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**Software Engineering Institute**

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Pittsburgh, PA 15213-3890

# **TransPlant<sup>SM</sup>**

**Introductory briefing for technologists**

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Pittsburgh, PA 15213-3890

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## **Desired Outcome for Session**

Raise awareness, begin to build understanding about TransPlant and its use for technologists

Consider the applicability of TransPlant in your environment



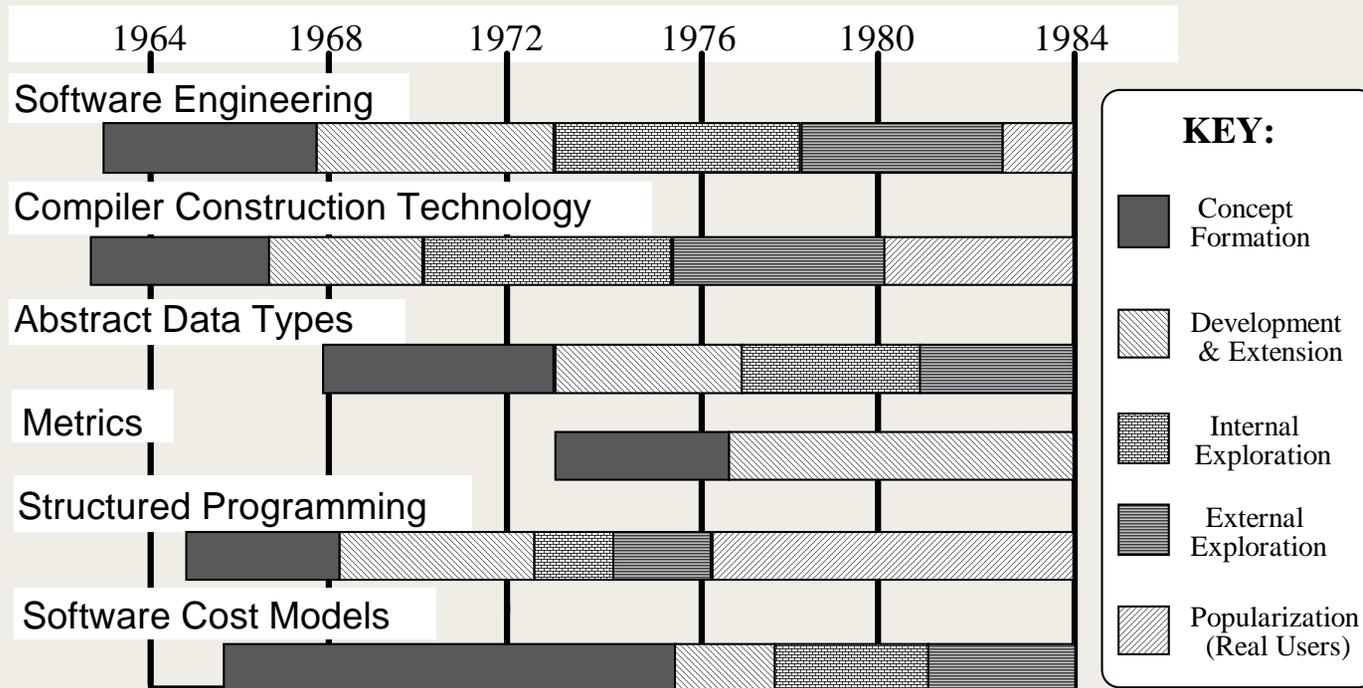
# The Problem

## Technology developers

- risk building a great technology and never seeing it put to use—or, are enamored of the “better mousetrap” fallacy
- will face impediments to getting their technology used that have little to do with the particular technology
- may struggle to find appropriate adopters and collaborators
- will need to find the right mechanisms to transition their technology to practice
- usually need to attract people with skills and resources beyond their own



# Technology maturation



Source: Redwine and Riddle

**15 ± 3 years is too long!**



## The Solution and its Benefits

A process that produces a transition plan that

- increases the likelihood of a technology getting into use
- identifies mechanisms to get over the barriers to getting a technology into use
- calls for actions to attract the right adopters and collaborators
- focuses the development team on the actions needed to reach transition goals

Our version of this solution: TransPlant<sup>SM</sup>





## **Expected Adopters**

Technology developers and deployers

Managers of technology developers

Marketing and strategic planning professionals who work with technology developers

Product managers

Managers and investors responsible for technology maturation, diffusion, or deployment



# What Is Technology?

“Any tool or technique, any physical equipment or method of doing or making, by which human capability is extended.”<sup>1</sup>

“The means or capacity to perform a particular activity.”<sup>2</sup>

<sup>1</sup> Donald A. Schon, *Technology and Change: The New Heraclitus*, 1967.

<sup>2</sup> William H. Gruber and Donald G. Marquis, Eds., *Factors in the Transfer of Technology*, 1965.



# What is Technology Transition?

*Technology transition* is the process of creating or maturing a technology, introducing it to its intended adopters, and facilitating its acceptance and use.

These words are all used to indicate transition activities:

- maturation
- introduction
- adoption
- insertion
- implementation
- dissemination
- diffusion
- transfer
- rollout
- deployment
- fielding
- technology change management



## What's the guiding theory?

Guiding principles from: Rogers, Tornatzky, Fichman and Kemerer, Leonard-Barton, Connors and Patterson, White, Leavitt, Moore...

Major discipline we borrow from: diffusion of innovation

But also, marketing, product management, organizational development, communications, rhetoric, social psychology, etc.



## **Why we need more than theory**

Technology transition is not a managed activity that yields predictable results.

The fields of diffusion of innovation and technology transfer are helpful but retrospective.

We design active processes to improve (though not ensure) successful transition.



## **The Assertion**

Occasionally, effective transition happens by luck and unconscious skill.

I prefer to rely on planning and management.

I assert that it is possible to plan and manage transitions, and to improve, though not yet predict results.

I think transition planning is amenable to training—even for researchers and hard-core ‘techies.’

Caveat: planning and managing transitions is an orderly attack on uncertainty. There is no algorithm. There is not even a heuristic.



## **What's so special about planning?**

It's what separates us from the beasts.

It is a reasoned response to uncertainty.

It gives us a basis for prediction and control.

It serves as an invitation to work together.

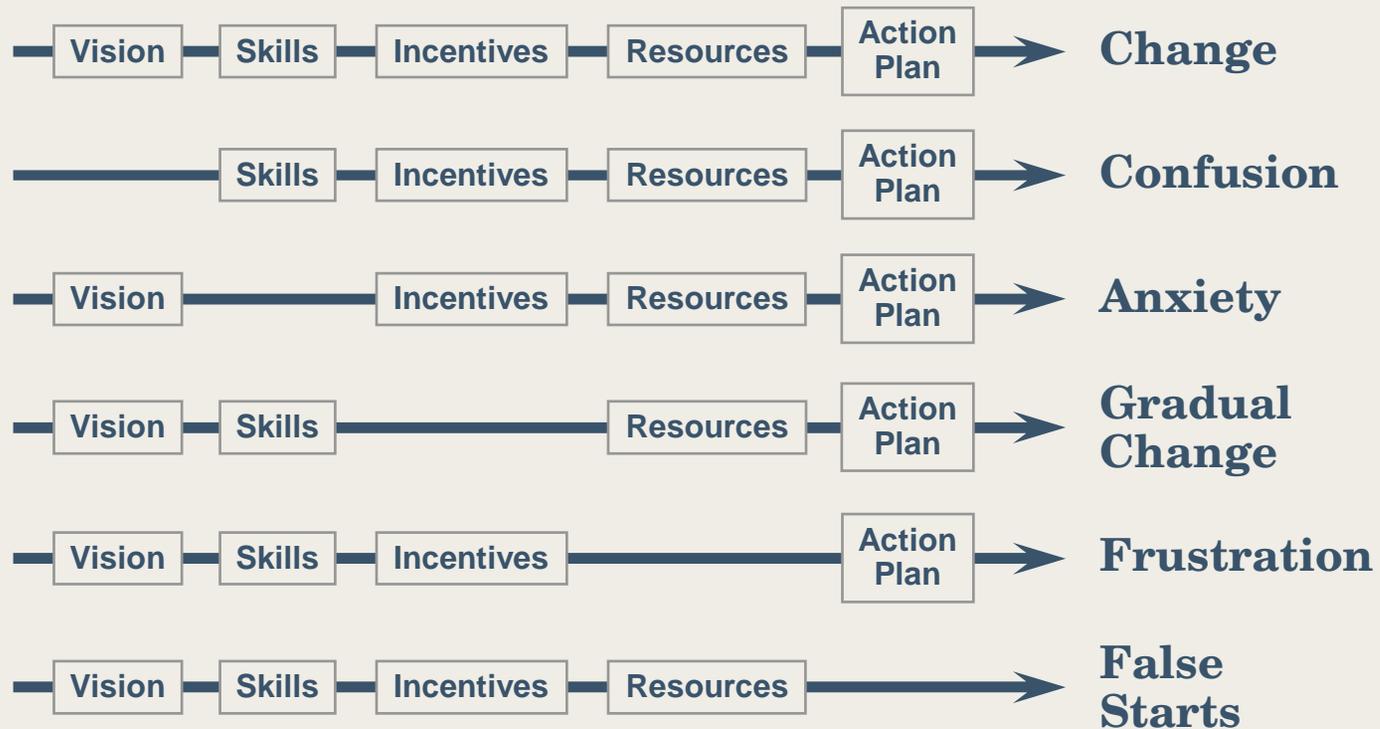
It represents an agreement about what we'll attempt.

It is a device for shared learning.

It gives us reversibility, economy, and flexibility.



## Effects of Missing Elements<sup>22</sup>



<sup>22</sup> Delores Ambrose, 1987. Personal communication. This model originally came from the Enterprise Corporation, a consulting firm no longer in existence.



## **Some cautionary advice**

Don't "overengineer."

Also keep in mind what Collins and Porras discovered:  
"Visionary companies make some of their best moves by experimentation, trial and error, opportunism, and--quite literally--accident."

Think of your planning as spiral development: a risk-based discovery of your requirements and iterative delivery of partial solutions to partial requirements.



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# Features of Effective Transition Planning

Precision about the problem, clarity about the solution

Transition goals & a strategy to achieve them

Definition of all adopters and stakeholders and deliberate design of interactions among them

Complete set of transition mechanisms—a whole product

Risk management

Either a documented plan or extraordinary leadership throughout transition



# Typical TransPlant Outputs

Problem statement, solution description, elevator speech

Transition strategy

Value network

Adopter descriptions, with priority decisions

Marketing guidance

Whole product design, complete set of transition mechanisms

Risks and mitigations

Documented plan



## Process Summary

1. Define problem, solution, and scope
2. Decide on transition strategy
3. Characterize adopters
4. Define whole products and commitment process to identify mechanisms
5. Design desired state; synthesize and select
6. Prepare to manage risk
7. Document the plan



## Contributors

TransPlant represents a synthesis of experience and research at the SEI, including efforts of Eileen Forrester, Mary Merrill, Betty Deimel, Priscilla Fowler, Linda Levine, Lynn Carter, and John Goodenough.

It also draws upon the work of researchers and practitioners from a range of disciplines and organizations (bibliography is available).

Most important, TransPlant has been greatly enhanced by our adopters, especially our innovators and early adopters: Jim Over, Tricia Oberndorf, Chris Alberts, Audrey Dorofee, Linda Pesante, Julia Allen, Barbara Laswell, and Carol Sledge.



## Summary of Lessons Learned

This process is useful, given

- a knowledgeable facilitator or coach
- scoping
- sponsorship or compelling driver
- right investment of time
- right people with the right skills present at right time

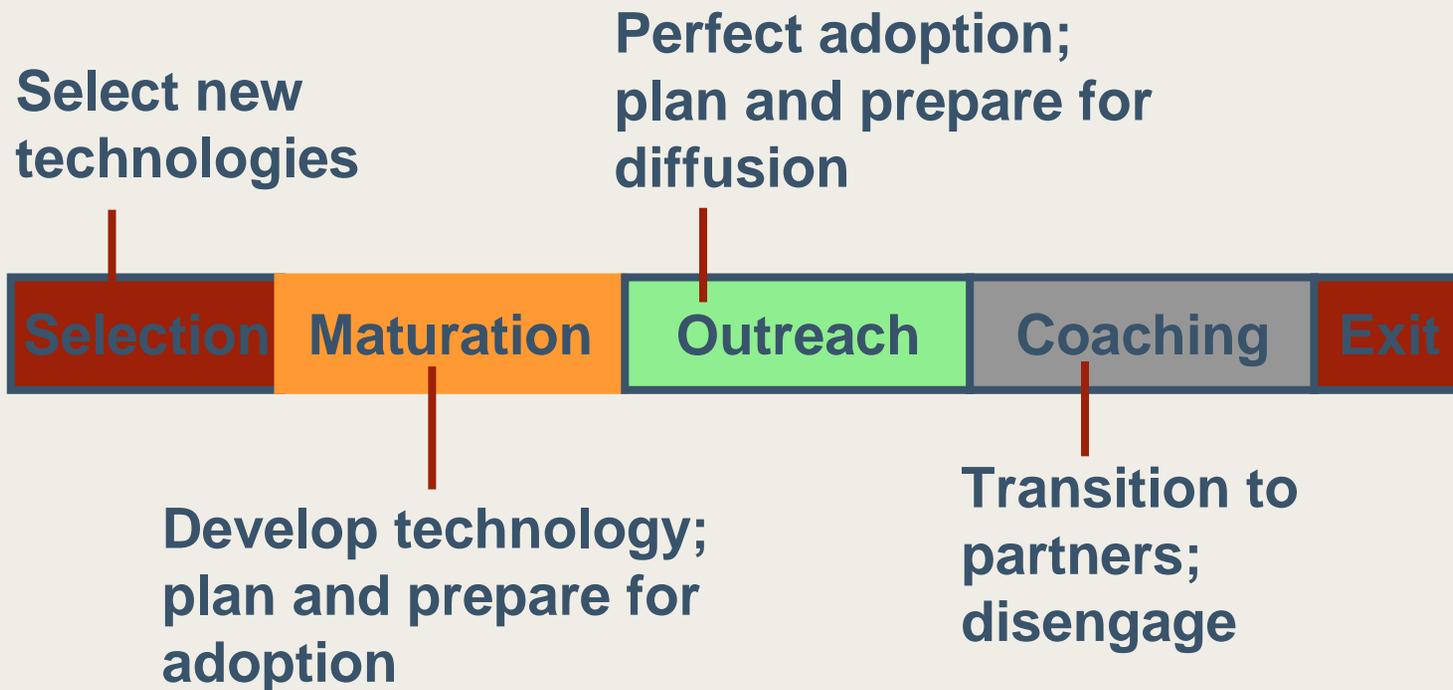
TransPlant has been especially helpful in

- clarifying what maturation actions may still be needed
- identifying whole product needs and likely collaborators
- enhancing communication between technology marketers and developers
- improving partnering, licensing, and business development

TransPlant is an immature technology. Pilots at the SEI and elsewhere have proven useful.



# How the SEI Transitions its Innovations





# Maturation/Transition Stages

Exploratory: establish an Initiative?

- analyze problem
- determine technical direction and collaborators

Maturation: maturing the technology

- establish technical credibility
- demonstrate value
- demonstrate transitionability

Outreach: achieving broad transition

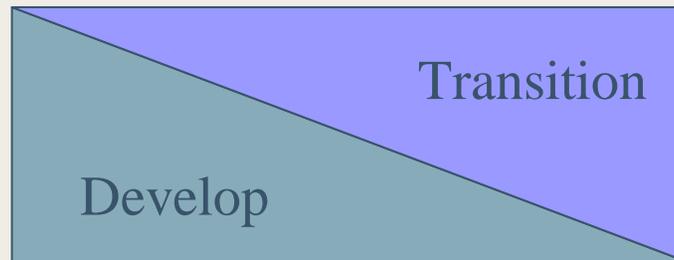
- establish whole product
- penetrate early majority

Support: self-sustaining transition



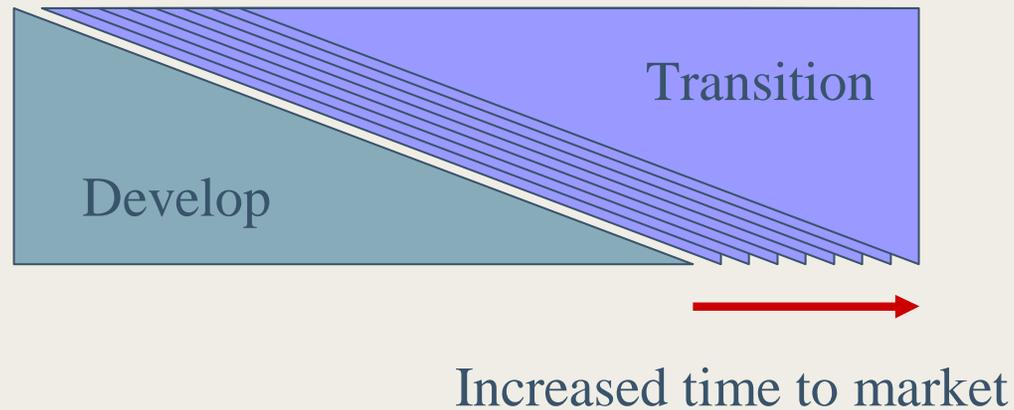
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# Technology Maturity





# Technology Maturity





## Applying the Process

We apply TransPlant in several modes. Some of them are Hands-on, all parties present, all work of the process done together in working sessions. Suitable for

- extroverts
- immature technology
- missing planning skills

Hands-off, coaching only as needed. Suitable for

- impatience with long, regular meetings
- mature technology or well-understood path
- good planning skills

Workshop approach (3-4 days). Suitable for

- mature technology or groundbreaking
- high-performing team
- desire to get a plan fast
- participants knowledgeable about transition concepts



## How long does it take?

Usual length has been 6-12 months

Possible in three-four days with good advance work

Current median instance (between hands-on and hands-off) is six months. This has meant

- some core and some occasional participants
- 90-minute meeting every 7-14 days
- about two meetings per step, with an additional all-day meeting on mechanisms and strategy
- offline work on outputs
- strong technology team leader and sponsorship
- advance prep for meetings
- two participants experienced in TransPlant



## **What TransPlant Can't Do**

Make up for a technology that is not ready, not right, etc.

Effect transition in itself—TransPlant produces a plan, not execution of that plan.

Make up for technologists or deployers who don't have the requisite skills, interest, support, teaming environment, etc.



# What Makes a Successful TransPlant?

Skilled facilitation.

Technology team with the right preparation, skills, time, and attitude.

Valuable technology.



## **Is this rocket science?**

Nope.

TransPlant has elements of strategic, communication, product, and marketing planning—but not complete coverage.

No algorithm. Lots of judgment.



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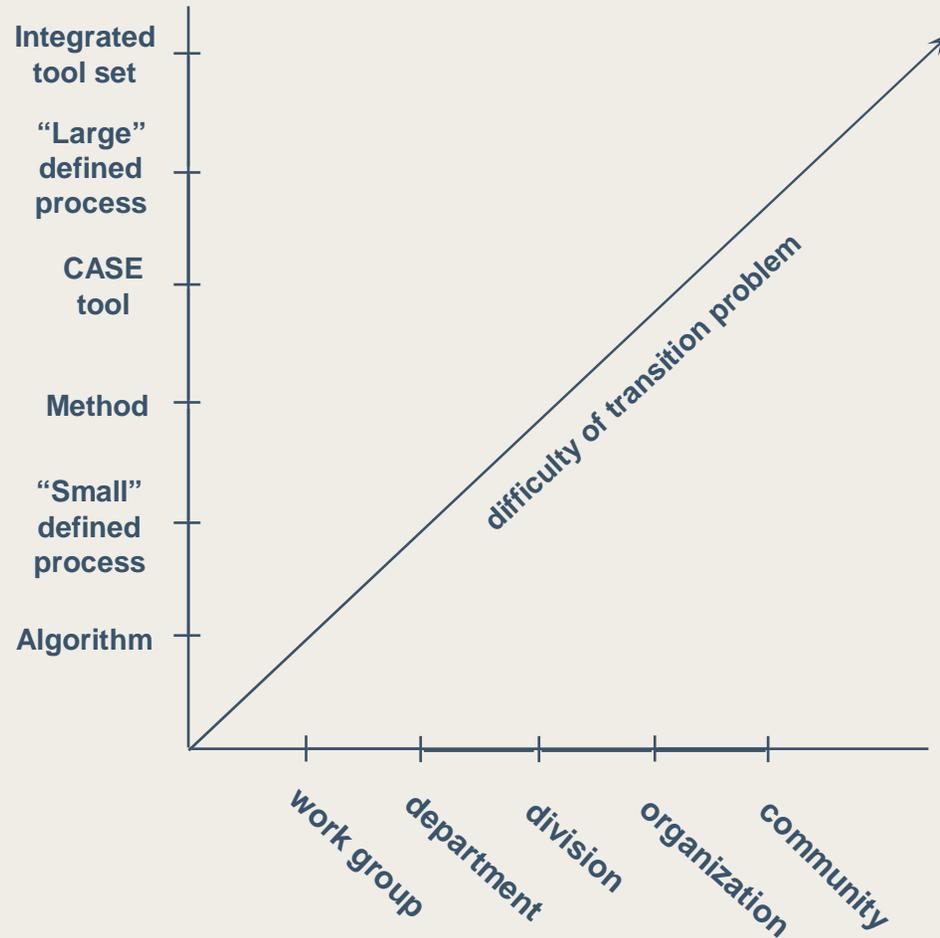
## Discussion

At this point, we can discuss your technologies, your situation, and the likely applicability and tailoring of TransPlant for you.

If we cover that, the slides that follow have some conceptual information about transition problems plus information on some common outputs from TransPlant.



## Technology Introduction Degree of Difficulty





# How individuals perceive innovations

1. relative advantage
2. compatibility
3. complexity
4. trialability
5. observability

\* adapted from E. Rogers, *Diffusion of Innovations*, 1995



# **Factors affecting critical mass of adopters**

- 1. prior technology drag**
- 2. irreversibility of investments**
- 3. sponsorship**
- 4. expectations**

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



## **Elevator Speech**

Marketing communication device adapted to definition of problem, solution, key adopters, key benefits

Features of effective speeches:

- brief, with short, declarative sentences
- focus is on compelling reason to buy, must-have value proposition
- distinguishes technology from competition
- multiple versions for different uses
- adaptable
- immediately useful



## **Early-Majority Must-Have Reason to Buy**

“Technology X radically improves productivity on a well-understood critical success factor specific to your business, and there is no existing means by which you can achieve a comparable result.”

To be credible

- must demonstrate familiarity with the business
- must demonstrate that product integrates cleanly with existing systems
- must create realistic alternatives to compare with



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# Elevator Speech Template

For (name the target adopter):

Who (statement of need or opportunity):

The (technology name) is a(n) (category):

That (statement of key benefit—that is, compelling reason to buy):

Unlike (primary competitive alternative):

(Technology) (statement of primary differentiation):



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## **Elevator Speech Example**

**For** software-intensive systems organizations

**Who** are concerned about cost & schedule overruns or unhappy stakeholders.

**The** Capability Maturity Model (CMM®) Integration<sup>SM</sup> is a process improvement method

**That** provides a set of industry-recognized practices to address productivity, performance, costs and stakeholder satisfaction in the software-intensive systems development process.

**Unlike** single-discipline or stove-pipe models that can result in confusion and higher costs when implemented together

**CMMI** provides a consistent, enduring framework for enterprise-wide process improvement and can accommodate new initiatives as future needs are identified.



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## Strategy: Dimensions

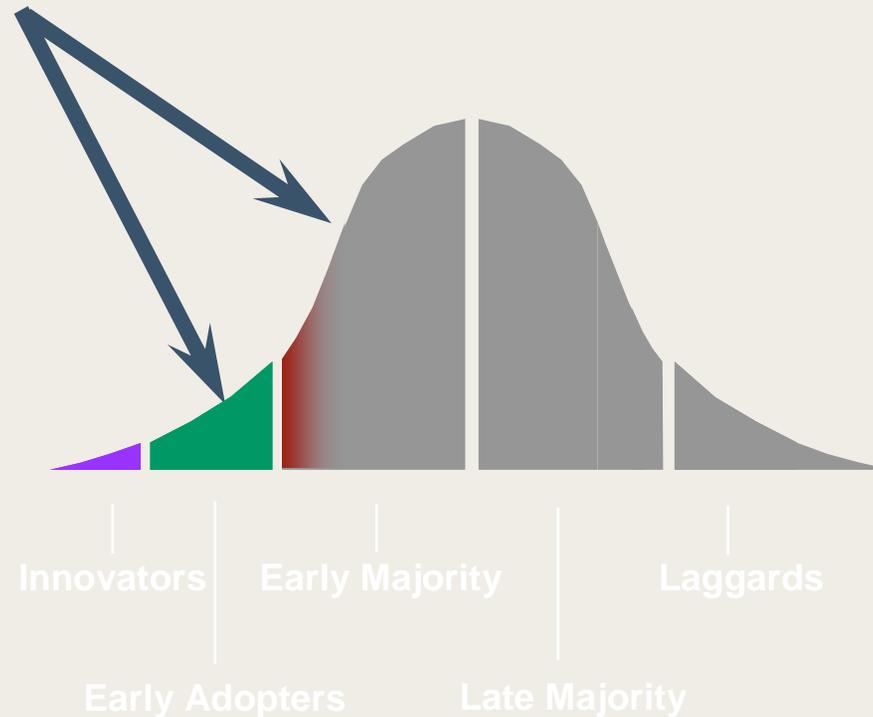
In addition to goals, we've found these four dimensions bear discussion.

- technology developer's role (long term):
  - leading
  - stewarding
  - unengaged
- adoption support the technology developer is willing to provide:
  - active
  - passive
- technology dependence:
  - stand alone
  - integrated
- change impact:
  - global
  - local



# Technology Adoption Cycle

SEI focuses on early adopters and initial early majority





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## **More on Adopters**

In addition to adopter types, consider job types, domains, industries, etc.

Build a value network.

Consider a day-in-the-life scenario.

Speak to a potential adopter.



## **The importance of value network**

For self-sustaining transition, it is rarely enough to go directly to the end user.

Technology developers, even deployers, often don't have the capability or the resources to do the whole job of transition.

Consider Gladwell on “connectors, mavens, and salespeople.”

Institutionalization is hard.



## **Describing a value network**

The value network is a graphic representation of all of the organizations, groups, and individuals that are or could be involved in the development, marketing, and use of a technology. The value network is derived from the value chain concept.

At least four major players are critical in the development and transition of most technologies. These organizations are expected to have early involvement with the technology

- The technology team

- Collaborators

- Value-added distribution partners

- Other technology developers

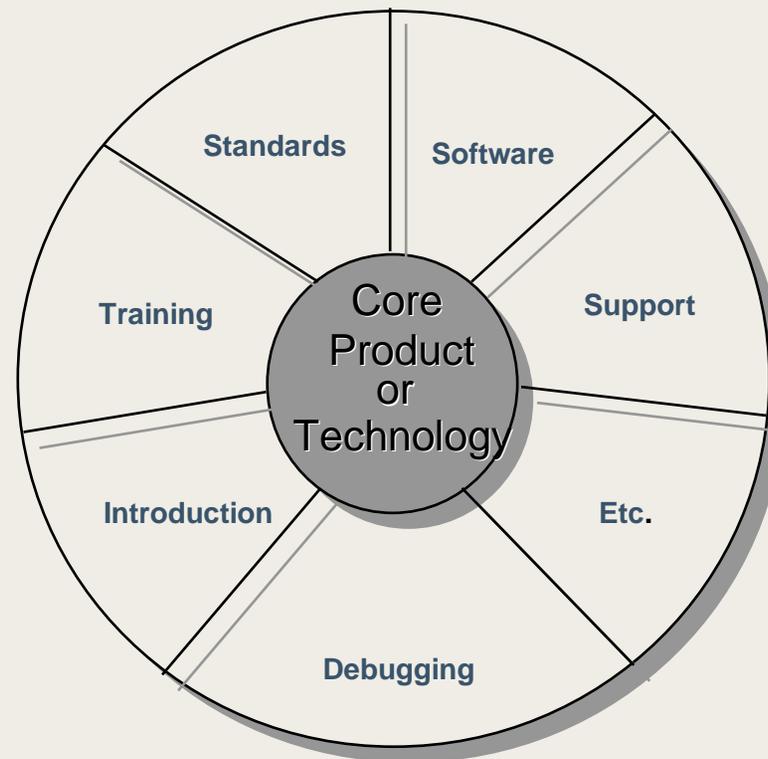


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# The “Whole Product” Concept\*

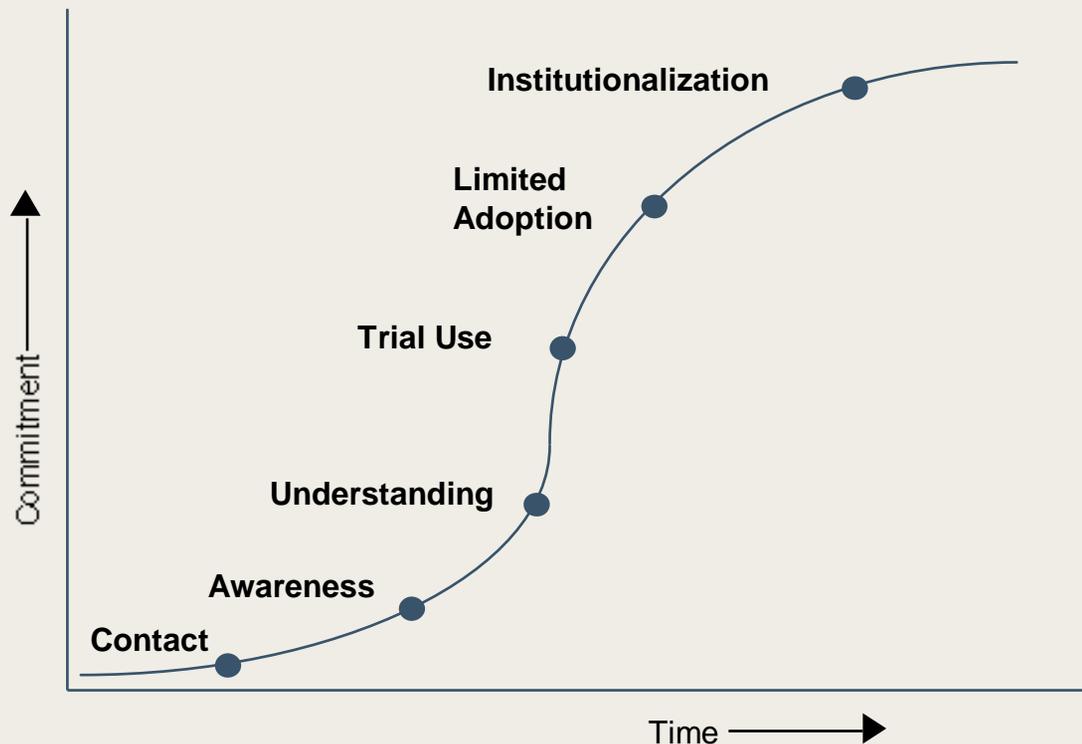


\* Geoffrey Moore, *Crossing the Chasm: Marketing and Selling Technology Products to Mainstream Customers*. Harper Business. 1991.



# How Organizations Commit to Change\*

These stages are used to classify mechanisms:



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



## **Transition Mechanisms: Information Dissemination\***

Briefings

Executive seminars

Libraries/external literature

Organization newspapers

Organization journals

Consultants

Seminars and conferences

Vendor demos

User group newsletters

News groups

Brown bag colloquia

Research reports

Internet, Worldwide Web

\* Adapted from Stanley M. Przybylinski, Priscilla J. Fowler, and John H. Maher, *Software Technology Transition* tutorial, 13th International Conference on Software Engineering, 1991.



## **Transition Mechanisms: Change In Practice\***

Internal/external consulting	Hot lines
Apprenticeships	Procedures
Pilot use	Reward system
Funding	Tools
Standards	Training
Policies	Templates
Checklists	Help desks

\* Adapted from Stanley M. Przybylinski, Priscilla J. Fowler, and John H. Maher, *Software Technology Transition* tutorial, 13th International Conference on Software Engineering, 1991.



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Contact and Awareness	Understanding	Trial Use	Adoption	Institutionalization



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Mechanism	Ignorance	Contact	Awareness	Understanding	Trial Use	Adoption	Institutionalization
Advertisements	████████████████████						
Article in popular magazines	████████████████████						
Briefings	████████████████████						
Organization newspaper	████████████████████						
Vendor demos		████████████████████					
Seminars and conferences		████████████████████					
Executive seminars			████████████████████				
Journals			████████████████████				
Textbook			████████████████████				
User group newsletters			████████████████████				
Funding			████████████████████	████████████████████	████████████████████	████████████████████	████████████████████
University course			████████████████████				
Training and skill development			████████████████████				
Apprenticeships			████████████████████				
Tools and procedures				████████████████████	████████████████████	████████████████████	████████████████████
Handbook				████████████████████			
Pilot guide, templates, checklists					████████████████████		
Adoption case studies						████████████████████	
Best practices and repositories							████████████████████
Hot lines and help desks							████████████████████
Reward system							████████████████████
Tailoring guides							████████████████████
Quantitative data							████████████████████
Policies							████████████████████
Standards							████████████████████
Consultants	████████████████████	████████████████████	████████████████████	████████████████████	████████████████████	████████████████████	████████████████████



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## Contact Information

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## **Likely things to do in advance**

Review the process definition

Collect any of these: existing plans, descriptions of whole-product components, customer and collaborator engagement scenario

Make a list of current customers, collaborators and adopters, plus current mechanisms, if any

Answer problem and solution questions

Think about “compelling reason to buy”

Mull the strategy dimensions