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Pittsburgh, PA 15213-3890

# **“Back to the Future”: Leveraging Your SW-CMM<sup>®</sup> Investment to Support Transition to CMMI<sup>®</sup>**

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# Agenda

Assumptions

What Will NOT Be Covered Today

Preview of CMMI Interpretive Guidance Project Preliminary Report

Different Elements to Think About in Transitioning to CMMI

Leveraging Your SW-CMM Value Network

Leveraging Your SW-CMM Transition Mechanisms

Identifying Transition Risks

Summary



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# Assumptions

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# **At Some Point, Your Organization Will Incorporate CMMI into Your Improvement Program**

A primary assumption is that this audience is interested in moving from a SW-CMM based improvement to one based on CMMI

I'm NOT assuming that you will necessarily be making this transition right now or in the next six months

- The approaches in this seminar should be applicable at any point that you decide to begin adoption of CMMI



## **You'll be Increasing the Scope of Your Improvement Effort**

I'm assuming that you are planning to take advantage of the more general scope of the CMMI framework and that you're thinking about including parts of the organization who have NOT been part of your SW-CMM improvement effort

- Who else gets involved depends on your business context
- I'm also assuming you're basing the decision on who to include based on the business benefits you expect/need



## **It's Been Awhile Since You Started Your Improvement Effort**

Many of you have been involved in SW-CMM based improvement for multiple years, multiple cycles of improvement

- Those that began the improvement effort may have moved on to other roles and/or other organizations
- Those who were in leadership in the organization at the beginning of your improvement effort may have moved on to other roles and/or other organizations

“Corporate memory” on what it took to get you to where you are today may be sparse



## **How does this audience fit with my assumptions?--1**

How many already have begun adoption of CMMI?

How many believe your organization will NOT adopt CMMI within the next 3 years?

How many are planning to include at least one more group in their organization in their CMMI adoption?

How many are planning to keep the scope (organization-wise) of their improvement the same if/when they adopt CMMI?



## **How does this audience fit with my assumptions?--2**

How many have been involved in CMM-based improvement:

- <1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- >10 years

How many of you know or have access to those who were the champions or leaders of your process improvement effort at the beginning?

How many of you know or have access to those who were the sponsors of your process improvement effort at the beginning?





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# **What Will NOT Be Covered Today**

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# **CMMI Structure or Content**

Go to the SEI web site to find out about classes in CMMI held at the SEI or by our transition partners

There are several books now available describing the model with suggestions for implementation

- Stay tuned – if you haven't seen the one you like yet, my guess is there will be at least half a dozen more in the next year to two years



## **The Exact “Recipe” for Adopting CMMI**

IDEAL<sup>®</sup> and other improvement life cycles provide relevant guidance on how to organize and implement an improvement effort

- The techniques and approaches included here should complement and integrate with most improvement life cycles



## **Finding a Partner to Work With Today**

With this many people, doing exercises to explore how some of the techniques work is a challenge, but not impossible

Easiest way I've found is to ask you to pair up with the person sitting next to you for guided discussion sessions throughout the seminar

- Might be someone you know, might not
- Should work ok either way

So, for first exercise, pair up with the person next to you (from here on known as your partner) to talk about why you came to the seminar today (5 minutes or so)



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# **Preview of CMMI Interpretive Guidance Project Preliminary Report**

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## From the Abstract....

“The preliminary data indicates that many adoption issues are not unique to commercial software, IT, and IS organizations. The same issues were typically reported by organizations in different domain areas. The data also confirms that most organizations believe that CMMI is adequate for guiding their process improvement activities. *From the data we also learned that organizations benefited from prior investment in process improvement as they adopted CMMI.*”



## **Two Areas of Further Investigation**

### Appraisals

- A number of negative comments and issues documented related to CMMI appraisal methods

### CMMI Representations

- An area of concern and confusion for many organizations



## **Interesting Tidbits from the Interpretive Guidance Data**

10% of responding orgns have chosen not to adopt CMMI  
62% of responding orgns have CMMI adoption in progress or already institutionalized

35% of respondents believe CMMI is “almost always” adequate for guiding their process improvement  
42.2% of respondents believe CMMI is adequate for guiding their process improvement “more often than not”

76% of respondents agreed or strongly agreed that adopting CMMI would help them to leverage earlier investments in process improvement





## Interesting Tidbits--2

42% of respondents agree or strongly agree that the cost of adopting CMMI is impeding their adoption of CMMI

On the other hand....40% of respondents disagree or strongly disagree that the cost of adopting CMMI is impeding their adoption of CMMI

58% of respondents disagreed or strongly disagreed that they had difficulty in mapping their processes to CMMI

48% of respondents agree or strongly agree that having a choice between two model representations has been helpful to them

23% disagreed or strongly disagreed on the same question



## **A Sampling of Adoption Support Needs Cited in the Questionnaire**

In answer to “What else could be done to facilitate your adoption of CMMI?” here are a sample of answers from respondents:

- More flexibility in the implementation and assessment process
- Courses by Process Areas
- Publication of business cases and adoption stories
- More simple, but complete examples of processes and data items
- “I think you need to talk to our executives”



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# **Different Elements to Think About in Transitioning to CMMI**

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# You Know More Than You Think You Know....

About:

- Communicating benefits of PI to senior management
- Working with practitioners and managers to produce workable practices that adhere to your model of choice
- Developing useful process guidance
- Developing and sustaining a Process Asset Library
- Developing and deploying useful measurements
- Selecting SEPG staff and helping them to be effective
- .....lots of other particulars of process improvement

Most important, you know what does **AND DOESN'T** work to communicate about and support implementation of process improvement *in your organization*



## **Does this Apply to CMMs?**

- *"Radical innovation is the process of introducing something that is new to the organization and that requires the development of completely new routines, usually with modifications in the normative beliefs and value systems of organization members."* -- Nord and Tucker, Routine and Radical Innovations, 1987

**“Radical innovations” are the topic of the research area of technology transition, a continuing research focus of the SEI**



## What do you think?

If you're new to model-based improvement:

- What do you think (based on your current knowledge of CMMI) that CMMI<sup>®</sup> adoption will require in terms of:
  - development of new routines (procedures)?
  - modifications in the norms, beliefs, and values of organization members?

If you've been using another model as your improvement base, how different are your answers?

- I'd expect you to still have to develop "new routines"
- I would expect that many of the norms, beliefs, and values are similar between another model (i.e., SW-CMM<sup>®</sup>) and CMMI)



# **Treating Your Adoption as a Technology Transition Effort May Make Sense**

In the technology transition arena, we use some of the same and some different tools as the process improvement community

My perspective:

- Use whatever tools/techniques you find useful in your environment
- Sometimes thinking about things from a different but related viewpoint opens up new useful directions



# Factors In Considering Adopting Complex Technology

Primary reasons organizations delay investing in new innovations.....

- prior technology drag--legacy systems and work procedures based on them
- irreversibility of investments--short "useful life" for large amount of money!
- sponsorship--getting and keeping it are a challenge for dynamic organizations
- expectations--what the technology can deliver vs. what is promised/expected

*(adapted from Fichman and Kemerer, , "Adoption of Software Engineering Process Innovations: The Case of Object Orientation," Sloan Management Review, Winter 1993, pp. 7-22.)*

Which of the above affect your consideration of transitioning to CMMI?





# Observations on Technology Transitions We've Witnessed

Each transition is highly situational and its strategy will be unique to that situation and context. However, some basic concepts can be applied in generating that strategy:

- Multiple dimensions have to be addressed simultaneously to achieve success, not just the technology content
- Different audiences respond differently as they are introduced to the technology
- Acceptance of a new technology does not happen in a linear, predictable fashion, no matter how pretty the charts look!



# Observations on Technology Transitions We've Witnessed--2

There are both different “levels of diffusion”—the breadth of technology acceptance—and “levels of use” (or infusion)—the degree to which the technology becomes embedded in the organization’s governing and social practices

Different “mechanisms” are useful at different points in the transition to address different implementation issues with different audiences

Most organizations are very poor at transferring what they’ve learned from one technology transition effort to another



## **Key Elements in Successful Transition from One Technology to Another**

- Understanding the goals of the different roles involved in the transition and how they relate
  - Understanding the target adoption population (market) for the technology
  - *Value networks is a technique we've developed to support understanding how different stakeholders in an adoption interact*
- Understanding the characteristics of the technology
  - What problems is it *intended* to solve? Are those the ones we're using it for?
  - How well does it match the needs of adopters who have a need to solve those problems?
  - How *“transitionable”* is the technology?



## **Key Elements in Successful Transition from One Technology to Another--2**

- Understanding what will be needed to make the technology “work” for different types of adopters
  - *Transition mechanisms* for the technology
  - Work practice and other changes required in the adopting organization
- Identifying and mitigating the different types of risks identified as part of understanding all the above



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# Leveraging Your SW-CMM “Value Network”

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# Understanding Your Audience for the Transition

These are the “nodes” in your value network.

Key questions in moving forward with CMMI:

*Which roles in your organization will need to change something in their behavior/attitudes/values to adopt CMMI?*

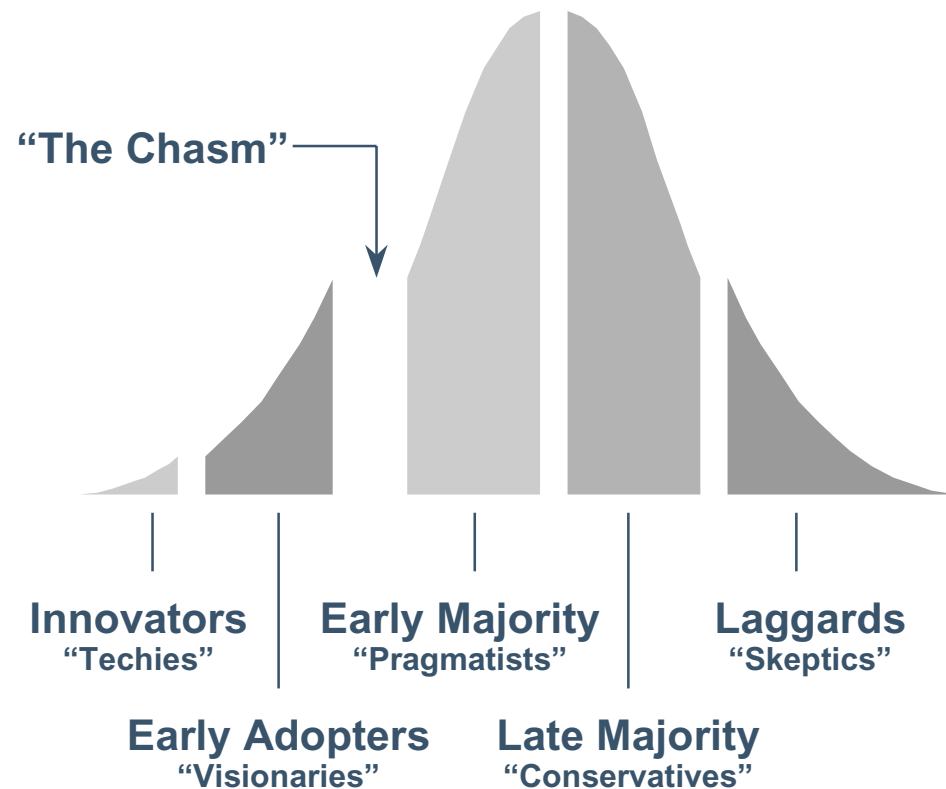
*What things make these groups more or less likely to change?*



# Different "Adopter Types" Move Through Adoption at Different Speeds

Depending on many factors, early adopters for one type of technology could be late majority/laggards for another (and vice versa!)

*Where are your different stakeholders with regard to major process changes?*



Source: Geoffrey Moore, *Crossing the Chasm*, 1991



# Innovators

Gatekeepers for any new technology

Appreciate technology for its own sake

Appreciate architecture of technology

Will spend hours trying to get technology to work

Very forgiving of poor documentation, slow performance, incomplete functionality, etc.

Helpful critics





# Early Adopters

Dominated by a dream or vision

Focus on business goals

Usually have close ties with “techie” innovators

Match emerging technologies to strategic opportunities

Look for breakthrough

Thrive on high visibility, high risk projects

Have charisma to generate buy-in for projects

Do not have credibility with early majority



## **Early Majority**

Do not want to be pioneers (prudent souls)

Control majority of budget

Want percentage improvement (incremental, measurable, predictable progress)

Not risk averse, but want to manage it carefully

Hard to win over, but are loyal once won



# Late Majority

Avoid discontinuous improvement (revolution)

Adopt only to stay on par with the rest of the world

Somewhat fearful of new technologies

Like pre-assembled packages with everything bundled



# Laggards

“Nay sayers”

Adopt only after technology is not recognizable as separate entity

Constantly point at discrepancies between what was promised and what is

*Hmmm.....are you seeing some of this behavior from those invested in SW-CMM?*

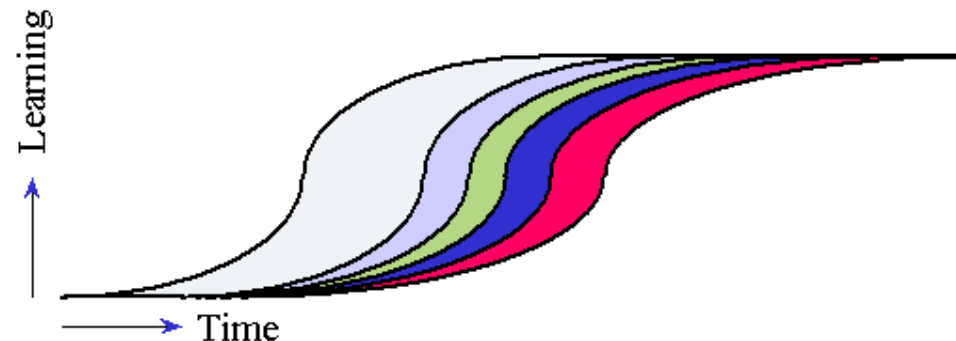
*When a technology becomes “overadopted,” sometimes people who would be innovators in other contexts act more like laggards!*



## Different Parts of the Organization Learn at Different Rates

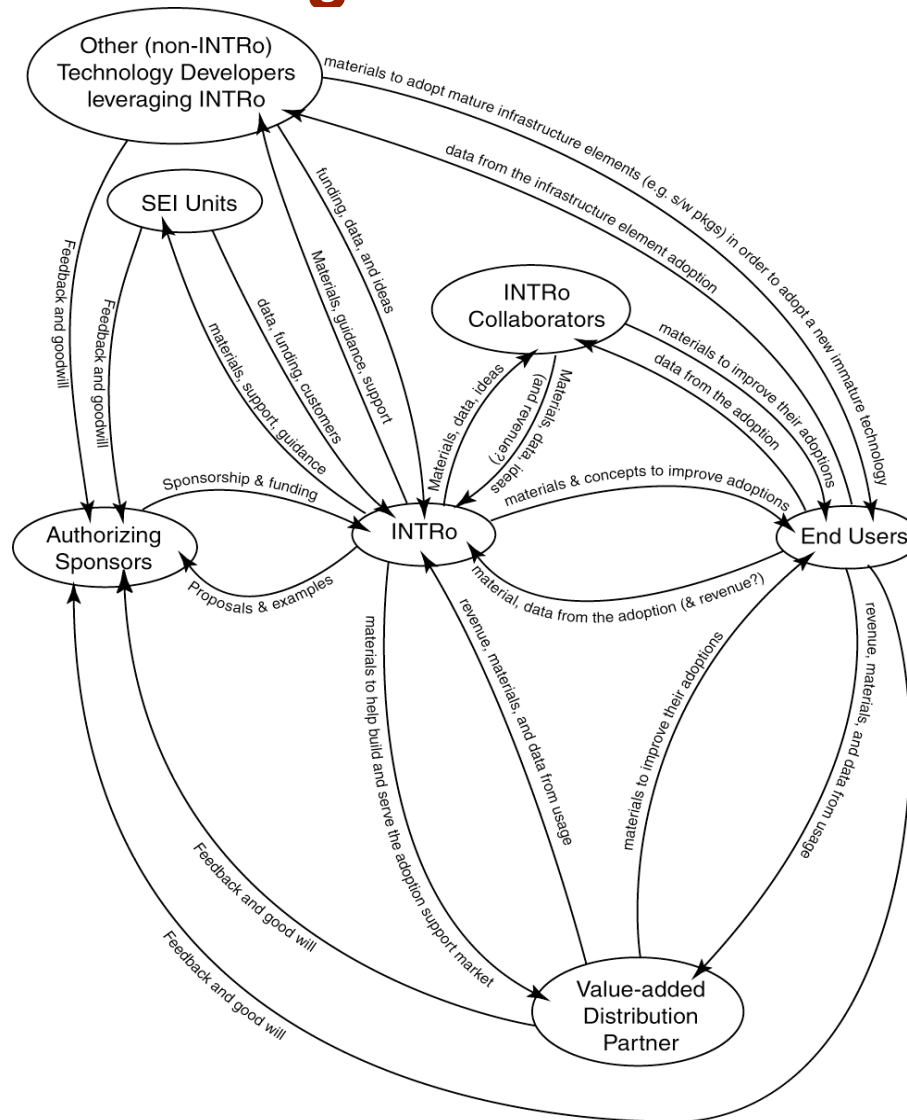
....because of their adoption inclinations, time available to pay attention to the new technology, management direction -- there are lots of factors that can impact how quickly one segment of the organization adopts vs. another

*What happens if the practitioners adopt early and quickly, and program management doesn't have time to pay attention and adopts more slowly?*





# Value Networks: A Different Way of Looking at Your Stakeholders



*Value Networks* are a way to start looking at the exchanges that need to occur between different roles within a “marketplace” or group of stakeholders

- Example here: a value network for INTRo, an SEI technology



# Applying Value Networks to CMMI

Identify nodes in the network:

- Stakeholder groups (preferably role-based) who need something from the CMMI transition team
  - Pilot projects
  - Project managers
  - Senior management steering groups
  - External customers
  - Internal customers
  - ...
  
- Stakeholder groups who have something that the CMMI transition team needs
  - External consultants
  - Internal consultants
  - Training/education group
  - Projects
  - SEI
  - ...



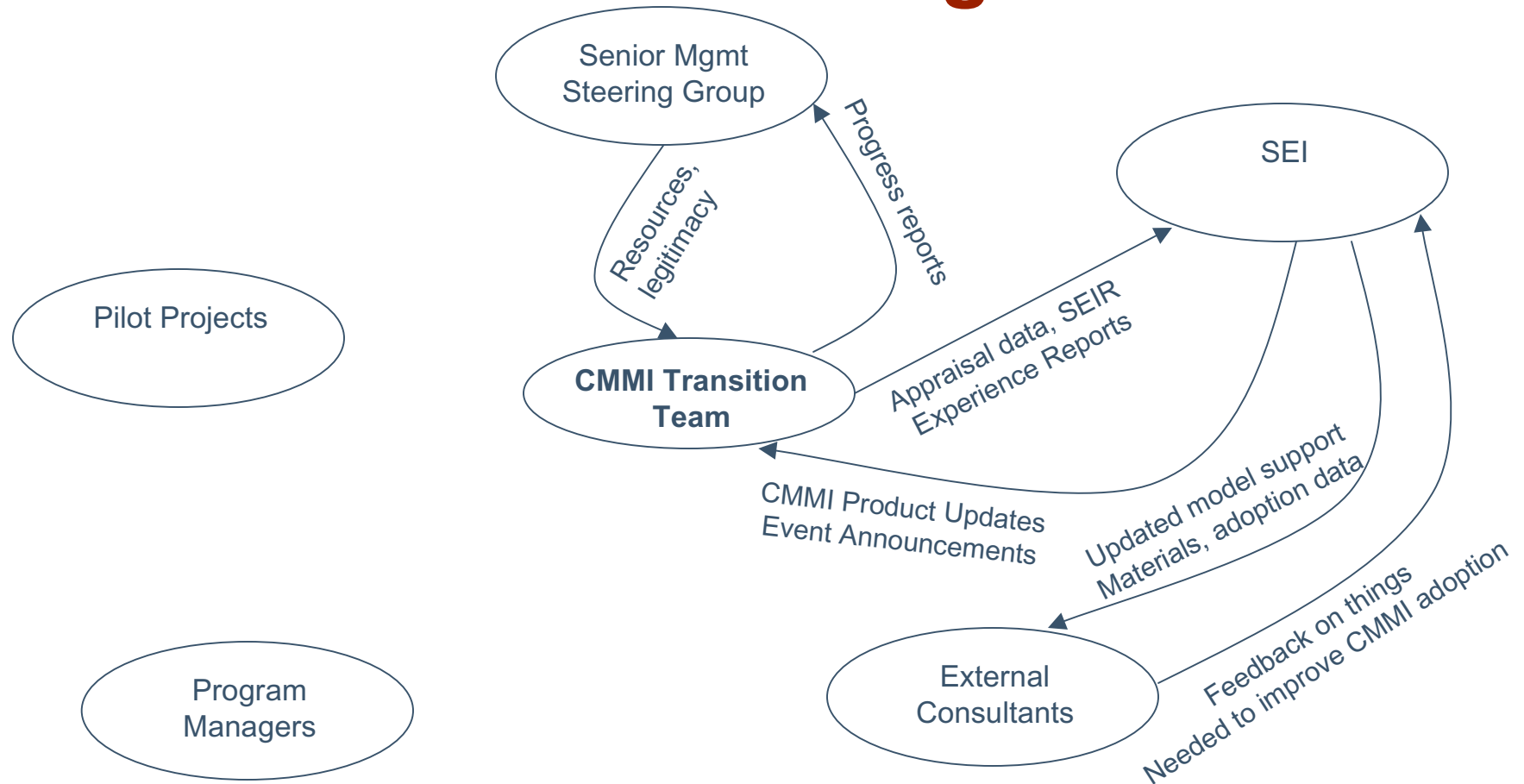
## **Identify “What’s Exchanged” Between/Among the Stakeholders**

- Data...
- Resources to get things moving...
- Special skills...
- Dollars...
- Project measures...
- Lessons learned...
- Process assets...
- Process appraisal results...
- .....





# Exercise: Put them together....



*NOTE: Interactions occur both between the improvement and stakeholders as well as among the stakeholders*



## **Instructions—7 minute limit (2 minutes working alone, 5 minutes discussion with partner)**

Think of the roles/groups that are stakeholders in your organization in your SW-CMM (or whatever model you're using) improvement effort. Write down the 5 most important stakeholder groups.

Share your list with the person next to you and vice versa

- If you both work in the same organization
  - Note the groups that are the same in terms of the “top 5”
  - Note the groups that are missing/different for each list
- If you work in different organizations
  - Note the groups that are the same in function, even if you use different names for them
  - Note the groups that are different for each list

In both cases...

- What additional groups “come up” as part of your conversation?
- Which of these groups are still important to you in moving to CMMI?



## **Now Let's Deal with Value Exchanges (10 minutes working alone, 5 minutes discussing with partner)**

Decide on 5 of the stakeholder groups you want to focus on for value exchanges—sketch a diagram with CMMI Transition Team in the center and the other stakeholders surrounding them

For each group:

- Think about/write down what (in the abstract) you think the key value is that is provided by that group to the CMMI transition team
- Think about/write down what you think the key value is that the CMMI transition team provides to that stakeholder group
- Think about/write down important values you think are exchanged among the stakeholders themselves

After 10 minutes, discuss your results with your partner

- How similar/different are the results?



## What To Do In Real Life with This...

We have been postulating and guessing about who the stakeholders are, what they want, what they can offer the team

There IS a way to get validation of your guesses:

- TALK to representatives of the stakeholder groups and confirm your hypotheses

You can get somewhat detailed with this, or stay abstract for awhile—beware of getting “stuck in the weeds”

Once you have your value network identified, you can use some of the other techniques to think about what kinds of *transition mechanisms* will be needed to help each one transition productively to CMMI (we’ll talk about this next)



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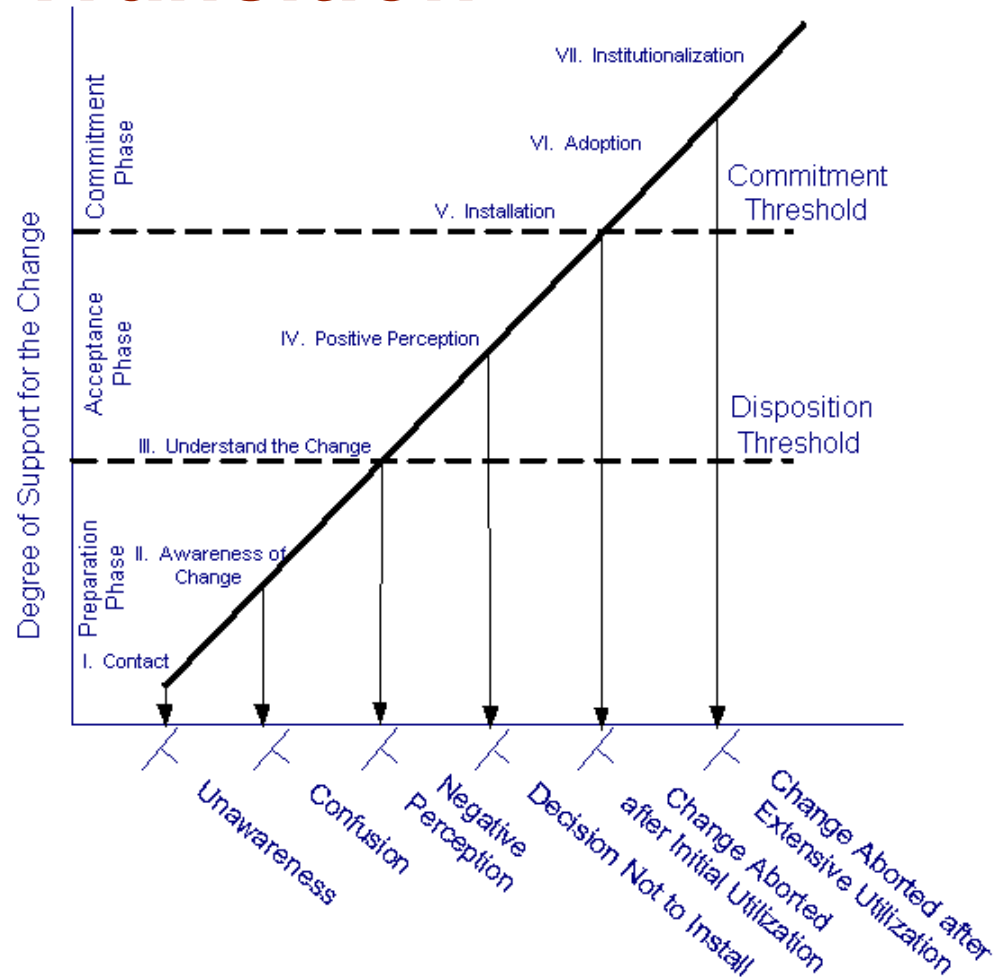
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# Leveraging Your SW-CMM Transition Mechanisms

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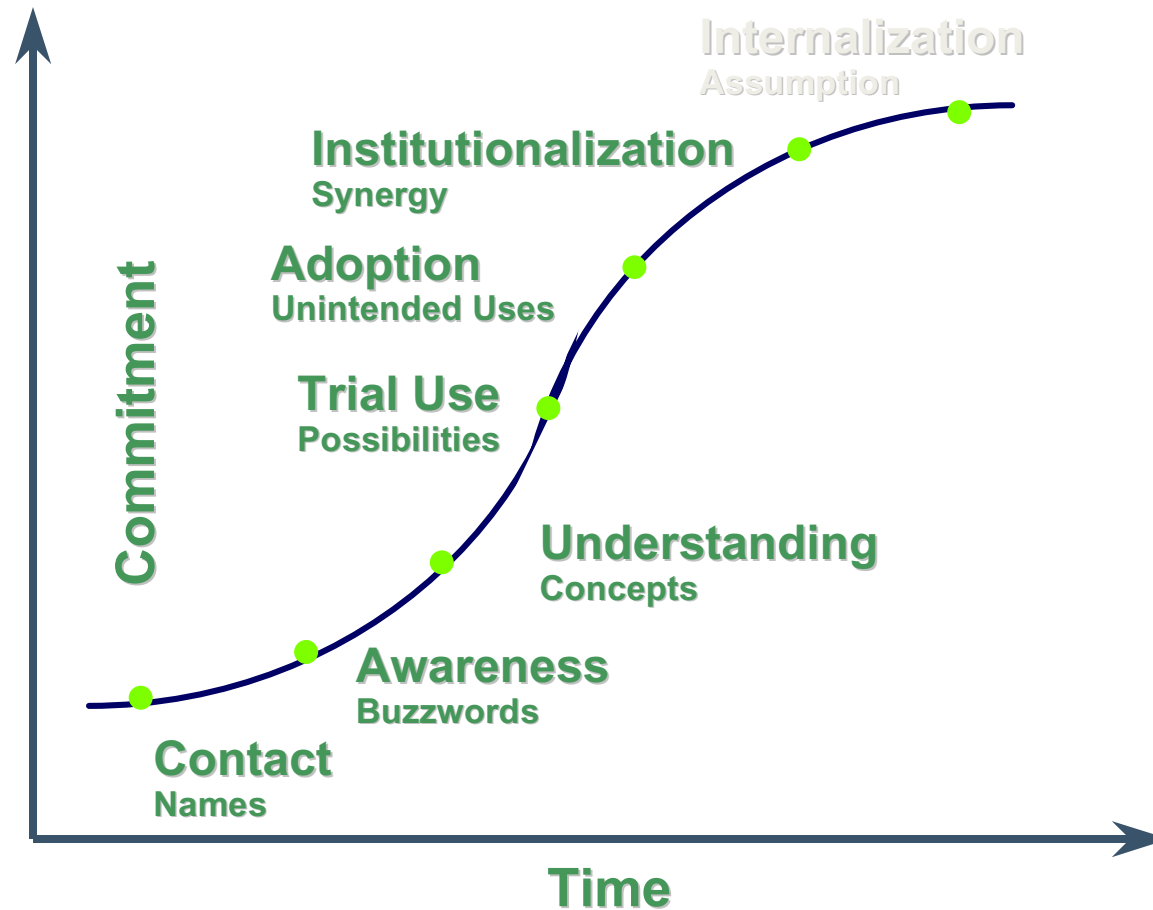
# Understanding Some Major Shifts During Transition



Source: Patterson & Conner, "Building Commitment to Organizational Change", 1982.



## A Success-Oriented View the SEI Finds Helpful



Adapted from Patterson & Conner, "Building Commitment to Organizational Change", 1982.



# **Enabling Movement From One Stage to Another through Transition Mechanisms**

Innovators and Early Adopters will tend to “make their own” transition mechanisms and make do with what's available from the technology producer

Early and Late Majority adopters expect many of these mechanisms to be readily available for them to acquire without development





# More Detail on Transition Mechanisms

The transition mechanisms that follow fulfill two purposes:

- for the technology producer (e.g., the CMMI<sup>®</sup> Product Team), many of the mechanisms in Contact, Awareness, and Understanding are used in their marketing kits
- for the technology adopter, technology producer materials need to be adapted to help “sell” the technology to the intended users

Note that not all of these are actually “products”; some of them are events or activities

These are a general set of mechanisms that could be used in your organization; which ones are right for you depend on your organization’s context and culture



# Tools for Contact and Awareness

Communication Devices

“Elevator speech”

Standard 45 minute pitch - road show

FAQ

Magazine articles

Conference briefings

Flash cards with objectives, benefits, URL, etc.

Web site devoted to the technology, with links and dialogue

Successful ROI stories, case studies

Focus on concept, not the buzzword

Executive summary of policy



# Understanding

Communication and education

One-day seminars, symposia for various vendors

Detailed case studies

Technical brief

Identify and authorize champions

Identify stakeholder roles, responsibilities, and interrelationships



## **Trial Use**

Questions to consider: How big do you need to be to consider pilots? How do small organizations conduct pilots?

Pilot Programs

Carefully identify a couple of focused pilots (or “experiments”)

Define incentives for pilot participation

Small working group to support pilots

Special authorities for pilots

Document pilot results

Protect and support the pilots

Communication, education, and support

Define measures of success

2-3 day course for pilots and interested others



## **Trial Use--2**

Users Group (may be external, e.g., SPINs) - share experiences

Transmit lessons learned from innovators and early adopters

Case exercise for transitioning from one set of work practices to one with the new technology support

Technology use startup and coaching

Identify barriers and workarounds



# Adoption

Strong set of incentives; rewards and consequences

Refined guidance on CMMI<sup>®</sup> usage choices and implementation

Education - mature courses, modularized for Just-In-Time delivery

In-Process Aids

Repository on business cases and lessons learned

Sample implementation plan with impact analysis

Job aids - process guides, start-up guides, coaching, JIT training, guidebooks

Identify, draft needed policies or standards

Ensure that CMMI sustainment infrastructure is in place and resourced



# Institutionalization

Fully realized curriculum of training for different types of users

New employee training/orientation

Stability in leadership use of CMMI<sup>®</sup> data

Grandfathering vs. cutover policy

Continuous improvement to adoption artifacts (guides, etc.)



## **SEI's “What Works, What's Needed” Workshop**

A workshop held in May 2001 with early adopter organizations for CMMI

Purpose: To determine what transition mechanisms were enablers of the transition to CMMI, and also to understand what transition mechanisms early adopters believed needed to be developed

Report from the workshop is available at the SEI web site Publications page

Next two slides summarize which communication mechanisms (generally focused on Contact, Awareness, Understanding) and implementation mechanisms (generally focused on Trial Use, Adoption, and Institutionalization) were cited in the workshop





# Communication Mechanisms

Primarily focus on moving between Contact Awareness, and Awareness Understanding

CMMI® Examples from 1<sup>st</sup> CMMI “What Works, What’s Needed” Workshop:

What Works: Contact / Awareness

- **"Think CMMI" promotional program; reference cards; promotional materials (14)**
- **Translations of SEI Material into local language (8)**
- **Establish multiple communication channels (4)**
- **CMMI awareness briefings/forums (3)**

What Works: Understanding

- **Self-assessment; gap analysis; mini-assessments; class B & C assessments that relate gaps to the organization’s processes (20)**
- **Chart on how processes are responsibility of different roles/across organization boundaries (11)**
- **Poster on CMMI (7)**
- **Transition Road Map (7)**
- **CMMI action plans (4)**
- **BoF on focused topics (4)**
- ***Note: cross-model maps didn't get many votes!***



# Implementation Support Mechanisms

Primarily support moving from Understanding Trial Use, Trial Use Limited Adoption, Limited Adoption Institutionalization

Example Implementation Support Mechanisms from WW,WN Workshop for CMMI®:

What Works: Trial Use

- **Integrating QA to measure PI progress (8)**
- **Link QA process to CMMI (8)**
- **Transition Strategy SW-CMM-->CMMI (8)**
- **Pilot/trials in non-development areas (7)**
- **Example CMMI PI budget (5)**

What Works: Adoption

- **Role-based training (24)**
- **Tailoring guidance/strategies for different organizational contexts (23)**
- **Transition steering group (10)**
- **ROI trend data (9)**
- **Integrating all disciplines into the process group (8)**

What Works: Institutionalization

- **CMMI Best-Practice Based Templates/Checklists/Assets (22)**
- **Integrating Process Review into Project Management Review (14)**



# **Exercise: Thinking About What You Can Reuse and How**

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## **Miniature “What’s Worked” Exercise (5 minutes working alone, 5 minutes discussing with partner)**

If you’re moving from an existing improvement effort to CMMI, you already have invested a significant amount of time, effort, and money into building transition mechanisms based on your previous model

- Some of them could be used with minimal change for CMMI
- Some of them would take a good bit of rework to be useful
- Some aren’t worth trying to “save” – you’re better off starting from scratch

Think about the mechanisms you’ve successfully used with your previous improvement effort

Using the table on the following slide as a guide, spend 5 minutes listing mechanisms you might think about reusing for CMMI

Discuss the similarities and differences between your table and your partner’s.



# What's Worked/How Much It Will Take to Reuse

**C**  
**o**  
**m**  
**m**  
**u**  
**n**  
**i**  
**c**  
**a**  
**t**  
**i**  
**o**  
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**I**  
**m**  
**p**  
**i**  
**e**  
**m**  
**e**  
**n**  
**t**  
**a**  
**t**  
**i**  
**o**  
**n**

<i>Rework Effort P-C Stage ↓</i>	<i>Minimal</i>	<i>Medium, but worth it</i>	<i>Too much—not worth reusing</i>
Contact			
Awareness			
Understanding			
Trial Use			
Limited Adoption			
Institutionalization			



## What do you do with the results?

Use results of analysis to estimate (at least some) of the resource needs for moving from one model-based improvement to another

- It's typical to assume "everything" can be reused, but a little thought often leads to a different conclusion
- Different people will have different ideas about level of reuse achievable
  - highlighting those differences can help you to refine your ideas
- How mechanisms were architected the first time around sometimes determines how easy they are to reuse
- Giving sponsors "data-based" estimates helps them to see you're "walking your talk"
- Don't forget that different mechanisms are likely to be needed for different stakeholders in your value network



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# Identifying Transition Risks

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# Sources of Transition Risk

Most transition risks come from misfits between the characteristics of the technology and the characteristics of the users who are asked to adopt it. Common transition risk areas include misfits between the technology and:

- Business strategy
- Organizational work practices
- Reward system
- Skills
- Values
- Sponsorship
- Structure
- Technology adoption history





## **The Good News....**

CMMI corrects many of the problems and defects that we have known were in SW-CMM 1.1 for some time but couldn't fix until a new model version could be released

The transition characteristics of SW-CMM and CMMI are pretty much the same for several of the transition risk factors—most of the differences are expansions in scope rather than focus

What this implies is that organizations who are at low risk with the transition risk factors for SW-CMM should be at low risk with those risk factors for CMMI



## **Some Notes on Differences....Mostly Expansions of Scope**

- Business strategy—CMMI expands the business strategy focus of CMMI into projects that go beyond software
- Organizational work practices—biggest area of difference  
CMMI expands the focus on work practices related to measurement, engineering, risk management, and integrated product development at minimum
- Reward system
- Skills—expanded set of engineering skills is needed to support some aspects of CMMI
- Values
- Sponsorship—sponsorship needed typically extends beyond software
- Structure—other parts of the organization will typically be involved
- Technology adoption history—successful SW-CMM adoption history should be helpful in CMMI adoption



# Homework

Think about risks related to:

- The value network you've identified and their expectations
- The transition mechanisms that you think will be needed to support your CMMI transition
- The transition risk factors highlighted in this section

Your CMMI transition plan can be started with risk mitigation actions to reduce the probability and/or effects of the risks you identify



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# Summary

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# Building a Transition Strategy for CMMI

## Key Points:

- Understand where you're starting from in terms of other model-based improvement efforts
- Understand your audience (both “old” and “new” if starting from another model)
  - Building a value network with the CMMI<sup>®</sup> Transition Team as the hub is a good way to explore this
  - What's the “fit” of CMMI with your key audiences?
- Understand WHY you are transitioning
  - What problem will CMMI implementation be expected to solve?
- Understand what you can leverage from previous efforts
  - We've taken a stab today at starting this



# **Technology Transition Approaches Can Help You to Analyze Your SW- CMM Implementation and How It Can Support Your CMMI Adoption**

Ones I hope you'll remember and use:

- Value Networks
- Transition Mechanisms
- Transition Risks



# Thank You!

For PDF version of this presentation, check at

[www.sei.cmu.edu/ttp](http://www.sei.cmu.edu/ttp)

AFTER Oct 24<sup>th</sup>

For other CMMI adoption support materials, check at

[www.sei.cmu.edu/cmmi](http://www.sei.cmu.edu/cmmi)

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COTS Usage Risk Evaluation<sup>SM</sup>  
EPIC<sup>SM</sup>  
Evolutionary Process for Integrating COTS Based Systems<sup>SM</sup>  
Framework for Software Product Line Practice<sup>SM</sup>  
IDEAL<sup>SM</sup>  
Interim Profile<sup>SM</sup>  
OAR<sup>SM</sup>  
Options Analysis for Reengineering<sup>SM</sup>

OCTAVE<sup>SM</sup>  
Operationally Critical Threat, Asset, and Vulnerability Evaluation<sup>SM</sup>  
PLTP<sup>SM</sup>  
Product Line Technical Probe<sup>SM</sup>  
PSP<sup>SM</sup>  
Personal Software Process<sup>SM</sup>  
SCAMPI<sup>SM</sup>  
SCAMPI Lead Assessor<sup>SM</sup>  
SCAMPI Lead Appraiser<sup>SM</sup>  
SCE<sup>SM</sup>  
SEI<sup>SM</sup>  
SEI-Europe<sup>SM</sup>  
SEPG<sup>SM</sup>  
TSP<sup>SM</sup>  
Team Software Process<sup>SM</sup>