Technology Transfer

The Human Side of Changing Technology

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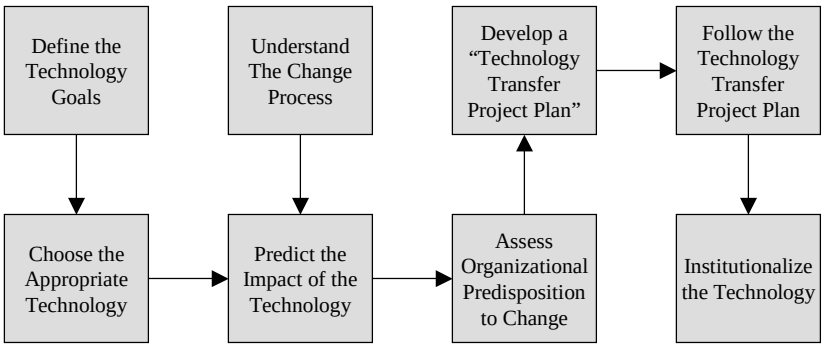
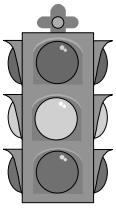
Delivering Software Project Success

A Technology Transfer Process



Proceed With Caution

- ***"Change introduced in the wrong way may well engender suspicion, resistance, resentment or even sabotage (we'll make sure it doesn't work here). Once an attitude of 'never again' is established about a certain technique, no matter how good the technique is in itself, it is doubly hard if not impossible to make it work in practice"*** **[Gilb93] p225**



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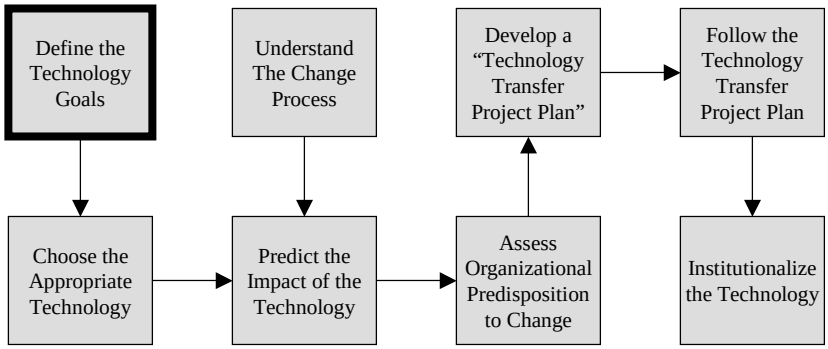
Define the Technology Goals



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Define the Technology Goals

- **Clearly define objective, quantified goals (measures-of-success) from the very start**
  - **Reduce time to market by some percent?**
  - **Reduce cost by some percent?**
  - **Increase quality by some percent?**
- **Make sure that the goals are attainable**
- **The goals should be accompanied by a business case justification**

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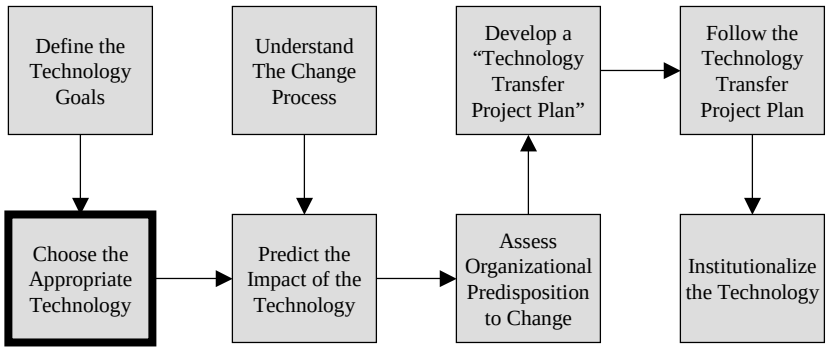
Choose the Appropriate Technology



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Choose the Appropriate Technology

1. **Survey the available technologies**
2. **Assess the choices in light of the defined goal(s)**
3. **Choose the most appropriate technology**

- **Notice that the goal(s) should drive the technology choice, not the other way around**

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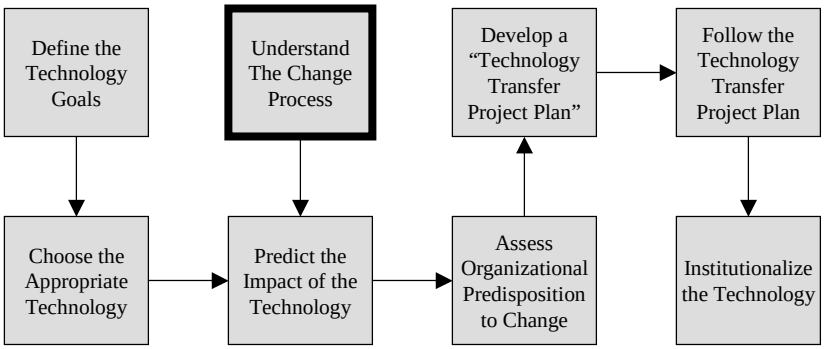
Understand the Change Process



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Understand the Change Process

- **Theory X [Townsend70]**
  - **People hate work**
  - **They have to be driven and threatened with punishment to get them to work toward organizational objectives**
  - **They like security, aren't ambitious, want to be told what to do, and dislike responsibility**
- **Theory Y**
  - **People don't hate work, it is as natural as rest or play**
  - **They don't have to be forced or threatened. If they commit themselves to mutual objectives, they'll drive themselves more effectively**
    - **But they will commit themselves only to the extent they can see ways of satisfying their ego and personal development needs**

The Change Process: A Theory X Version

- ***"Resistance to imposed change can be so extreme that the phases individuals and organizations go through in dealing with change are very similar to the grief process" [Rubenstein92]***
- **Shock**
- **Denial**
- **Acknowledgement (grief)**
- **Acceptance**
- **Adaptation**

The Change Process: Theory Y Versions

- **C: D * V * F > R**
  - **Change happens only when there is**
    - **Dissatisfaction with the current situation**
    - **A Vision of an improved situation and how to get there**
    - **Some First Steps are taken**
    - **and these combine to outweigh Resistance**
  - **Attributed to Richard Beckhard and Gene Dalton**
- **The U-A-S Model**
  - **People will change themselves, but only when**
    - **They understand the proposal**
    - **They have accepted it as being valid**
    - **They have decided to support it**

Rogers' Innovation Adoption Framework

- **Rogers' framework [Rogers95] consists of four elements**
  - **The Innovation**
  - **Communication**
  - **The Adoption Process**
    - **Knowledge, Persuasion, Decision, Implementation, Confirmation**
  - **A Social System**

Rogers' Key Factors

- **Key factors affect the overall rate of diffusion**
  - **Relative advantage**
  - **Compatibility**
  - **Complexity**
  - **Trialability**
  - **Visibility**

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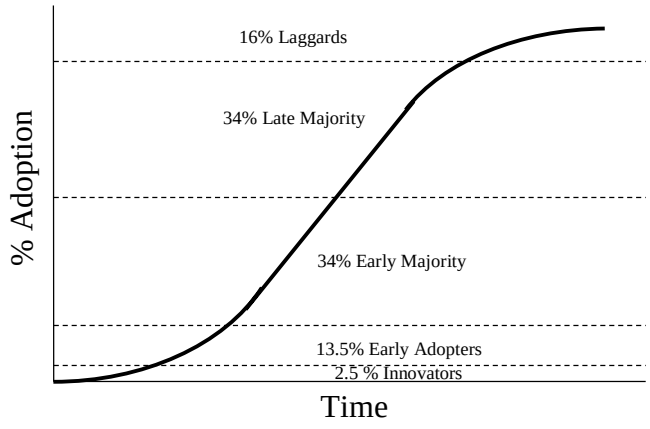
Rogers' Innovation Adoption Curve



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Rogers' Personality Profiles

- **Innovators (2.5%)**
- **Early Adopters (13.5%)**
- **Early Majority (34%)**
- **Late Majority (34%)**
- **Laggards (16%)**

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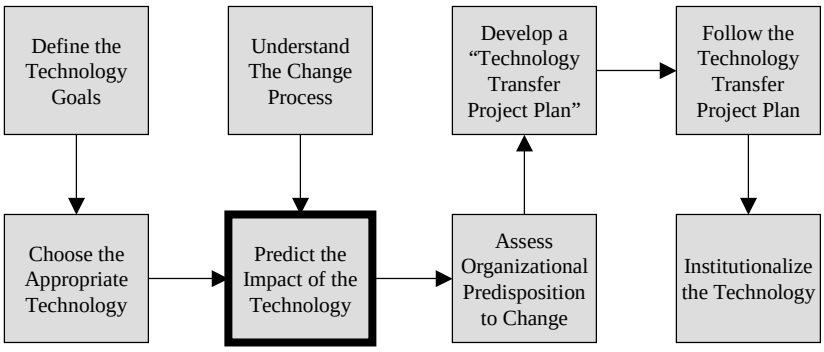
Predict the Impact of the Technology



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Predict the Impact of the Technology

- ***"Ignoring human responses to change is often the single greatest pitfall to successful implementation of technological change" [Rubenstein92]***

- **How big of a change is it to the organization?**
- **How much of the organization will be affected?**
- **How long do you have to fully implement the change?**
- **How motivated are the people to implement the change?**
- **How well can the people anticipate the effect of the change on them?**
- **Does it change the political landscape?**

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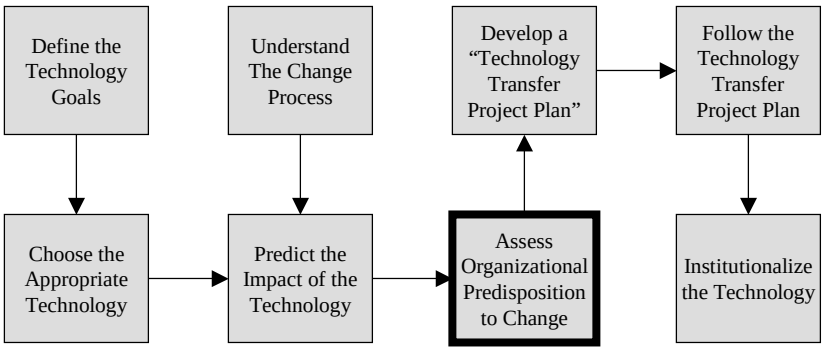
Assess Organizational Predisposition to Change



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Assess Organizational Predisposition to Change

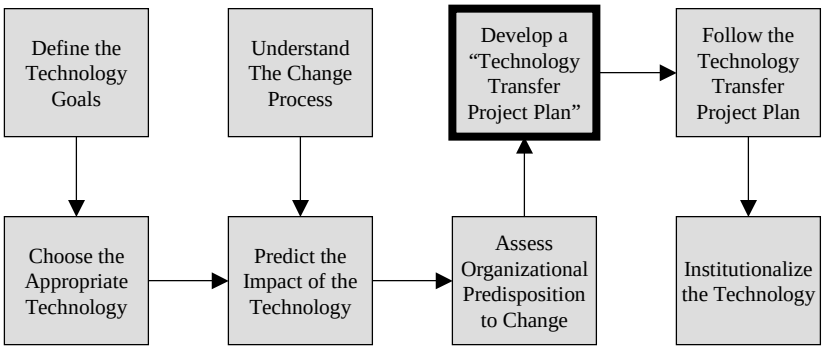
- ***"There is a threshold beyond which a person or organization cannot effectively adapt to change… Beyond this point, healthy, coping behaviors are displaced by dysfunctional symptoms" [Toffler70]***

- **How much change have they dealt with recently?**
- **Are they satisfied or dissatisfied with the current situation?**
- **Who, if anyone, is making the first steps?**
- **What is the existing social system?**
- **What Innovation Adoption types are there?**

Controlling Impact and Disposition

- **Many of the factors affecting impact and predisposition to change are probably beyond your control. However some may be under your control**
  - **Can you reduce satisfaction with the current situation?**
  - **Can you demonstrate taking the first steps yourself?**
  - **Can you market it as being "for special people only"?**
    - **Turn the technology into its own reward**
  - **Can you package it in a way that emphasizes its**
    - **Relative advantage? Compatibility? Complexity (or lack of)? Trialability? Visibility?**
  - **...**

Develop a "Technology Transfer Project Plan"



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Develop a "Technology Transfer Project Plan"

1. **Secure the organizational commitment**
2. **Develop the infrastructure**
3. **Deploy the technology**
4. **Support the deployment**

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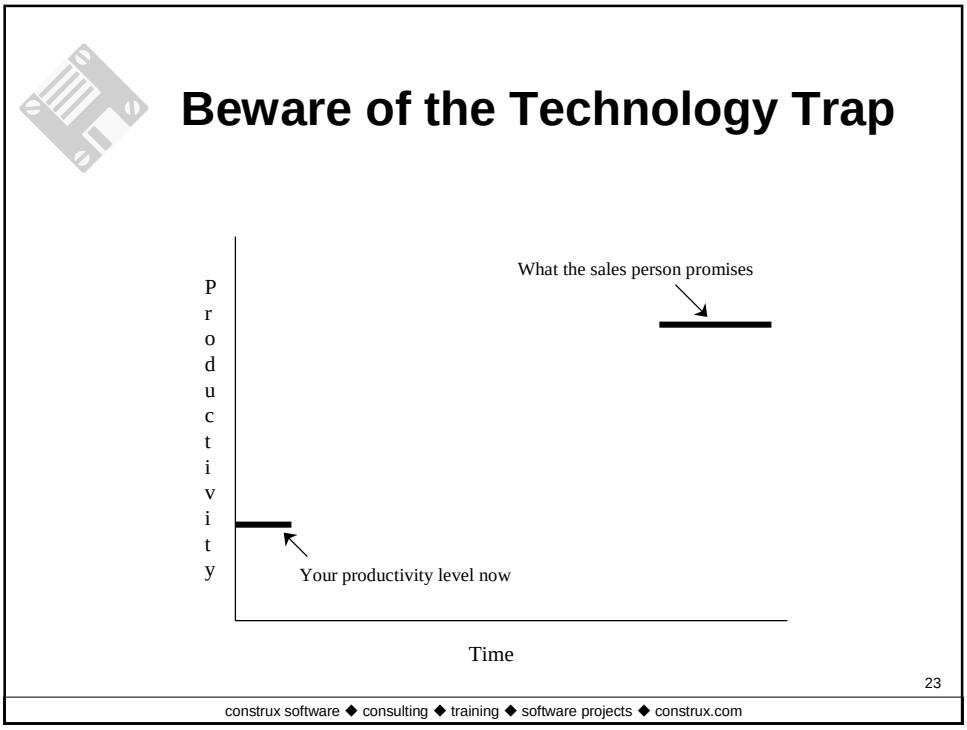
Beware of the Technology Trap
What the sales person promises
Productivity
Your productivity level now
Time
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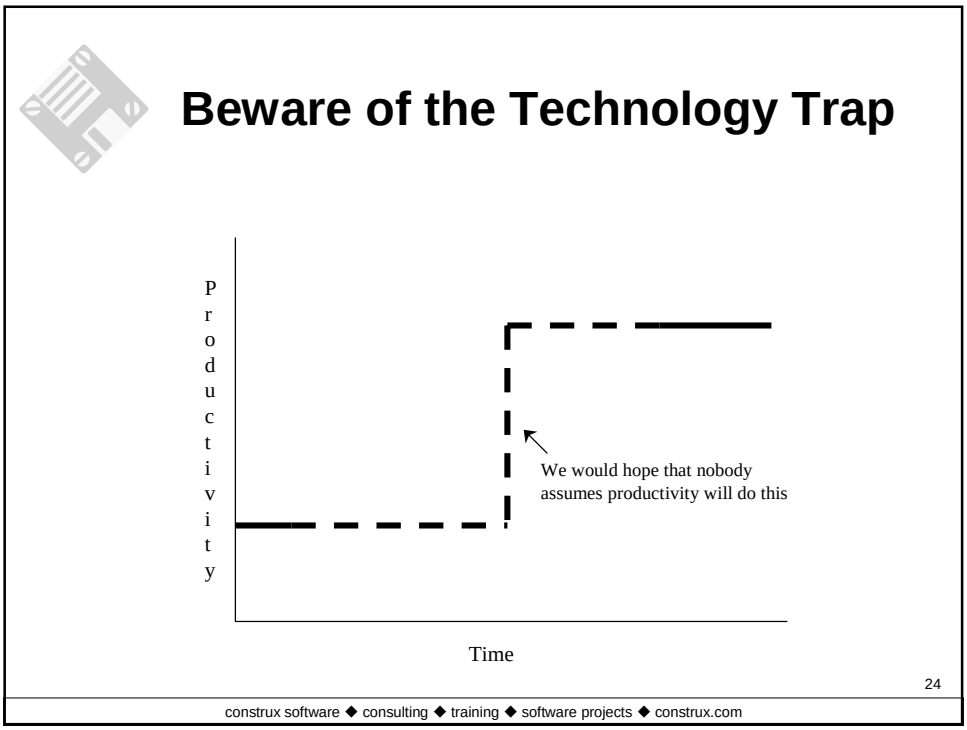
Beware of the Technology Trap
Productivity
We would hope that nobody
assumes productivity will do this
Time
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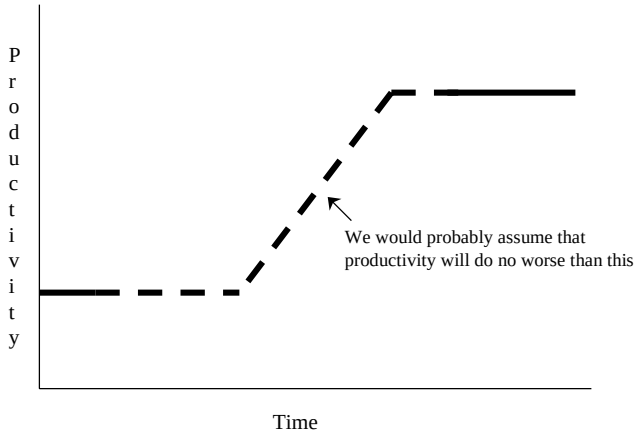
Beware of the Technology Trap



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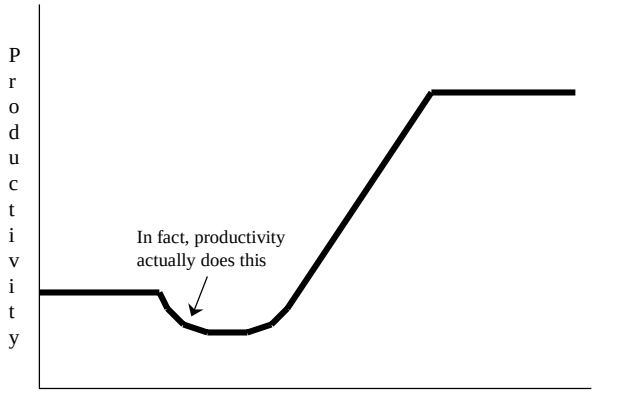
Beware of the Technology Trap



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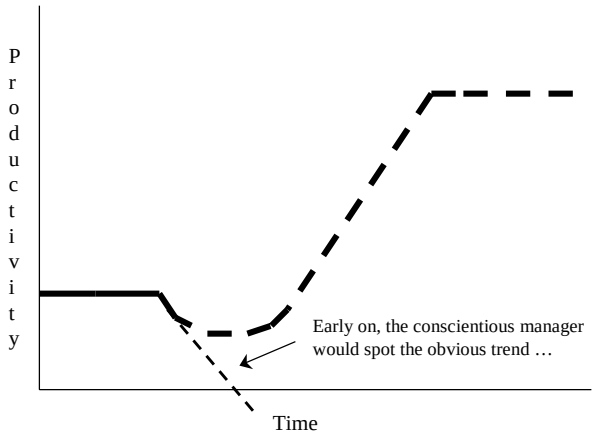
Beware of the Technology Trap



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Defusing the Technology Trap

- Plan for the initial drop in productivity
- Be aware of the demands placed on you by the new technology
- Avoid the Fad-of-the-year Syndrome
- Validate the new technology on a pilot project
- Remember Brooks' Law

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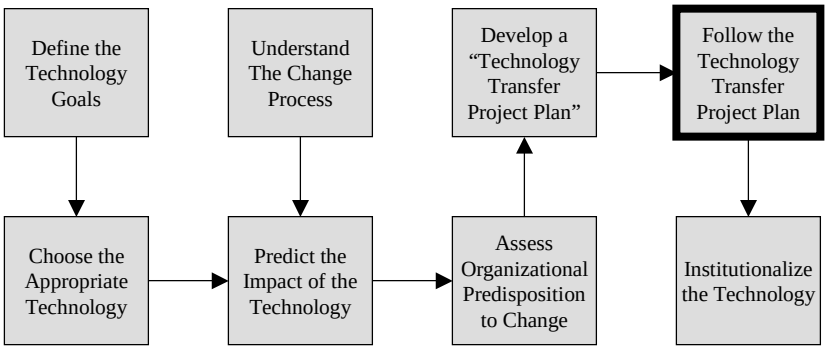
Follow the Technology Transfer Project Plan



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Follow the Technology Transfer Project Plan

- **Follow the established plan, but be willing to make adjustments**
  - **As you learn more about the technology and its impact**
  - **As the organizational goals change**
  - **As surprises and delays are encountered**
- **For the duration of the "Tech Transfer" project**
  - **Be honest in interpreting your observations**
  - **Be honest in reporting the status, including surprises and delays**
- **Communicate during the entire "Tech Transfer" project**
  - **The benefits and costs of the technology**
  - **The impact of the technology on those concerned**
  - **The current status of the project and the current plan for the project**
- **Listen to the experts, but also listen to those affected by the technology**

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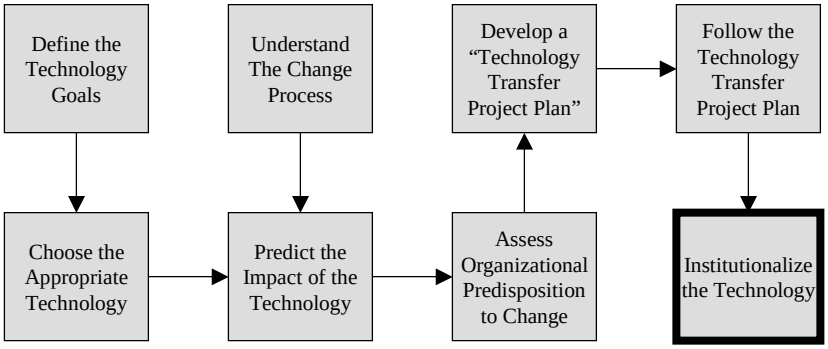
Institutionalize the Technology



Institutionalize the Technology

- **Once the Technology Transfer Project is finished, don't allow the effort to be undone**
  - **Continue to advertise the benefits of the technology**
  - **Show how previous problems have been reduced**
  - **Keep the incentive system in place**
  - **…**

Some Important Observations

- People differ in their ability to adapt to change
- The perceived attributes of an innovation have strong implications on the success or failure of the change
- Innovation-adoption decisions are influenced by both rational and irrational factors
- Technology transfer takes time
- Change happens in a social context: factors like social structure, culture, and norms can facilitate or impede that change
- Social systems are complex and difficult to control and change
- How you "deploy" a new technology will have a big influence on your eventual success or failure

A Couple of References

- [Block83] The Politics of Projects
- [DeMarco88] Peopleware
- [Gilb93] Software Inspections
- [Maurer02] Why Don't You Want What I Want
- [Raghavan89] "Diffusing Software-Engineering Methods"
- [Robbins88] Essentials of Organizational Behavior
- [Rogers95] Diffusion of Innovations
- [Rubenstein92] "Getting from here to there: managing change"
- [Toffler70] Future Shock
- [Townsend70] Up the organization: How to stop the corporation from stifling people and strangling profits

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