

Diffusion of Innovations



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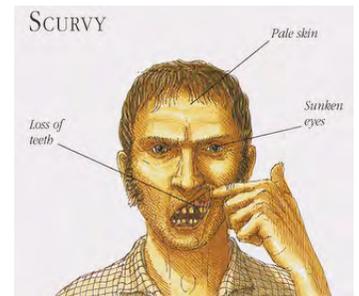
- Everett Rogers, 1995
- Change is like a wave passing through society
- Intellectual roots: Anthropology, Sociology
- Purpose: Explain how new ideas and activities are understood and adopted by populations
 - Explain the process of social change

Diffusion of Innovations: Scurvy

- The major health threat to crews on sailing ships
- Dietary factor suspected, but it took hundreds of years to prove it
- Captain James Lancaster, 1601
 - Gave lemon juice to all the sailors on one boat of a fleet of 4: none of them died
 - 40% of the sailors on the other ships died

Diffusion of Innovations: Scurvy

- Despite Lancaster's success, British Navy didn't adopt the innovation
- It took 264 years and two more experimental trials to get citrus added to the Navy's diet



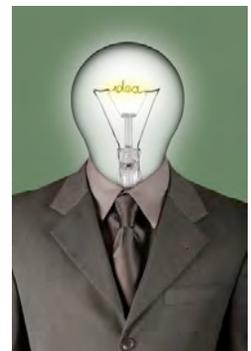
Diffusion of Innovations: Scurvy

- Meanwhile, Captain James Cook (1760s) adopted citrus
 - He was an innovator
 - Once flogged a sailor for failing to eat his sauerkraut



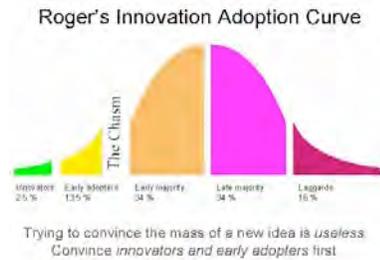
Diffusion of Innovations: Constructs

- Innovation: An idea, practice, or object that is perceived as new by an individual or other unit of adoption
 - The perceived newness of the idea influences the reaction to it



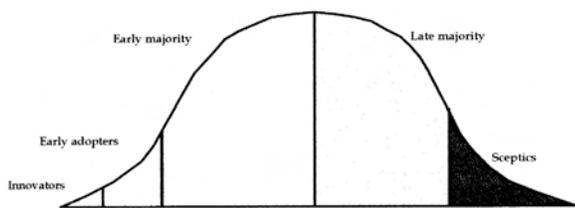
Diffusion of Innovations: Constructs

- Diffusion: the process by which an innovation is communicated through certain channels over time among the members of a social system



Diffusion of Innovations

- What determines the extent & rate of diffusion?
 - Adopter Categories
 - Who are the people being targeted?
 - Characteristics of the Innovation
 - And how it is perceived
 - Stages of Adoption
 - And the context in which the innovation is offered



- How innovation moves through a societal group
- Slowly at first, as innovators adopt the innovation
- Faster, as influence moves through the population
- Peaks
- Declines as pool of innovators and early adopters shrinks

Adopter Categories

- Innovators:
 - Venturesome and Imaginative
 - Risk-taking
 - Fascination with novelty
 - Higher SES
 - Adopting the innovation requires effort and involves risk for them
 - May be considered weird or incautious (mavericks)
 - Occur in all types of societies



Adopter Categories

- Innovators:
Educational Strategies
 - Involve them in program planning
 - Recruit and train them as peer educators



Adopter Categories

- Early Adopters
 - Respected by other members of social group
 - Experimental
 - Quick to make connections between clever innovations and their personal needs
 - Trend-Setters
 - They like the phrase “State of the art”



Adopter Categories

- **Early Adopters: Educational Strategies**
 - Face to face methods like information nights and peer education
 - Demonstration events
 - Reward their egos - such as media coverage
 - Offer regular feedback

Adopter Categories

- **Early Majority**
 - Tend to adopt new ideas just before the average members of a system
 - Pragmatists - won't act without proof of benefits
 - Influenced by other pragmatists
 - Not risk takers, but will accept simple, proven, better ways of doing what they already do
 - Like to hear "industry standard"

Adopter Categories

- **Early Majority: Educational Strategies**
 - Offer free give-aways & trial runs
 - Use mainstream advertising & publicity featuring endorsements from credible, respected sources
 - Guarantee performance
 - Provide strong customer service and support

Adopter Categories

- **Late Majority:**
 - Skeptical
 - Adopt new ideas after the average members of a social system
 - Peer pressure is often necessary for adoption
 - Need to overcome barriers
 - Risk-averse but don't like to be left behind

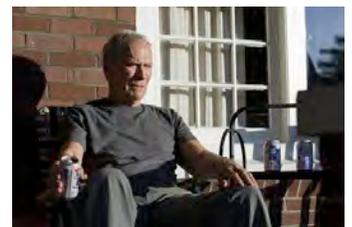
Adopter Categories

- **Late Majority: Educational Strategies**
 - Refine the product to increase convenience and reduce costs
 - Diversify the product to satisfy niche needs
 - Respond to criticism from skeptics



Adopter Categories

- **Laggards**
 - Traditional
 - Pay little attention to the opinions of others
 - They may make good arguments and direct further innovation
 - Educational Strategies
 - Regulated compliance



Innovation Characteristics



- “Perceptions of an innovation predict between 47% and 87% of the variance in the rate of spread”
 - Berwick, 2003, page 1971

Innovation Characteristics

- Relative Advantage (Perceived Benefit)
 - The degree to which the innovation is perceived as better than the idea it replaces
 - Is this better than what we had before?
 - Measured In:
 - Economic Terms
 - Social Prestige
 - Convenience
 - Satisfaction

Innovation Characteristics

- Relative Advantage (Perceived Benefit)
 - Benefit is a balance between risks and gains
 - The status quo is balanced between the unknown future
 - This is addressed by providing information and reducing uncertainty

Innovation Characteristics

- Compatibility
 - The degree to which an innovation is perceived as being consistent with values, beliefs, past history, and current needs of potential adopters
 - Does it fit with the intended audience?



Innovation Characteristics

- Complexity
 - The degree to which an innovation is perceived as difficult to understand and use
 - Is it easy to use
 - Modification, often in the form of simplification, is a nearly universal property of successful dissemination
 - Innovations always change as they spread

Innovation Characteristics

- Trialability: The degree to which an innovation may be experimented with on a limited basis
 - Can it be tried before I commit to it?
 - Can I start with just a little before doing it all?
 - Trialability reduces uncertainty and anxiety about adoption

Innovation Characteristics

- Observability
 - Are the results of the innovation observable and directly measurable?
 - Visibility stimulates spread of the idea as well
 - Can I observe other people enjoying the benefits before I commit?
 - Sounds like vicarious self-efficacy...



Innovation Characteristics

- What makes an innovation quickly adopted?
 - High relative advantage
 - High compatibility
 - High trialability
 - High observability
 - Less complexity

The Tipping Point

- At some point, it becomes difficult to stop a change from spreading further
- At 15% to 20%, great momentum is gained
- This represents the early majority beginning to follow the lead of the innovators and early adopters
- Interface between innovators/early adopters and early majority is critical!

The Tipping Point

- The jump from Innovator/EA to Early Majority is the key
 - Communication is not always smooth between these groups
 - Big difference in risk-tolerance & desire for change
 - The idea has to transform from one that appeals to the first group to one that appeals to the majority
 - Gladwell, 2002

The iPod

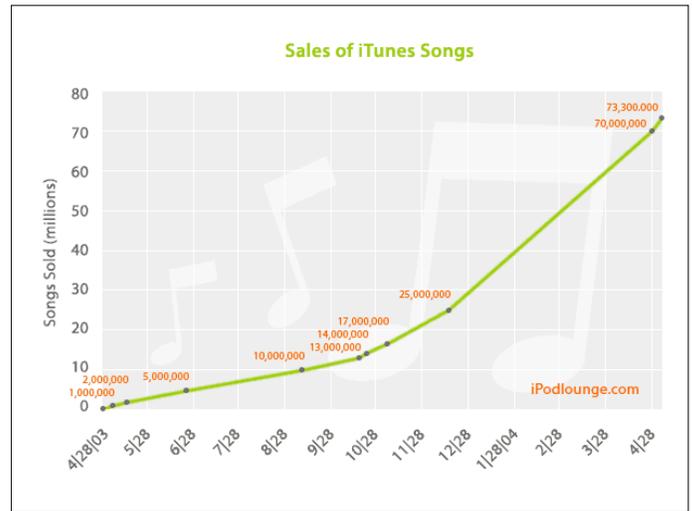
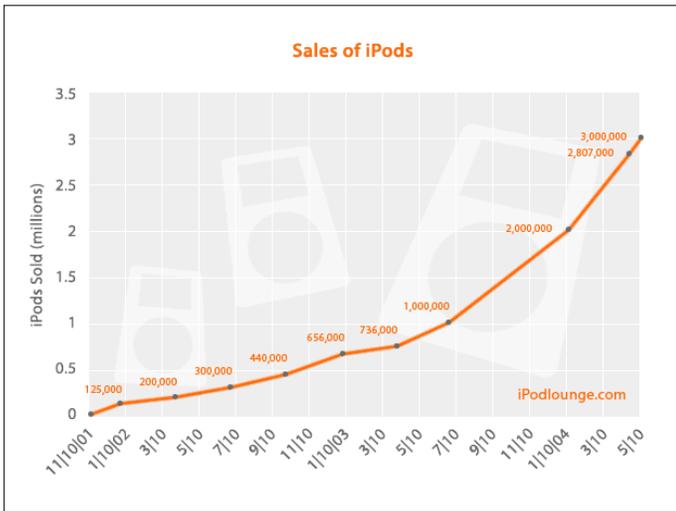
- Introduced by Apple on October 23, 2001
 - Integrated hard disk
 - Small size
 - Ease of Use
 - Large Storage Capacity
 - Easy interface with iTunes
- 125,000 sold in first two months



The iPod & Oprah

- Spring 2003: Oprah names iPod one of her favorite things on her show
- Gives one to every member of the audience
- She didn't know how to use it...





The iPod

- Relative Advantage
- Compatibility
- Trialability
- Observability
- Complexity

Stages of Diffusion

1. Innovation Development
2. Dissemination
3. Adoption
4. Implementation
5. Maintenance

Stages of Diffusion

- Innovation Development
 - Decisions and activities that occur from an idea's conception through to its development and production
 - Can be guided by several models/frameworks
 - Social Marketing
 - PRECEDE/PROCEDE
 - Intervention Mapping

Stages of Diffusion

- Dissemination
 - An active approach for transferring knowledge from the resource system to the user system
 - Channels can be formal or informal

Stages of Diffusion

- Adoption

- Uptake of the program by the target audience
- This occurs in stages
 - Persuasion
 - Decision
 - Implementation
 - Confirmation



Stages of Diffusion

- Adoption

- Influenced by 3 types of knowledge
 - Awareness knowledge
 - What is it
 - Procedural knowledge
 - How to do it
 - Principles knowledge
 - How it works

Stages of Diffusion

- Implementation

- Initial use of the program in practice
- Involves improving the self-efficacy and skills of adopters



Stages of Diffusion

- Maintenance

- Ongoing implementation or continued use of the intervention in practice
- Two types
 - Maintenance: continued use
 - Institutionalization: Incorporation of the program into the SOP of an organization

Research Application

- Physicians' use of the Internet as a source of up-to-date medical information
- Mail survey of 58 family physicians
- Innovation attributes constructs predicted physician use of the Internet
- Gender & recency of training were not predictive
 - Chew, Grant, & Tote, 2004

Research Application

- Survey measured innovation attributes:
 - Relative advantage
 - Compatibility
 - Observability
 - Trialability
 - Complexity
- Items were scored with a Likert scale

Table 1

Internet Technology Perceptions Among Family Physicians, Gender Groups, and Training Recency Groups

Innovation Attributes	Percentage Agree and Strongly Agree (n=56)	MEAN (SD)				Training Recency	
		Family Physicians Total (n=56)	Males (n=34)	Females (n=22)	<10 years (n=26)	10+ years (n=29)	
Relative advantage: r=.45** Specific Internet sites are a treasure trove. I get a lot of useful information from the Internet.	62.7	3.61 (0.96)	3.53 (1.04)	3.71 (0.85)	3.65 (0.98)	3.56 (0.96)	
	62.5	3.59 (1.02)	3.45 (1.12)	3.78 (0.85)	3.73 (0.96)	3.47 (1.07)	
Compatibility: r=.53** Searching the Internet takes too much effort. [‡] I don't have time to browse the Internet. [‡]	58.9	3.55 (1.21)	3.64 (1.22)	3.44 (1.20)	3.58 (1.17)	3.53 (1.25)	
	44.6	3.16 (1.42)	3.0 (1.37)	3.41 (1.50)	3.46 (1.42)	2.90 (1.40)	
Complexity: r=.35* I don't type so I don't use the computer. [‡] My Internet skills are excellent.	91.3	4.51 (0.87)	4.44 (1.02)	4.61 (0.58)	4.73 (0.53)	4.32 (1.05)	
	44.7	3.23 (1.24)	3.18 (1.26)	3.30 (1.22)	3.46 (1.30)	3.03 (1.16)	
Observability: r=.48** Some of my colleagues have benefited from Internet use. Using the Internet has improved clinical practice.	79.4	3.91 (0.74)	3.70 [§] (0.84)	4.17* (0.49)	4.04 (0.75)	3.79 (0.73)	
	55.8	3.35 (1.03)	3.03 [§] (1.19)	3.77 [§] (0.61)	3.81* (0.69)	2.88 [§] (1.13)	
Trialability: r=.56** I'd like to see how the Internet can improve my work. I would take a CME course on Internet navigation.	61.8	3.58 (1.01)	3.47 (1.16)	3.74 (0.75)	3.69 (0.97)	3.48 (1.06)	
	38.9	3.07 (1.21)	2.97 (1.36)	3.23 (0.97)	3.04 (1.27)	3.10 (1.18)	

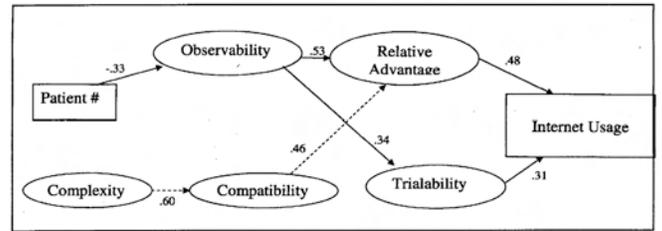
CME—continuing medical education
SD—standard deviation

‡ Reverse coded

* P<.05, ** P<.001

‡ r=.241, P<.019; § r=.272, P<.009; ¶ r=.3.60, P<.001

Subjects were asked to rate the above statements on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). Spearman correlations (r) were computed between the paired innovation attribute statements.



- Predictors of Internet Usage, Relative Advantage, Trialability, Observability, and Compatibility
- Chew, Grant, & Tote, 2004
- Solid line: Pathway begins with reduced patient load & observation of colleagues benefiting from Internet use
- Dotted line: Pathway begins with skill acquisition

