improvement
- ▶ Possible PI Sources of Influence
- ▶ Real World Case Study
- ▶ Lessons Learned
- ▶ Flight of the Improvement Bumble Bee
- ▶ Epilogue
- ▶ Q&A

# Influence – Enabling Successful Improvement<sub>1</sub>

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- ▶ Influence (v.) – To sway, compel, move, or affect (a person) to action
- ▶ In nature, plants have characteristics that sway insects to transfer pollen and enable pollination, evolution and survival
- ▶ Interestingly, not all insects are attracted by the same characteristics
- ▶ An analogy could be made for processes, improvement and people

# Influence – Enabling Successful Improvement<sub>2</sub>



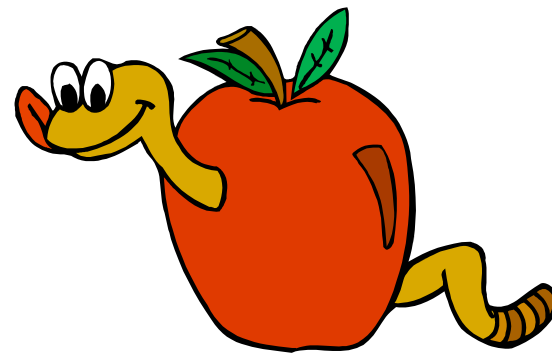
- ▶ Overcoming resistance to change is a challenge often associated with new or improved processes
- ▶ Taking inspiration from nature, perhaps we can be influenced to create more attractive processes and improvements
- ▶ This would be a paradigm shift from creating processes and trying to influence others to use them

# Not Just Man Over Nature<sub>1</sub>



► In his book “The Botany of Desire”, Michael Pollan asserts that man has exerted control over plants to satisfy the following 4 desires using the following examples:

- Sweetness - Apples
- Beauty - Tulips
- Control - Potatoes
- Intoxication - Marijuana



# Not Just Man Over Nature<sub>2</sub>



- ▶ But plants do not evolve just due to man's influence, there are several other ways their genetic material is spread
  - Some obvious, some not so obvious
- ▶ The same could be true regarding the way we evolve our ideas
  - There are many sources that influence the way we think and act, although unique to each of us
  - Unlike plants, we can control what we will allow to influence us, at least at the conscious level

# Influence and Process Improvement<sub>1</sub>



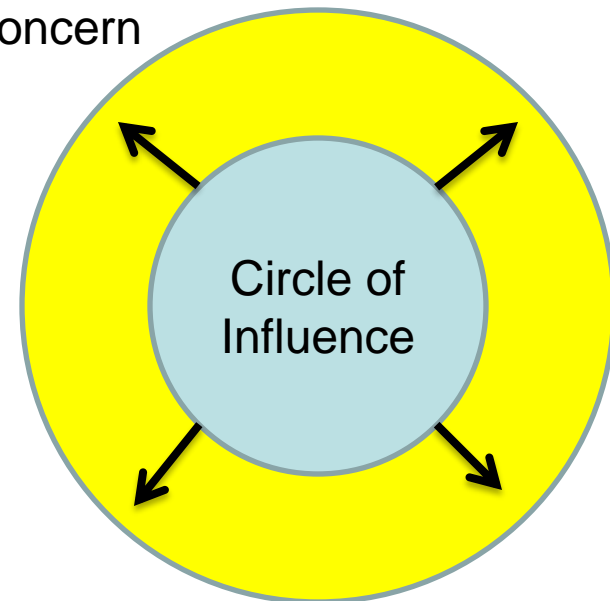
- ▶ Stephen Covey introduced the concept of concentric circles of concern and influence in his bestseller “The 7 Habits of Highly Effective People”
- ▶ According to Covey, the amount of influence we exert within a specific area of concern, like process improvement (PI), depends on how proactive and open we are to change

# Influence and Process Improvement<sub>2</sub>



- ▶ Covey suggests that proactive focus increases our circle of influence while the opposite occurs when we succumb to resistance and defensive behavior or if we are not heard

Circle of Concern

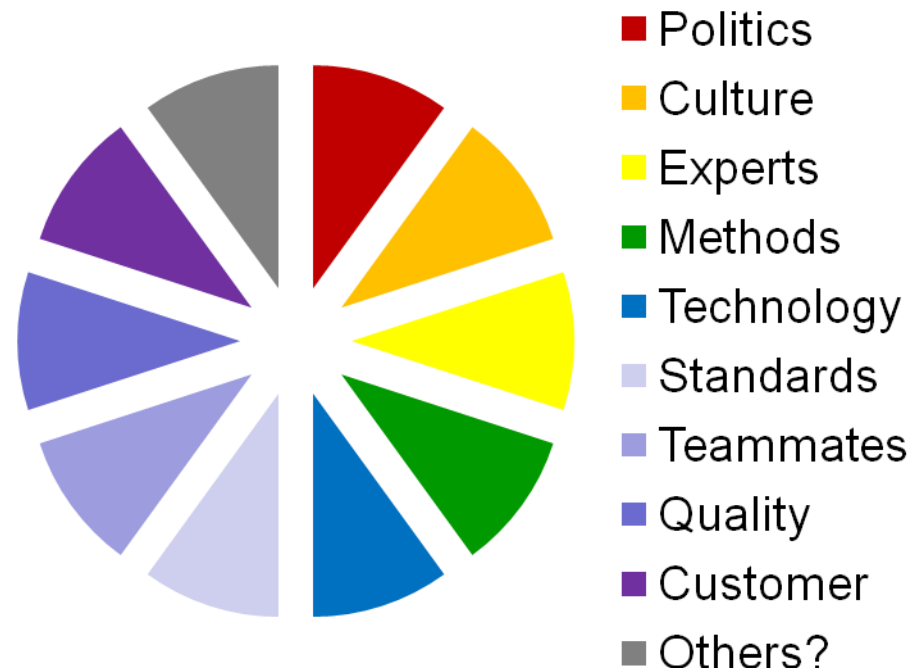


# Influence and Process Improvement<sub>3</sub>



- ▶ A complementary approach could be to help others widen their circles to create overlapping circles of concern and influence
  - Or allow them to join our circle
  - This is what synergy (win/win) is all about

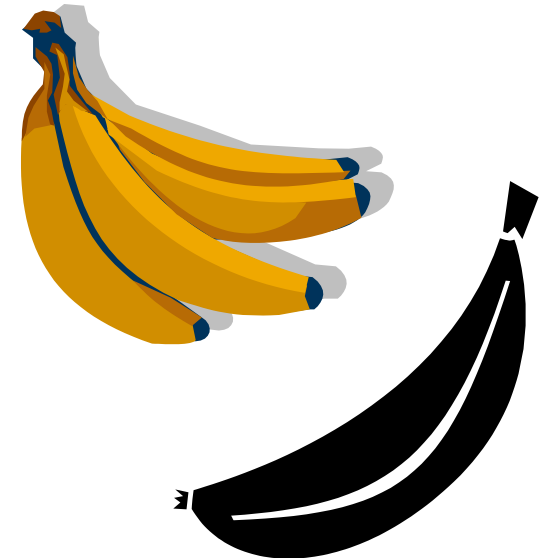
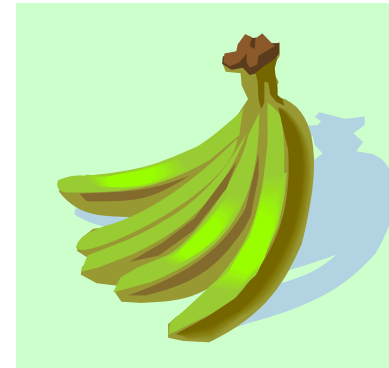
## Integration of Influences



# How to Influence People One Banana at a Time



- ▶ What can peeling a banana teach us about process repeatability?
- ▶ How monkeys can influence this process and us...



# Other PI Sources of Influence

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- ▶ Experience - Past successes *and* failures
  - Sometimes success is hidden within failure
  - Different conditions might be enough to convert failure into success
- ▶ Research and Development
- ▶ Reference Materials
- ▶ Social Networks
- ▶ Media, the Arts and many others

# Change Agent as Leader



- ▶ Shifting the Covey influence paradigm to an integration paradigm requires leadership and a broad set of skills:
  - Identifying potential influences
  - Evaluating risks/rewards of candidate influences
  - Using influences to craft a process solution that is both useful and attractive
    - We can also evolve existing processes to be more attractive using this strategy
  - Using continuous PI and lessons learned to create more successful approaches

# Real World Case Study



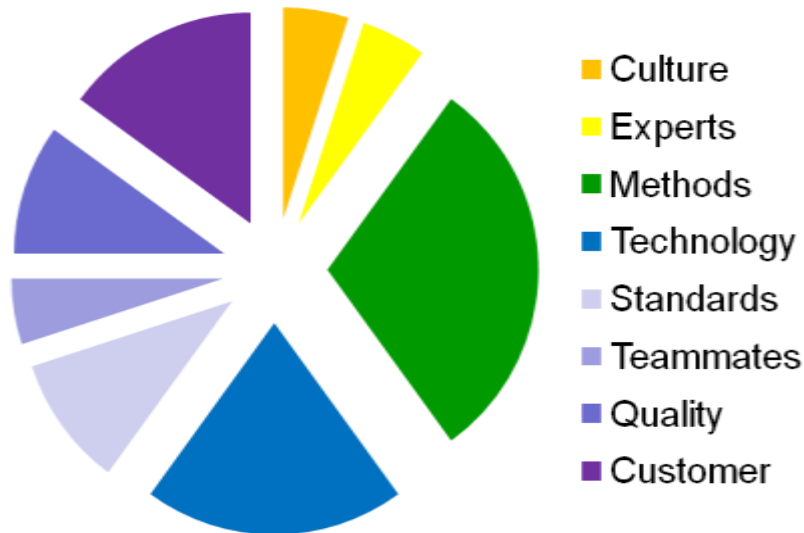
## ► Task:

- Perform verification and validation (V&V) on a software application to nuclear standards (NQA-1)
- Produce a high quality product to enable simulation aided engineering
- Provide sufficient documentation to satisfy a review by Nuclear Regulatory Commission (NRC) engineers

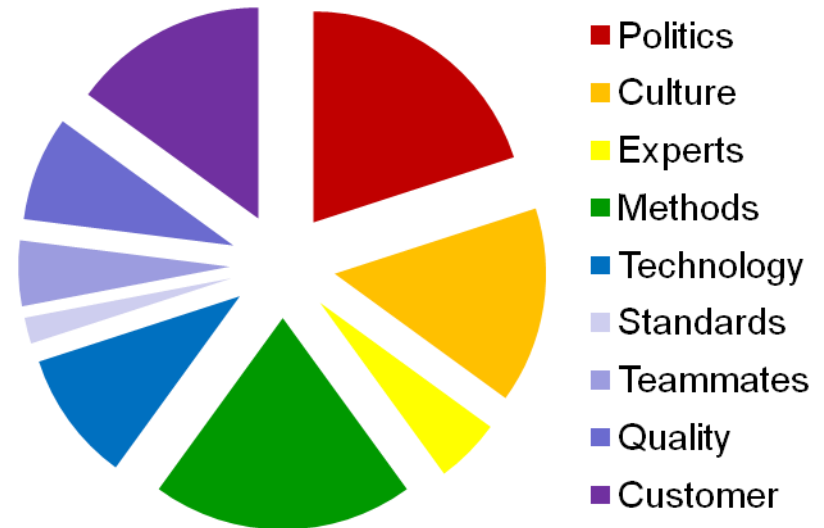
# Shift of Perceived Influences<sub>1</sub>



## Initial Technically-Focused Perception



## Introduction of Politics and Cultural Concerns



# Initial Approach: Focus on Methods & Standards

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- ▶ Since formal V&V was new, test methods were researched, selected and introduced
  - Equivalence Class Testing
  - Boundary Value Analysis
  - Decision Table Testing
- ▶ Formal document templates were created
  - Since NQA-1 references IEEE software process standards, Microsoft Word was used to create traditional templates for a test plan, test case specifications, test procedures and test reports

# Initial Approach: Fill Best Practice Gaps

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- ▶ High value CMMI process areas and select practices were adopted
  - Requirements Development (RD)
  - Requirements Management (REQM)
  - Configuration Management (CM)
  - Process and Product Quality Assurance (PPQA)
  - Verification (VER) and Validation (VAL)
  - Integrated Project Management (IPM)
- ▶ V&V planning based on IEEE 1012-2004
  - V&V activities based on integrity level per application

# Approach Revised Due to Unperceived Influences

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- ▶ 80 year old engineer's resistance to change encouraged a paradigm shift
  - The story of how one unusual employee's struggles with eyesight and other limitations led to adaptation of Big Process to Little Process
- ▶ He was accustomed to using a simple Excel spreadsheet (supplied by customer) to specify test cases and record test results
  - Initially dismissed since testing was ad hoc and incomplete - requirements did not exist
  - But Excel does have some flexibility over MS Word

# Addressing Cultural and Individual Issues<sub>1</sub>



- ▶ Although this individual was very old, I decided to allow his resistance to influence the design even though there was a high probability that he would be reassigned
  - But instead of just modifying one element of the process, I decided to experiment and convert the entire process to Excel
  - I found several exciting advantages



# Addressing Cultural and Individual Issues<sub>2</sub>



- ▶ Excel provides the potential to represent the entire lifecycle in 1 file with distinct elements allocated to different sheets
  - One file could house all the test artifacts and simplify the review process, similar to the software development folder concept
  - A test data file (TDF) template was created with a built-in process! (see example)
  - A TDF was allocated per major component

# Addressing Cultural and Individual Issues<sub>3</sub>

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- ▶ The TDF was also influenced by the agile nature of the organization's culture and the fuzziness of the product's requirements
- ▶ Since all the phases of the test lifecycle are represented, the process could be easily adjusted to allow a more agile approach

# Addressing Cultural and Individual Issues<sub>4</sub>

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## ► Resulting agile process

- Test-Driven Development could be leveraged to create rapid prototypes and uncover what-if questions
- Requirements could then be iteratively and incrementally developed with the remaining process following in a classic spiral
- Peer review sheets and revision history and change logs record iteration activities

# Other Influences<sub>1</sub>



- ▶ Consultant's PI and tailoring experience
  - Reuse of meeting-less peer review process
  - Enforce equivalence class identification
  - Build QA into the process
- ▶ NIST Special Publication 504-234
  - Reference information for software V&V
- ▶ Distributed Agile concepts influenced project to attempt a multi-site approach

# Other Influences<sub>2</sub>



- ▶ Politics caused a shift in project roles
  - Customer tech lead assigned as process owner to increase their influence on the effort
  - Other responsibilities shifted to counter conflicts of interest due to competition between customer organizations which affected resource commitments
- ▶ Project team was asked to pilot and tune TDF and process to best fit culture

# Surprises??!!



- ▶ Able to convince team and customer that requirements engineering had to be performed
  - Politics were preventing requirements issues from being circulated (circles of influence were ignored), but the new process empowered this discussion
  - This resulted in double the effort
- ▶ Everyone easily accepted training on mathematical and set theory based test techniques
- ▶ Distributed agile process initially failed due to political conflicts, but was adjusted accordingly

# Side Effects?



▶ Excel-based approach influenced other process areas and spread throughout the company



- For example, QA plan and communication was greatly simplified, resulting in management actually reading it!
- See example QA plan

▶ Technique passed on to other customers, a sneaky way to spread process improvement

# After Shocks??!!



- ▶ Our old friend finally came around (a year later) to admit that V&V and more rigorous testing was of value!
- ▶ Shift to lighter weight “documentation” has influenced all to challenge need for “wordy” documents, including author 😊
- ▶ A new “crop” of tools “sprouted” up to give more visibility to other processes



# Lessons Learned<sub>1</sub>



- ▶ Effort showed that there is no substitute for the basics (analysis-design-code-test)
- ▶ What started as test-driven development wound up requiring a great deal of requirements analysis and redesign
- ▶ Quality of product improved significantly by shifting to a more disciplined and mathematically-based test approach

# Lessons Learned<sub>2</sub>



- ▶ Removing personal bias is challenging, perhaps more so when the sides are polarized from many years of independently successful experience
- ▶ Improvement should come from within but filling gaps successfully requires objectivity
- ▶ Tool-based processes are more attractive and win out over documentation-based approaches. Documents represent waste - a waste of effort, paper, time and require continued attention.

# Lessons Learned<sub>3</sub>



- ▶ What did Michael Pollan teach us?
- ▶ Desire: Sweetness
  - Work and play nice with each other
  - Creates a more welcome environment and culture
- ▶ Desire: Beauty
  - Honor each other's perspectives
  - Allow people to shape their worlds and participate in the change process, every little bit helps!
  - Reduces resistance to change

# Lessons Learned<sub>4</sub>



## ▶ Desire: Control

- Training wheels are a good thing
- Take control when needed
- Encourage others to drive the process when ready

## ▶ Desire: Intoxication

- New process accepted, adopted, adapted and improved!
- Success comes from more than just an attractive solution, it has to be an effective, high quality process
- Quality leads to a very happy customer and team!

# Flight of the Improvement Bumble Bee



- ▶ With this success, all involved now carry around a little bit of PI pollen
- ▶ The more mobile of us will end up spreading this influence the farthest
- ▶ Also, since process solution is a hybrid between CMMI and ISO 9001, it is attractive to a wider spectrum of companies and cultures...

# Epilogue



- ▶ One of the most powerful quotes I live by is:
  - “If you change the way you look at things, the things you look at change” – Dr. Wayne Dyer
- ▶ It’s important to be receptive to other ideas, however different they might appear
- ▶ You can’t please everyone, but you can try; and although you might not make everyone happy, you just might be rewarded anyway!

# Questions and Answers



# Presentation Sources<sub>1</sub>



- ▶ Pollan, Michael. *The Botany of Desire, A Plant's-Eye View of the World*. Random House, 2001.
- ▶ Covey, Stephen R. *The 7 Habits of Highly Effective People*. Simon & Schuster, 1990.
- ▶ Rost, Thomas L, et al. *Plant Biology*. Wadsworth Publishing Company, 1997.

# Presentation Sources<sub>2</sub>



- ▶ Perez, Nelson. “Applying Agile and Software Development Techniques to Process Development”. Proceedings, SEPG, Volume 21, March 23, 2009.

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