Carnegie Mellon
Software Engineering Institute

Pittsburgh, PA 15213-3890

Are You Prepared for CMMI?

SEPG 0557
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Agenda

Introduction/Expectation Setting

Why TTP is Interested in CMMI® Transition

Seeing CMMI® as a Technology Transition

Applying Technology Transition Concepts to CMMI® Transition

Building a Transition Strategy for CMMI ®

Analyzing Your Existing PI Infrastructure for Potential Reuse

Summary/Where Will You Go From Here?

®CMM, Capability Maturity Model, IDEAL, and CMMI are registered with the US Patent and Trademark Office

Who Are We and Why Do We Care About CMMI® Transition?

Who?
- SuZ: Researcher in technology transition practices who also has extensive experience building and deploying CMM®s
- Maggie: Process improvement specialist working with multiple models with multiple organizations; SCAMPI Lead Assessor

Why do we care?
- SW-CMM is the first major SEI technology to be "replaced" by a subsequent SEI technology
- We don't want to see organizations adopting CMMI® making mistakes we've already learned from in SW-CMM® adoption
- We want to see organizations transitioning from SW-CMM® CMMI® make as easy/effective a transition as possible

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Who are YOU?

How many (raise hands please!)
- Are currently involved in SW-CMM® based improvement?
- CMMI® -based improvement?
- Improvement using another model/approach?

How many have been working in model-based improvement….
- Less than 1 year
- 1-3 years
- 3-10 years
- > 10 years

How many have been working with CMMI®-based improvement
- Less than 1 year
- 1-3 years

Why are *YOU* Interested in (possible) Transition to CMMI?

Context for TTP Involvement in SEI Technologies

The SEI's goal is to *institutionalize new and improved practices in the acquirer and developer communities* This requires corporate competence in at least two areas:

- technically excellent solutions to relevant software engineering problems, and

- impact-producing strategies for technology transition.

* SEI Strategic Plan, FY2003

TTP Focus and our focus in this workshop

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What We Will NOT Be Dealing with Today…

Content or Structure of CMMI®

- Information resources at back of tutorial materials provide links to lots of information related to structure/content

- Other presentations/tutorials at this conference will be covering structure/content

What We Will Be Dealing With

- Understanding the goals for adoption
- Understanding the goals of the different roles involved in the transition and how they relate
- Understanding the characteristics of the technology (that would be CMMI!)
- Understanding what will be needed to make the technology "work"
- Identifying and mitigating the different types of risks identified as part of understanding all the above

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The TTP Mission

To ensure and provide the SEI's core competence in "impact-producing strategies for technology transition".

How?

Consulting

Technologies

Education

To: stakeholders inside and outside the SEI

Where does TTP fit within the SEI?

TTP is the "home" of the best practices for the SEI's core competency, **software technology transition,** and resides within the Technology Transition Services Directorate

TTP supports all the SEI technical initiatives, by providing
- Consulting for the different transition roles involved in an SEI technology
- Adaptable workshops, processes, and other practices ready to be tuned to the needs of a particular technology or transition role

TTP is active in evolving the body of knowledge for technology transition through research, application of best practice, and sharing of lessons learned with the SEI and technology transition communities

Technology + Transition = Impact

Summary of the SEI's technology maturation/transition approach
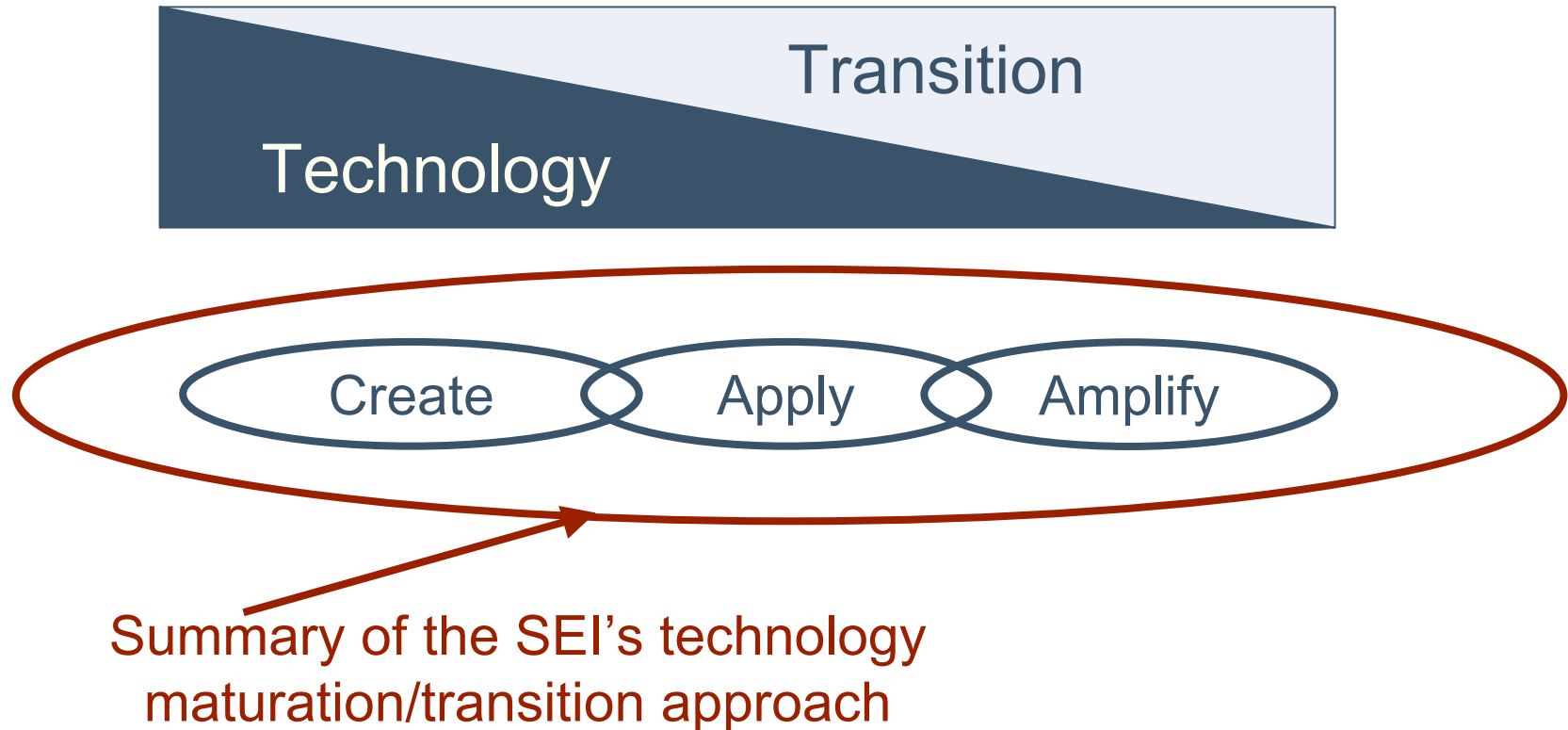
Common Misconceptions about "Transition"

Activities addressing transition aren't needed until the technology is done

Planning for Transition starts in the Create stage. Early Majority piloting and Whole Product development culminate in the Apply stage. Monitoring and refinement happen in the Amplify stage. Waiting until the end of technology development to begin transition activities is **expensive.**
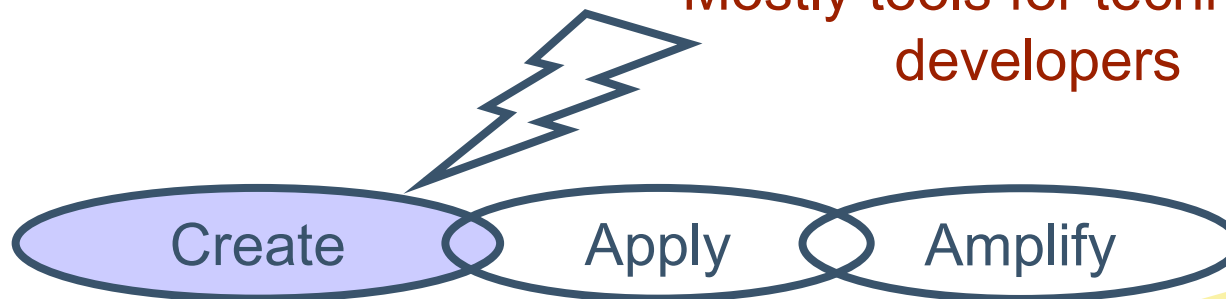
Think this…

Rather than …

The TTP Toolkit

Mostly tools for technology developers

Create   Apply   Amplify
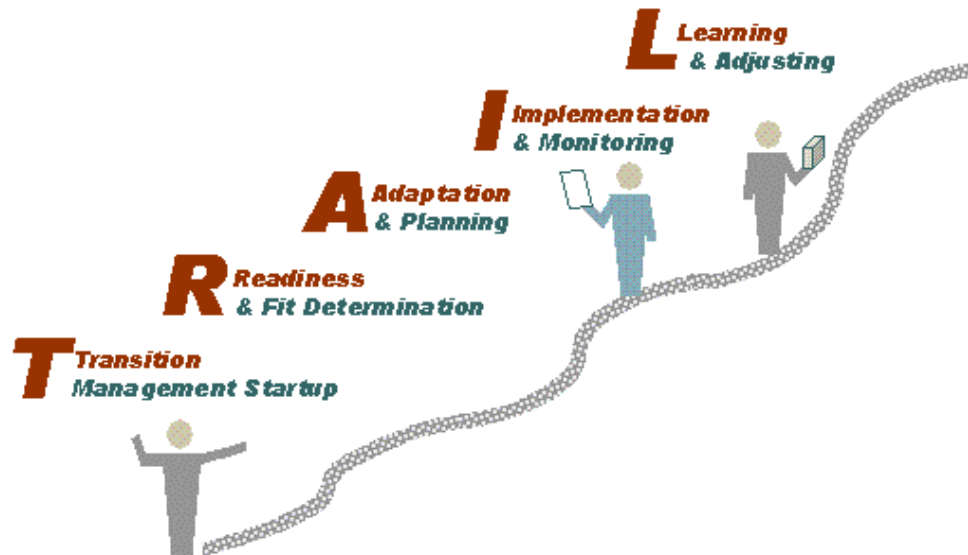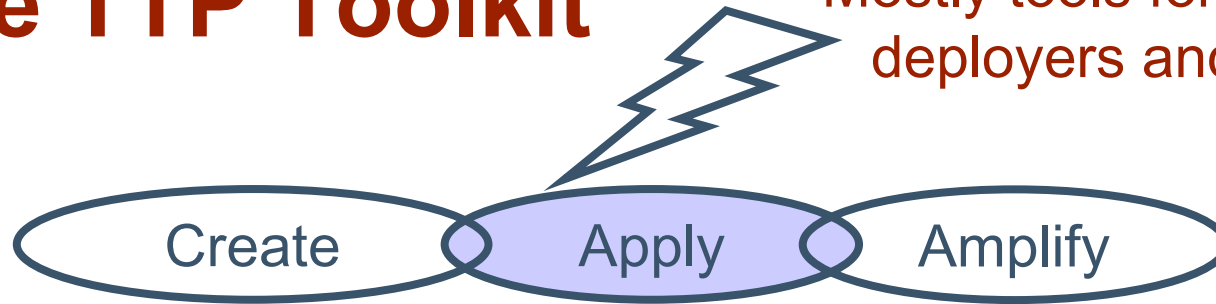
Groundbreaking workshop

Transition Baseline Review

The TTP Toolkit

Mostly tools for technology deployers and adopters

Create   Apply   Amplify

L Learning & Adjusting

I Implementation & Monitoring

A Adaptation & Planning

R Readiness & Fit Determination

T Transition Management Startup

The TTP Toolkit

Mostly tools for transition communities & technology developers

Create · Apply · Amplify

Transition Progress Review

Transition Skills Development

Professional Certificate Program

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Context

The next set of slides are written from the viewpoint of what CMMI® is like (from a transition viewpoint) to someone who is not currently active in improvement….

- Many of the same things could have been said when adopting SW-CMM®
- The "radicalness" of the change will be less when moving from one CMM®-based improvement context to another

Why Look at the Adoption of the CMMI® as a Technology Transition?

CMMI® *is* a technology--a process technology, and what's more, it's radical if you've never been involved in model-based improvement before

> – *"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

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® 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®) and CMMI®

A few possibilities of changes in norms, beliefs, and values of key roles in a "typical" organization beginning CMMI®-based improvement…..

What will CMMI® mean to Managers/Practitioners

Focus of behavior changes for CMMI® Maturity Level 2:

- Commitment:
  - understanding who the stakeholders are and achieving common understanding with them of the project's scope/requirements
  - moving from accepting changes without adequate impact analysis to negotiated changes based on impact ($,time)
- Control:
  - management moves from after-the-fact corrective action to measurement-focused, more proactive controls throughout the program
  - requirements are the fundamental basis for planning and control
  - risk management is explicitly used throughout the systems and software engineering disciplines

What will CMMI® mean to Managers/Practitioners-2

- Communication:
  - management focus moves from "communication is an extra step in the process" to "communication is vital to keeping the process going"
  - notion of stakeholders as the base for communication expands the scope of communication activities

Senior Managers

MORE....
- focus on requirements as the basis for planning and changes
- early information on risks and problems

LESS....
- firefighting
- making commitments without adequate impact analysis
- rewarding of firefighting vs. fire prevention behaviors

Resulting in....
- fewer letters/phone calls from unsatisfied external customers on systems issues I.e. fewer product quality complaints.
- less shipping of engineers to the field "until the problems are solved"
- more visibility into ability to meet system schedules and budgets I.e. forecasting and estimation.

Program Managers

MORE...

- involvement in understanding system and software requirements and their impact on the system
- routine visibility into project progress
- visibility into subsystem subcontracts
- insight into subsystem subcontractor risks

LESS/FEWER....

- large, unmanageable tasks
- reason or ability to make un-negotiated commitments
- accepting requirements changes without adequate impact analysis

Functional Managers

MORE...

- requirements-based planning
- information available
- communication about potential problems EARLY
- focus on negotiating change, rather than accepting all proposed changes without impact analysis
- focus on consistent inclusion of stakeholders throughout proposals
- scheduled communication of progress and result reporting throughout the project
- training in project management
- knowledge about "how things work" available to engineers

Functional Managers-2

LESS/FEWER....

- firefighting
- willingness to accept commitments that are known(because of data!!!!) to be impossible to meet
- reliance on "single point failures"
- reliance on large, undifferentiated WBS' as management focus
- daily "corrective action" meetings late in the project (firefighting)
- reliance on primarily intuition-based management practices

Practitioners

MORE....
- requirements-based estimation
- information available earlier
- opportunity to surface potential problems early
- focus on negotiating change, rather than accepting all proposed changes without impact analysis
- information on "how to get things done" in a consistent fashion

LESS/FEWER....
- Overtime/working weekends
- reliance on intuition for engineering estimates
- demand to accept commitments that are known(because of data!!!!) to be impossible to meet
- reward for fixing problems late that should have been surfaced early!
- daily "corrective action" meetings late in the project

Support Groups

Human Resources:
- better trained work force
- higher morale in work force

Marketing:
- better estimates of product costs -- not necessarily "cheaper", but more accurate!

Contracts/Subcontracts:
- better criteria for selecting subsystem subcontractors
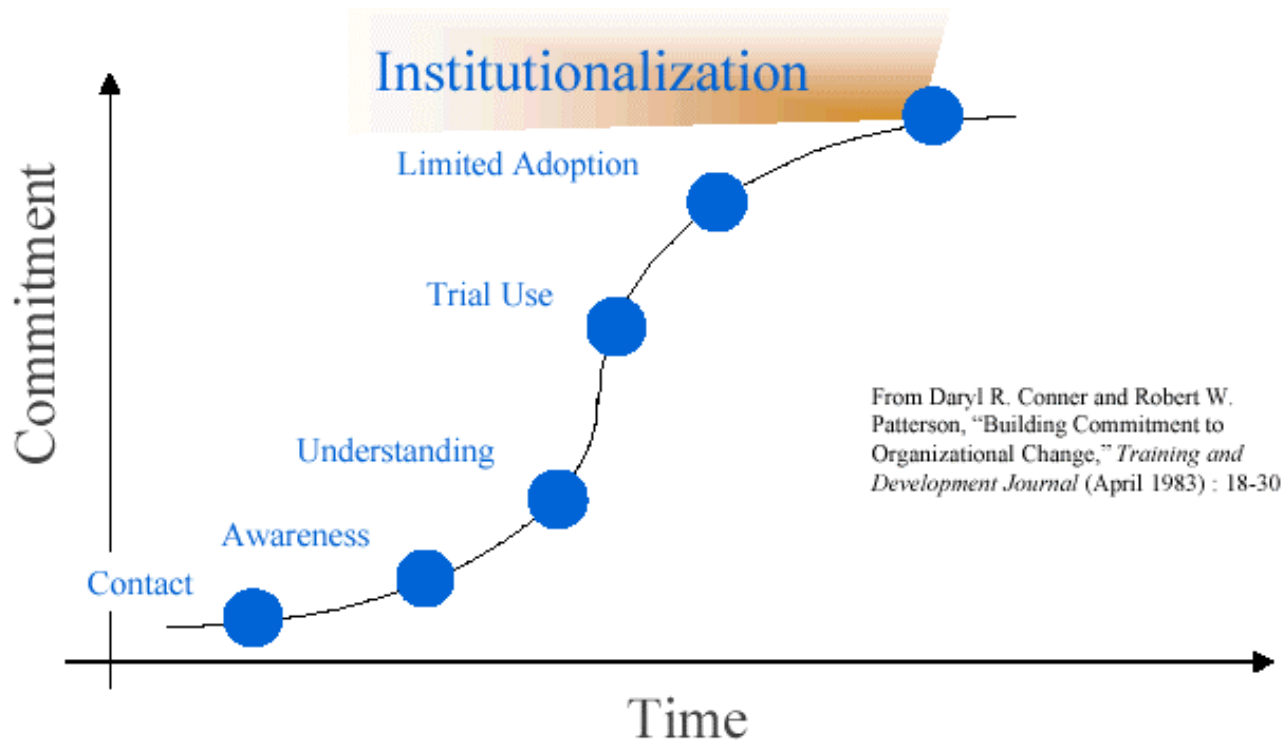- more insight into risks with subsystem subcontractors

But getting there means CHANGING!

...and we know how easy THAT is!

From the Change Agent's Viewpoint

Institutionalization

Limited Adoption

Trial Use

Understanding

Awareness

Contact

Commitment

Time

From Daryl R. Conner and Robert W. Patterson, "Building Commitment to Organizational Change," *Training and Development Journal* (April 1983) : 18-30

From the Users' Viewpoint

From the Executive's Viewpoint

New technologies
- are hard to select efficiently/effectively
- are hard to deploy efficiently/effectively
- are (too) soon replaced by even newer technologies
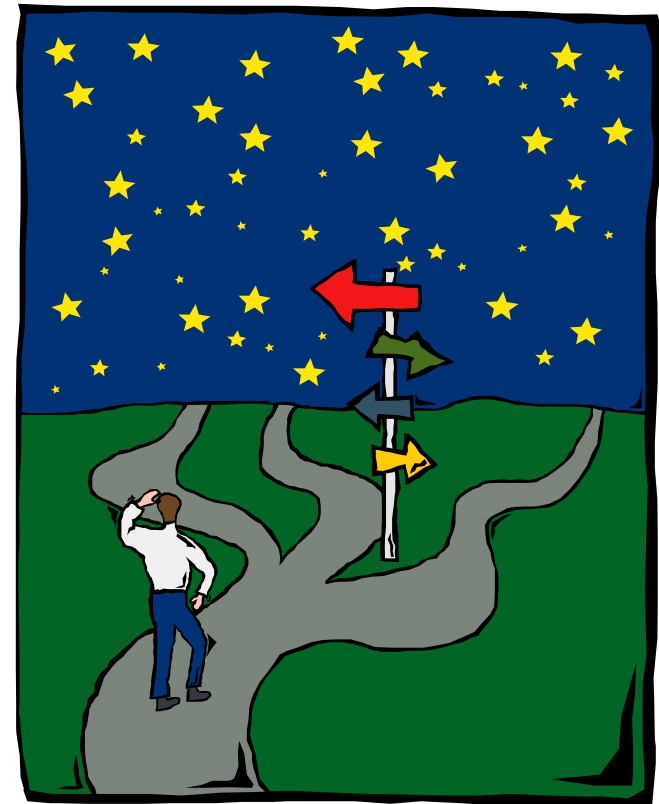
Role of TTP with CMMI®

Work with CMMI® team to monitor/refine CMMI® transition strategy

Apply TTP practices and techniques to enabling and monitoring CMMI® transition:

- Multiple instances of "what works, what's needed" workshops have been facilitated by TTP and those trained by TTP
- "Are You Prepared for CMMI®?" Crosstalk article/conference tutorial to help build awareness of techniques to facilitate transition to/adoption of CMMI®
- TTP is piloting selected transition practices from TRAIL (TTP's framework for transition management practices) with an Army Systems Engineering Division
    - Transition from SW-CMM® to CMMI®
    - Expanding improvement effort to include systems engineering and other SED stakeholders

Why a special framework for transitioning to a new technology?

Even though many organizations are using IDEAL®-based practices, we still see many of these problems in the field:

Poor fit between maturity of the technology and characteristics of the adopters

- Important issue for CMMI®

Insufficient/inappropriate support mechanisms defined and/or implemented

- Will pay special attention to this in this tutorial

"Train it and they will adopt" mentality

- Too often training is seen as the only support mechanism needed to achieve adoption

Insufficient transition agent skills/knowledge

- The range of skills/knowledge needed by transition agents is broader than most people think

TRAIL is one way (not the only one) to implement IDEAL® practices

A Framework for Technology Transition Success – TRAIL

Overall Goals of the Framework

- effective, timely adoption of technology
  - as defined by developer
  - as defined by acquirer
  - as defined by deployer
  - as defined by adopter

Other Objectives

- improve understanding of technology transition management
  - as defined by a transition community
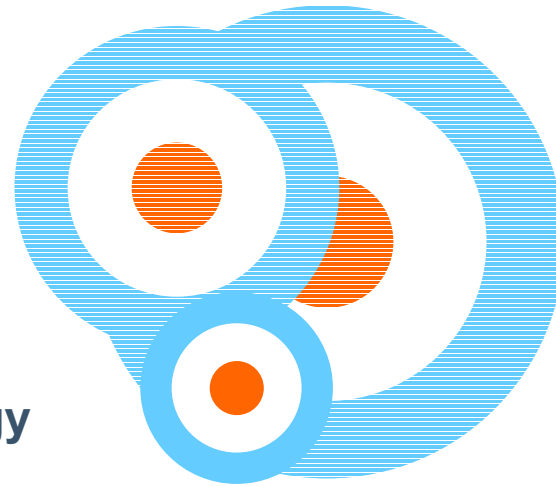
Key Elements in Successful Transition

- 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*
- 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?
- 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 in the adopting organization
- Identifying and mitigating the different types of risks identified as part of understanding all the above

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Concepts that Apply to Any Technology Transition

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!

Concepts that Apply to Any Technology Transition-2

- There are both different "levels of diffusion" --breadth of technology acceptance, and "levels of use (or infusion)" -- 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

The rest of this section will focus on relieving some of these issues.

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?

Understanding Your Audience for the Transition

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!
Where are you with regard to major process changes?

Innovators

Early Adopters

Early Majority

Late Majority

Laggards
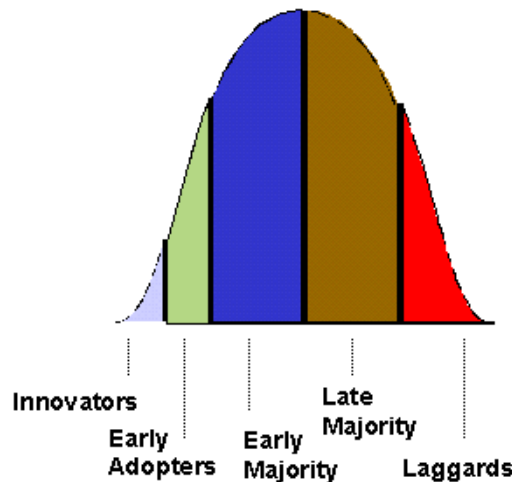
Source: Rogers, Everett. *Diffusion of Innovation,* 1995.

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

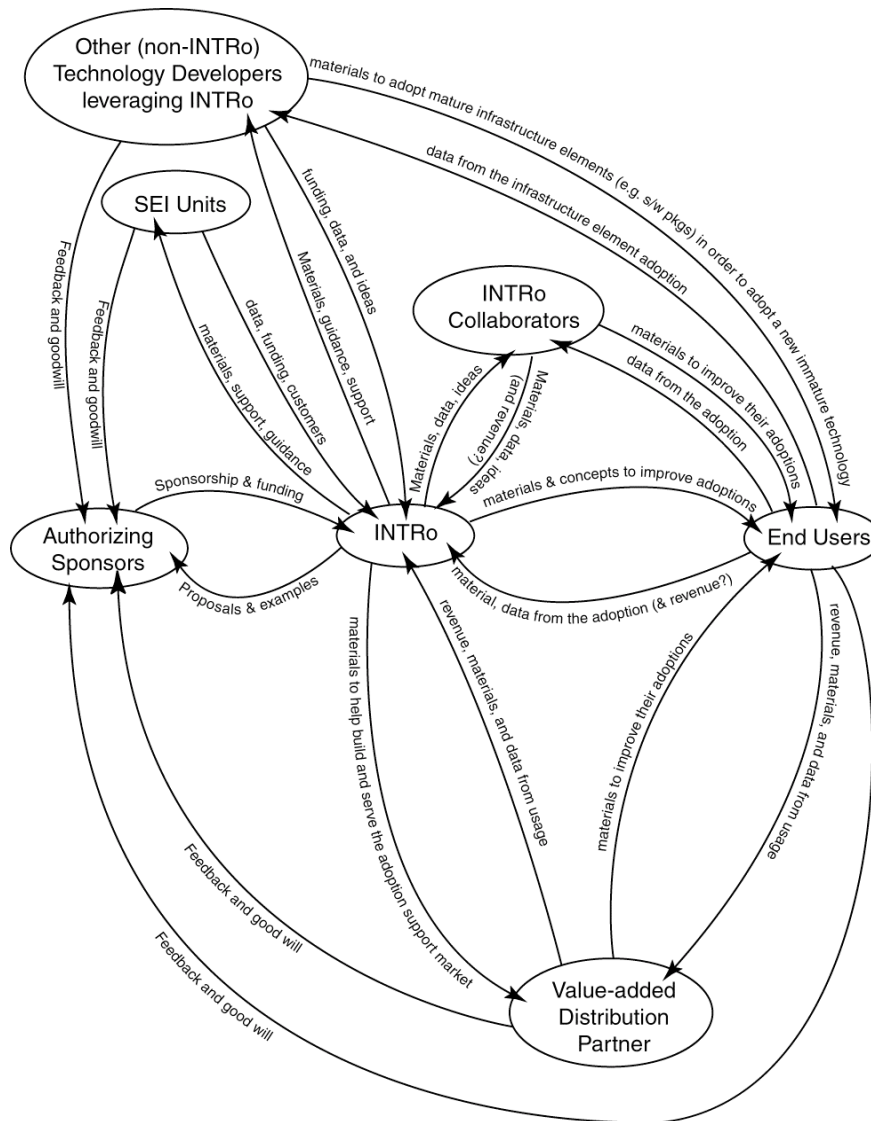Like pre-assembled packages with everything bundled

Laggards

"Nay sayers"

Adopt only after technology is not recognizable as separate entity

Constantly point at discrepancies between what was promised and what is

Beyond Understanding Adopter Categories

Value Networks are a way to start looking at the exchanges that need to occur between different roles within a "marketplace"

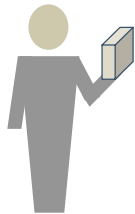- Example: a value network for INTRo, an SEI technology

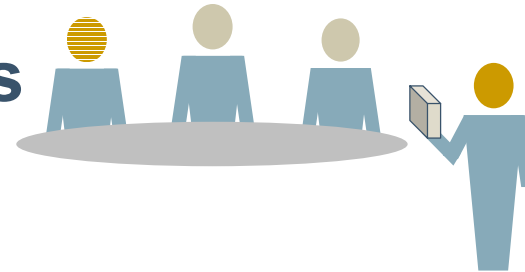# Adopters Aren't the Only Roles with Different Issues

- **Technology Developer**

- **Technology Acquirer**

- *Technology Deployer—transition agents*

- *Technology Adopter*

- **Transition Communities**

Key Roles in Technology Transition-1

Technology developers: those who create new technologies for use by specific or general populations.

- Examples of technology developers include SEI initiatives, DoD S&T organizations, or commercial product innovation teams.

Technology acquirers: those who determine which technologies will be used to support their own system development efforts.

- Examples of technology acquirers include individual acquisition program offices and corporate business units.

Key Roles in Technology Transition-2

Technology deployers: the organization or individual facilitating the adoption of one or more technologies into a particular context

- Examples of technology deployers include SEI Transition Partners and military organizations like STSC who are mandated to support technology adoption for particular communities.

- *Transition agents* are deployers who (generally) are interested in deploying more than one technology into more than one context – their specialty is transition issues as much or more than the technologies themselves

Key Roles in Technology Transition-3

Technology adopters: the organization or group who will actually be using a new technology.

- Examples include warfighter units in the military, manufacturing personnel using new tooling, or an organization adopting a new maturity model.

Transition community: a mix of developers, deployers, acquirers, and/or adopters who have a common interest in moving a particular technology forward in its maturation and/or adoption.

- Examples of these communities include a geographic region interested in CMMI® adoption, or an interest group within a particular technology area (eg information security) who are attempting large-scale adoption of a particular technology quickly and effectively across their defined community.

# Understanding Some Major Shifts During Transition
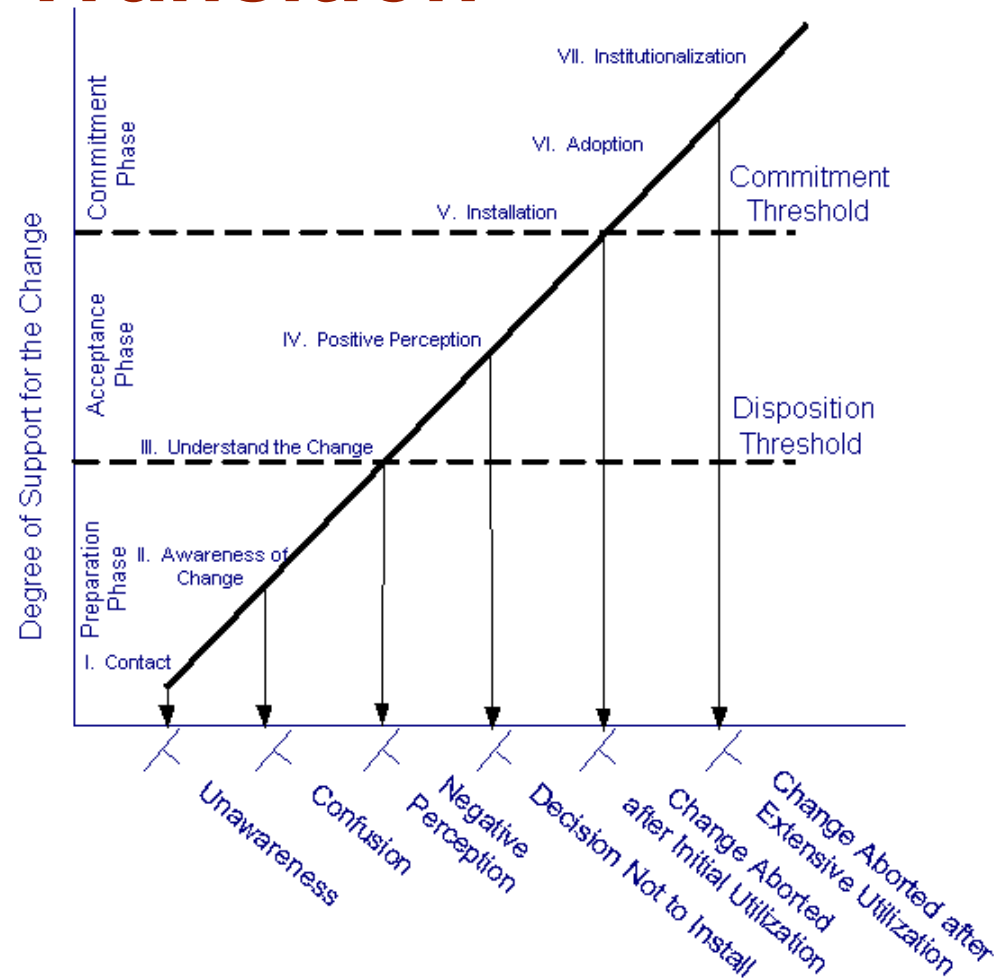
Source: Patterson & Conner, "Building Commitment to Organizational Change", 1982.

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?
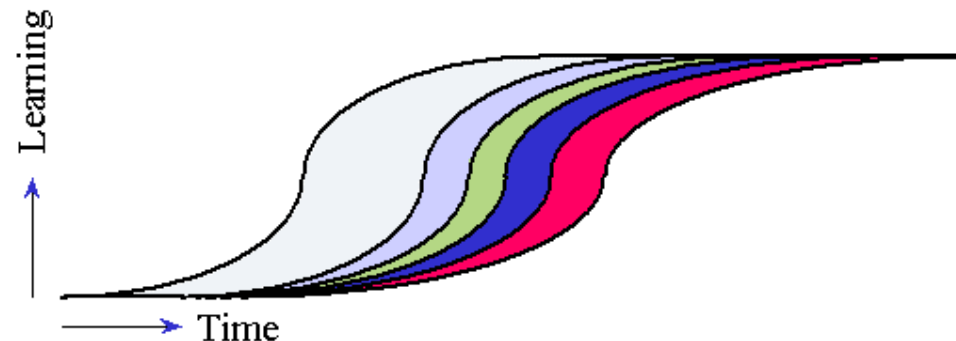
Enabling Movement From One Stage to Another through Transition Mechanisms

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 (i.e. the CMMI® 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

Question 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, i.e. 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® 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® data

Grandfathering vs.. cutover policy

Continuous improvement to adoption artifacts (guides, etc.)

Adoption Progress Measurement

You can use the concept of phased transition mechanisms to help build a "profile" of adoption progress…

- Define the key events that constitute evidence of movement from one state to another
- Create measures that allow you to know when those events have occurred
- Gather and chart the measurements

Example that follows provides "notional" profiles as an organization progresses through a technology adoption
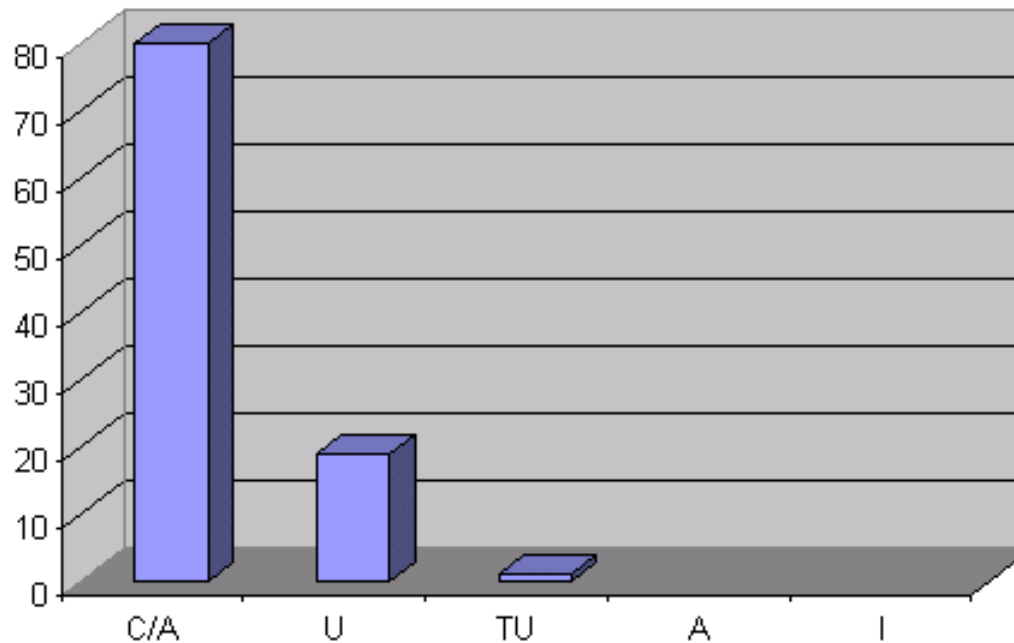
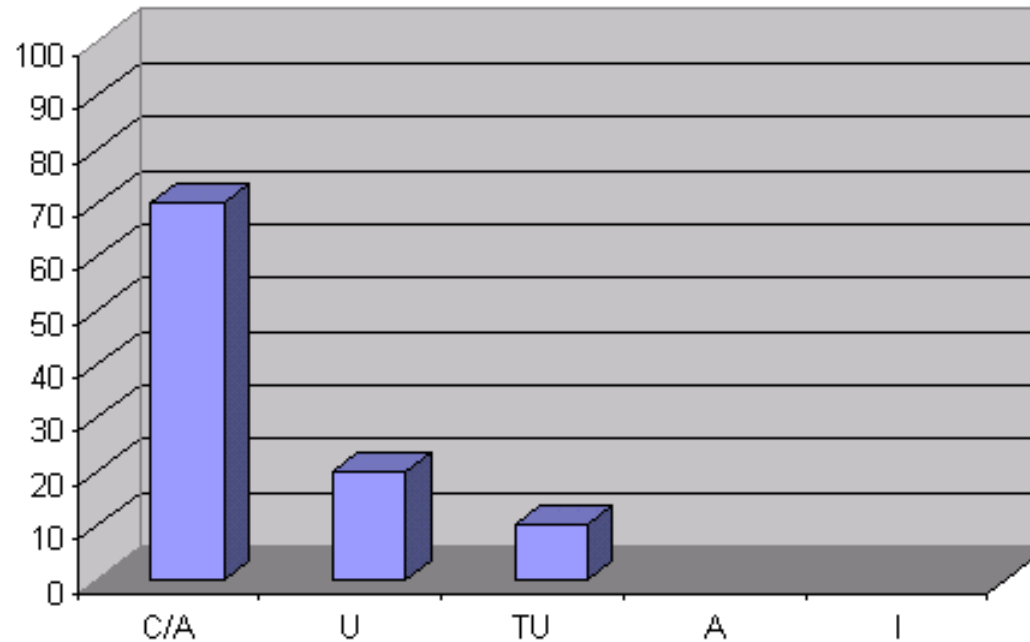# Measuring Diffusion of Process Improvements
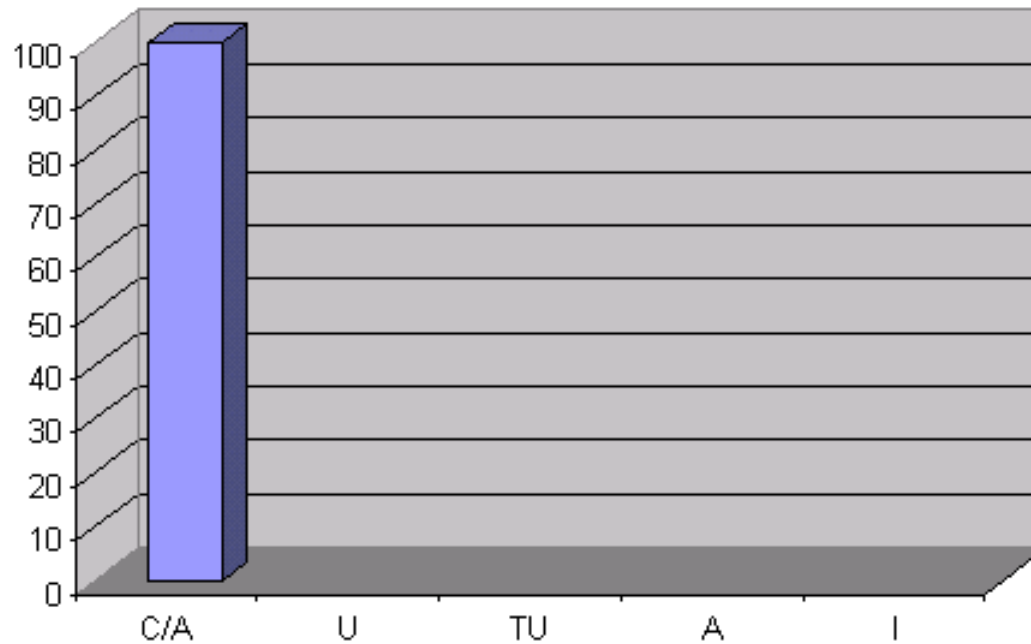
After the PI kickoff
meeting…

Getting Awareness/Education Started…
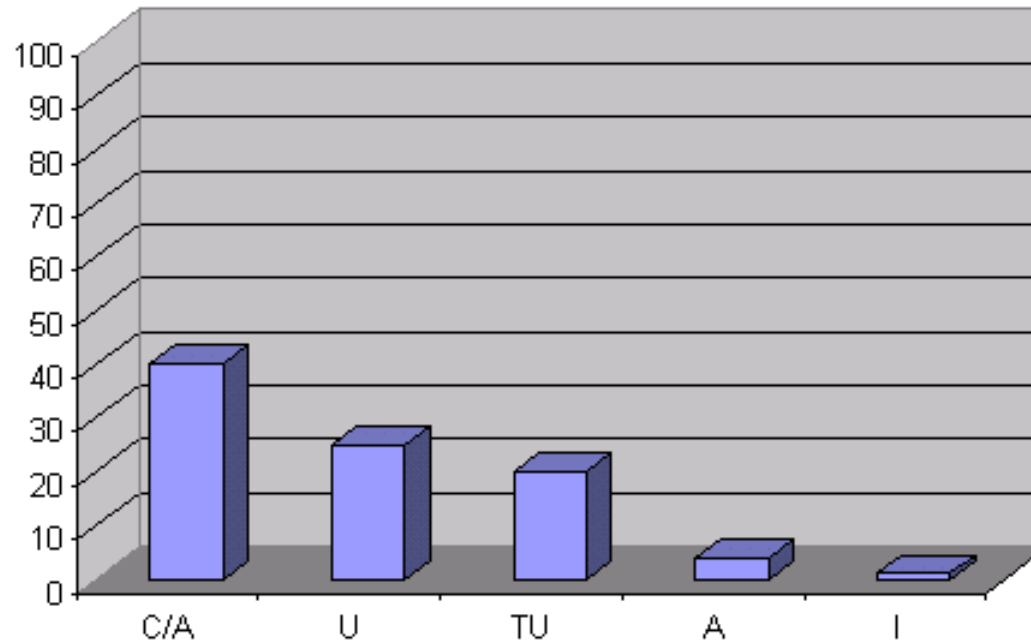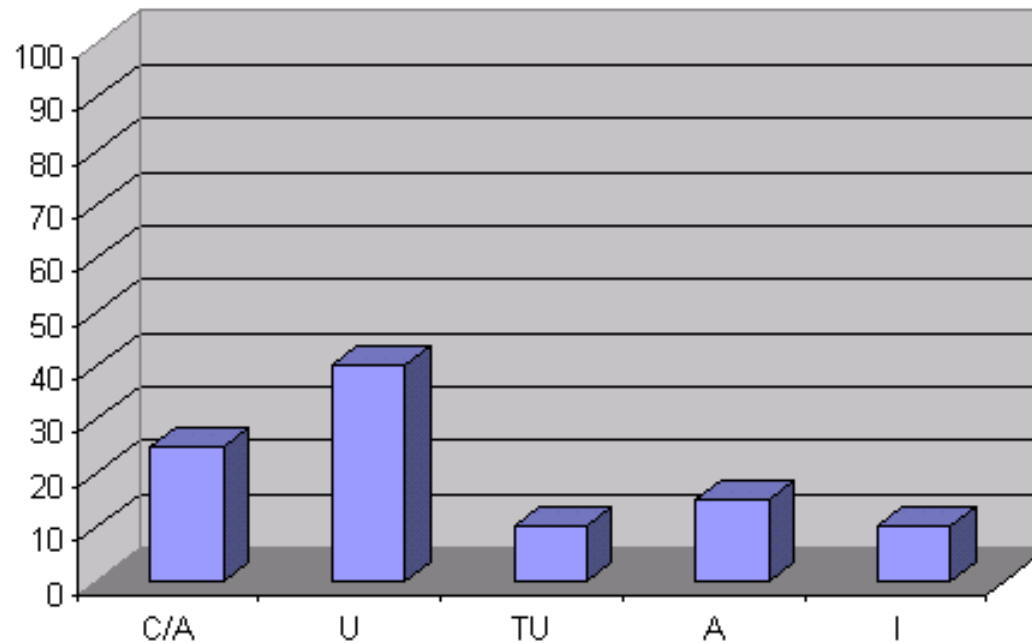
Starting to work with pilots…..

Moving out beyond the pilots…
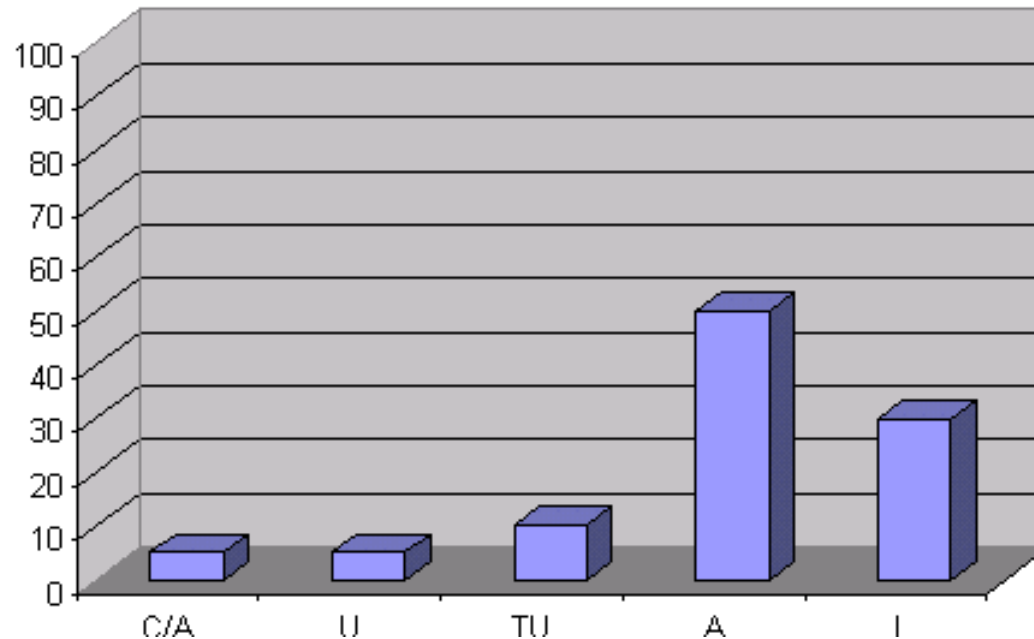
Starting to see institutionalization…

![Carnegie Mellon Software Engineering Institute logo]

Moving into widespread use…

Widespread institutionalization
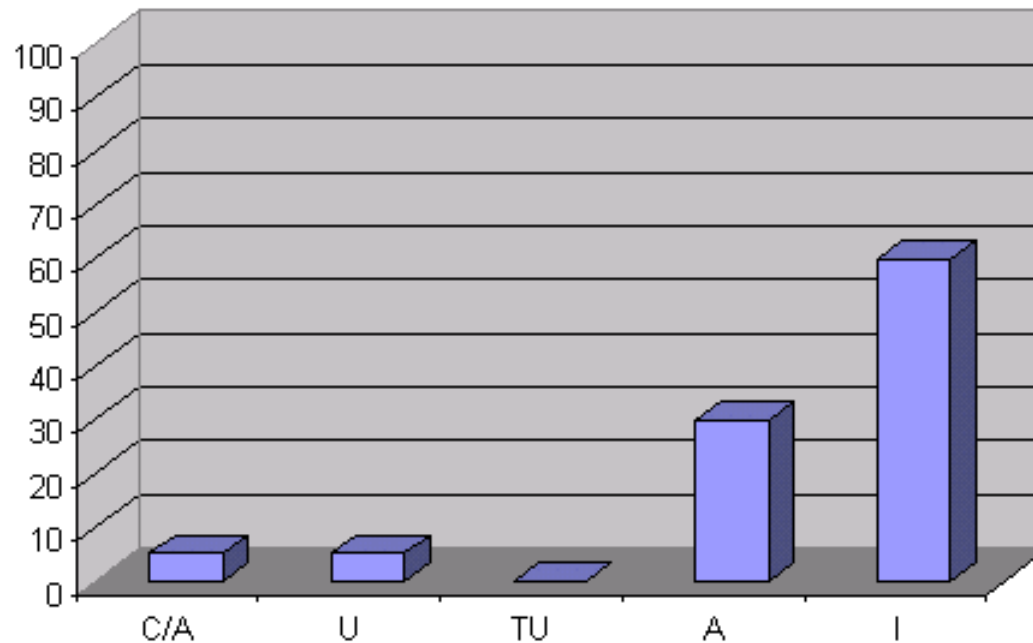
The "new" improvement is now the status quo!

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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 "EPG" 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 your desired/needed pace of transition
  - Use adoption progress measurement to track
- Understand what you can leverage from previous efforts
  - We'll do an exercise to get you thinking about this!

L Learning
& Adjusting

I Implementation
& Monitoring

A Adaptation
& Planning

R Readiness
& Fit Determination

T Transition
Management Startup

•**TRAIL can provide you with ideas on practices/techniques to use to develop and implement your strategy**

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TRAIL
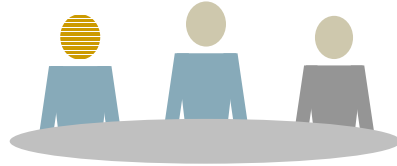
Goals for Transition Management Startup

- **Problem that proposed technology is meant to solve is understood**

- **Common transition issues are understood**

- **Scope & goals for the transition are defined**

- **Expectations for sponsorship are established**

- **Transition infrastructure needs are identified/ planned**

How would these apply to CMMI?

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T<u>R</u>AIL
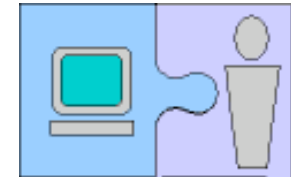
Goals for Readiness & Fit Determination

- "Maturity"/readiness of the technology is understood

- Related characteristics of the intended adopters are understood

- Initial adoption risk mitigation actions are defined

How would these apply to CMMI?

TR**A**IL

Goals for Adaptation & Planning
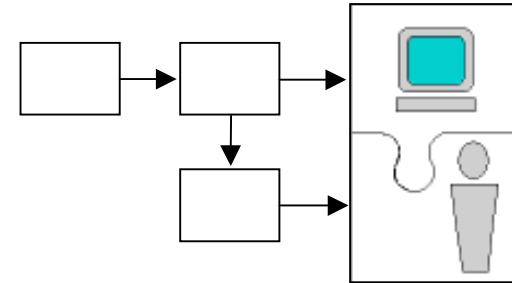
- **Changes needed for the technology & adoption contexts have been identified**

- **Transition plan and measures have been defined**

- **Transition mechanisms have been defined**

How would these apply to CMMI?

Carnegie Mellon
Software Engineering Institute

TRAIL

Goals for Implementation & Monitoring

- **Technology implementation events are defined**

- **Transition mechanisms are available for use in the implementation**

- **Technology is successfully implemented**

- **Progress of the implementation is understood**

How would these apply to CMMI?

TRAIL

Goals for Learning & Adjusting
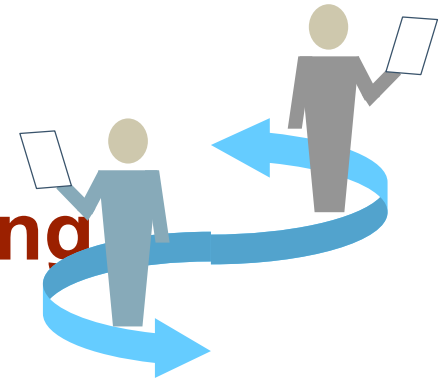
- Lessons learned from implementations
  have been shared with the relevant community

- Transition elements have been updated

How would these apply to CMMI?

Transition Management Startup for Organization Moving to CMMI®

Transition Management Startup Workshop

Commitment by sponsors to move forward with CMMI® Adoption

Transition infrastructure established
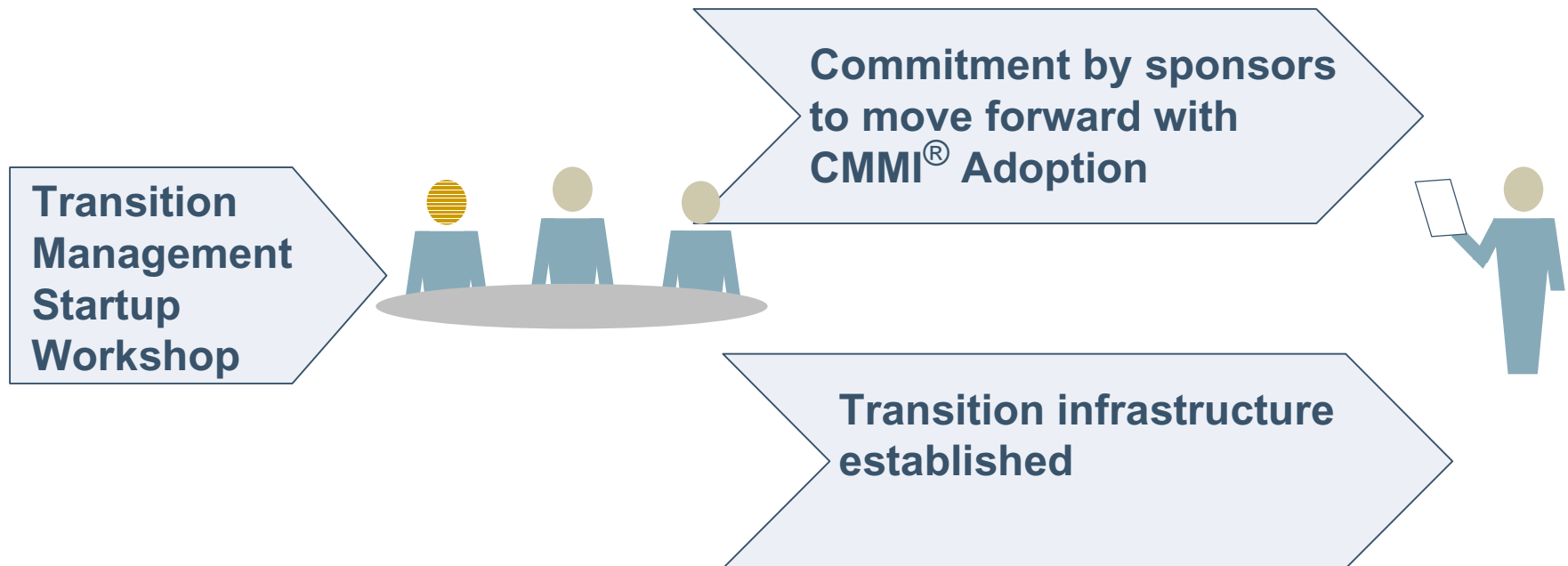
Readiness & Fit Determination for Organization

Planning/Readiness Analysis

- Organization Skills/ Knowledge Gaps
- Adoption Risk Areas Identified

Adaptation & Planning for Adopting Organization

Build Organizational Transition Plan

Build Transition Skills for Local Transition Agents

Organization Ready for CMMI Adoption

Develop Organizational Transition Mechanisms For CMMI
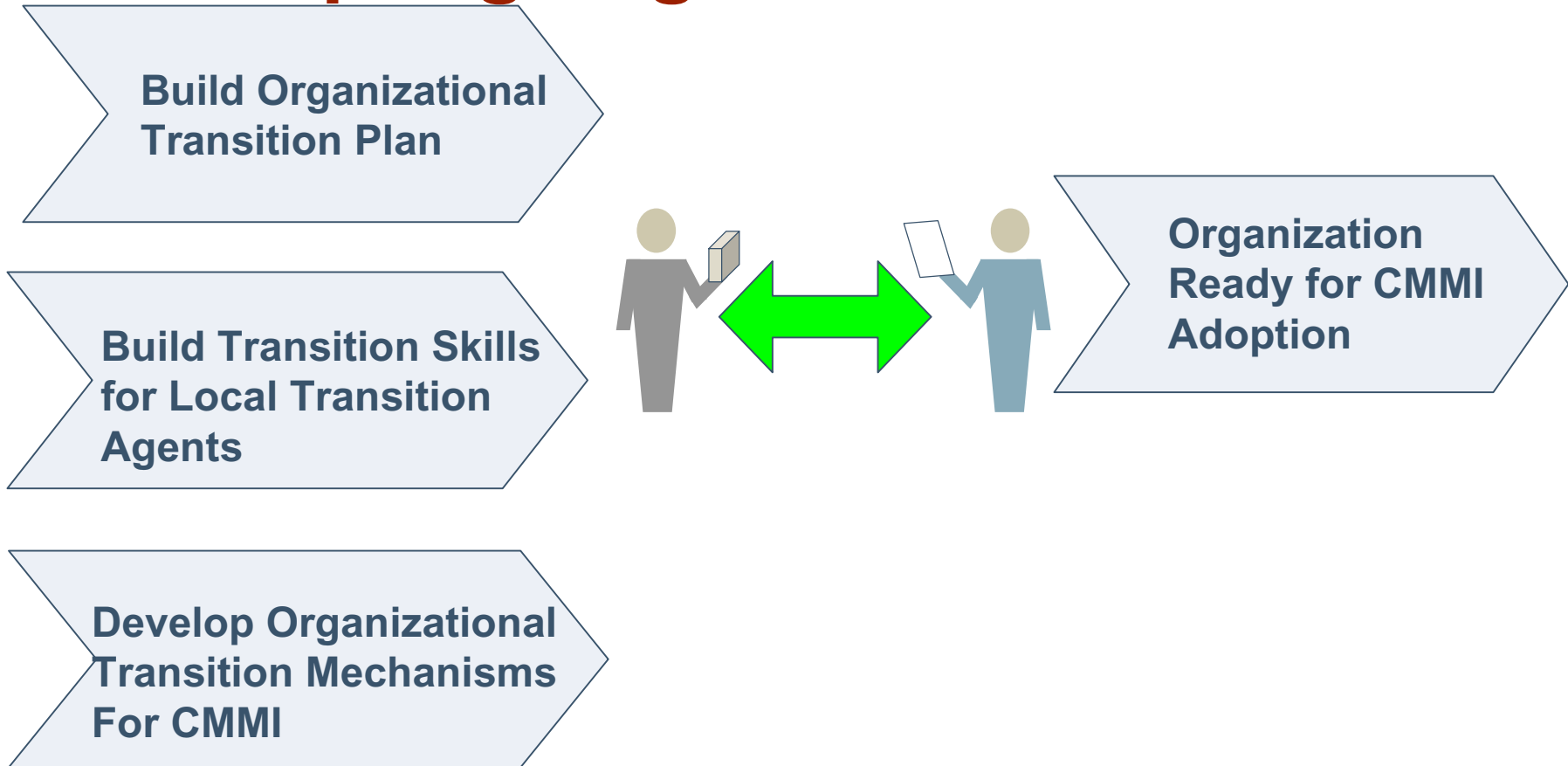
Implementation & Monitoring for Adopting Organization

CMMI® Implementation Planning & Training

CMMI Implementation & Monitoring

Transition Implementation Planning w/ Orgn

CMMI Training for Adopters

TTW-C Workshop

Organization Transition Checkup
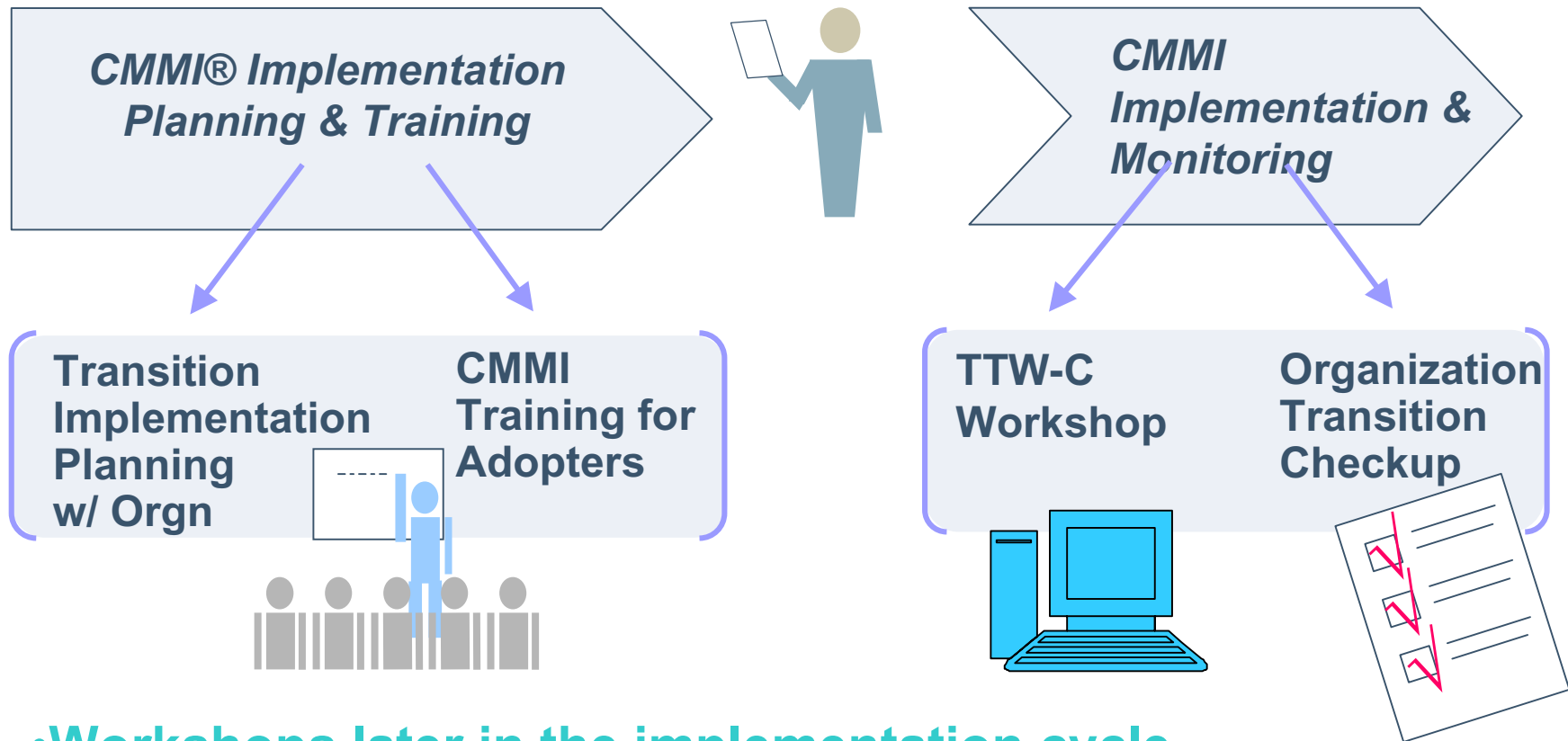
- Workshops later in the implementation cycle
- "Applying" transition agent skills to the implementation

Learning & Adjusting for Orgn

Transition Implementation Planning w/ Adopters

Technology Training for Adopters

TTWC Workshop

Community Transition Checkup

CMMI Implementation Monitoring

Share Lessons Learned
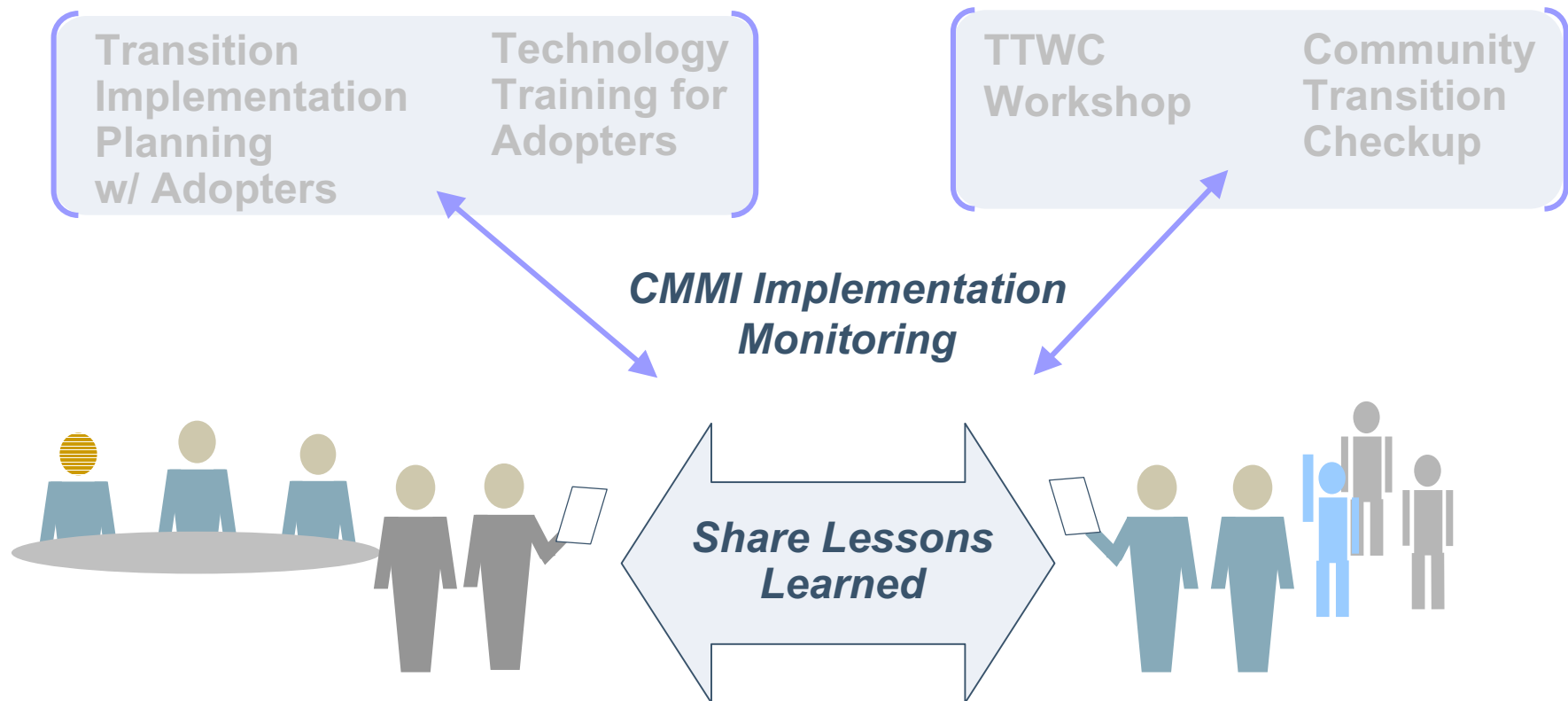
- **Using the transition infrastructure to keep things "fresh"**

Agenda

Introduction/Expectation Setting

Why TTP is Interested in CMMI® Transition

Seeing CMMI® as a Technology Transition

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Building a Transition Strategy for CMMI

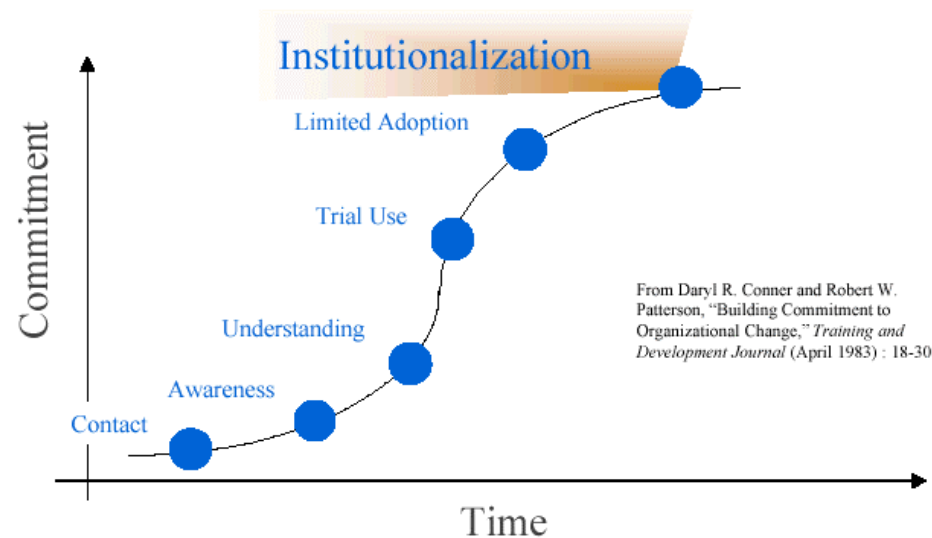*Analyzing Your Existing PI Infrastructure for Potential Reuse*

Summary/Where Will You Go From Here?

Stepping onto the TRAIL….

One of the activities in TRAIL is to define *transition mechanisms* for your technology—in this case, CMMI

- Transition mechanisms are a way of helping individuals and groups "move" successfully between the stages of commitment of the Patterson-Conner curve referred to in many SEI publications….
- 2 types: communication and implementation support

Institutionalization

Limited Adoption

Trial Use

Understanding

Awareness

Contact

Commitment

Time

From Daryl R. Conner and Robert W. Patterson, "Building Commitment to Organizational Change," *Training and Development Journal* (April 1983) : 18-30

Communication Mechanisms

Primarily focus on moving between Contact → Awareness, and
Awareness → Understanding

CMMI® Examples from 1st CMMI® Tech Transition Check 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 TTC 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)**

Miniature "What's Worked" Exercise

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 10 minutes listing mechanisms you might think about reusing for CMMI

Write any you think would be particularly useful to the group on a sticky note and post on the flip chart

After individual work, we'll look at the table and discuss its implications

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

Communication

Implementation

Rework	Minimal	Medium, but worth	Too much — not wor

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, however 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"
- Results of this analysis feed into "readiness/fit" and "adaptation/planning" stages of TRAIL

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Summary/Where Will You Go From Here?

Summary-1

Looking at CMMI® from a "TRAIL" viewpoint rather than a traditional PI viewpoint
- Is easier for some people
- Is compatible with most process improvement approaches, but looks at some elements differently

Watch the CMMI® and TTP websites for other ideas/techniques for supporting CMMI® implementation

Participate in the CMMI® User's Forum and other mechanisms provided by the SEI and provide feedback on "what's worked, what's needed" for YOUR CMMI® implementation context!

Summary-2

CMMI® is early in its maturation/transition life cycle. That means:

- those who adopt CMMI® will have to build most of the implementation mechanisms
- there is little "hard data" on successful/unsuccessful strategies for its use
- there is no "ROI" data that a CFO would find credible (yet!)

As an early adopter of CMMI, you need to be prepared to "fill in the gaps"

- understand and be prepared to invest in creating the transition mechanisms your organization will need to be successful
- there won't be as much reuse of SW-CMM® materials as you'd like or hope!

Summary-3

- build your internal case study from the beginning--what/how you did it
- put your baseline measurements in place from the beginning--so you can have your own ROI data sooner rather than later!
    - Basic data to collect if you don't already:
        - defects released to the field within 1st year of operation;
        - # of defects detected prior to release via review/testing;
        - total program schedule, effort, cost (planned vs. actual), plus total schedule, effort, cost for software subsystems and for systems engineering function
- Consider using TRAIL to help formulate, communicate, implement your CMMI transition strategy
    - Give us feedback on how it works – TRAIL is still in development!

Information Resources

The following resource list for CMMI® and systems engineering was compiled by Beth Gramoy of the Navy's SEPO/SPAWAR:

Web sites
- Software Engineering Institute (SEI)
  - http://www.sei.cmu.edu/sei-home.html or
  - http://www.sei.cmu.edu/cmmi/ for CMMI® specific info
- International Committee on Systems Engineering (INCOSE)
  - http://www.incose.org/
- Defense Systems Management College, Systems Engineering Management Department
  - http://www.dsmc.dsm.mil/educdept/se%5Fdept.htm
- NASA Systems Engineering
  - http://sed.gsfc.nasa.gov/V/vision.html

Information Resources-2

- NASA Software Engineering Lab
  - http://sel.gsfc.nasa.gov/
- MITRE Systems Engineering Process Office
  - http://www.mitre.org/resources/centers/sepo/
- Headquarters Standard Systems Group, located at Maxwell Air Force Base-Gunter Annex,
  - http://web1.ssg.gunter.af.mil/sep/SEP/menus/main.asp?.5456115580168115/
- DoD Software Information Clearinghouse, Defense Analysis Center
  - http://www.dacs.dtic.mil/

Documents
- Systems Engineering Fundamentals, Defense Systems Management College Press, Dec 99
  - http://www.dsmc.dsm.mil/educdept/se%5Fdept.htm#SE Fund

Information Resources-3

- Univ of Ariz & Sandia Lab: What is Systems Engineering
  - http://www.sie.arizona.edu/sysengr/whatis/index.html
- INCOSE Systems Engineering Journal
  - http://www3.interscience.wiley.com/cgi-bin/jtoc?ID=39084
- INCOSE Systems Engineering Handbook
  - http://www.incose.org/pubslist.html INCOSE Systems Engineering
- INCOSE Metrics Primer
  - http://www.incose.org/pubslist.html INCOSE Systems Engineering
- DoD Guide to Integrated Product and Process Development
  - http://www.acq.osd.mil/te/survey/table_of_contents.html
- NASA Systems Engineering Handbook
  - http://sed.gsfc.nasa.gov/R/Res-Guidelines.html

Information Resources-4

Tools
- INCOSE Tools Database working group
  - http://www.incose.org/tools/index.html
- SE Tool Surveys
  - Requirements Management Tools Survey
  - Systems Architecture Tools Survey
  - Measurement Tools Survey
  - Vendors who have responded to previous surveys
- SE Tool Databases
  - Tools Database by Name
  - Tools Database by Vendor
- SE Tools by Taxonomy
  - Tools Database by IMPIG Taxonomy
  - Tools Database by EIA-632 Taxonomy (tools categorized by EIA-632 requirement)
  - Tools Database by IEEE-1220 Taxonomy

Information Resources-5

- NASA Tool Inventory - Goddard Space Flight Center
    - http://joy.gsfc.nasa.gov/MSEE/mseehome.htm
Standards
- EIA-632 Processes for Engineering a System, Dec 1998
    - http://global.ihs.com/
- EIA/IS-731 Systems Engineering Capability Model, Dec 1998 (being phased out in favor of CMMI)
    - http://global.ihs.com/

Information Resources-6

- Capability Maturity Model Integration – Systems Engineering/Software Engineering, V1.02, 4 Dec 2000
  - http://www.sei.cmu.edu/cmmi/products/models.html
- IEEE 1220 Application and Management of the Systems Engineering Process, 1998
  - http://shop.ieee.org/store/HelpDesk/standards.as
- IEEE/EIA 12207 Software Life Cycle Processes
  - SSC San Diego PAL: http://sepo.spawar.navy.mil/sepo/Standards.html

Information Resources-7

- Bodies of Knowledge
  - Engineering Management Book of Knowledge (EMBOK)
    – IEEE Engineering Mgmt Society project
  - Project Management Institute (PMI) Management Book of Knowledge (PMBOK)
    – http://www.pmi.org/publictn/pmboktoc.htm
  - Guide to the Software Engineering Body of Knowledge (SWBOK)
    – http://www.SWEBOK.org/