

Design Evaluation Demand Forecasting



The background is a dark blue-grey color with a faint, light-colored graphic. On the left side, there is a compass rose with a needle pointing towards the bottom-left. To the right of the compass, there is a faint outline of a map or a geographical area. The overall aesthetic is clean and modern.

“The art of prophecy is very difficult –
especially with respect to the future.”

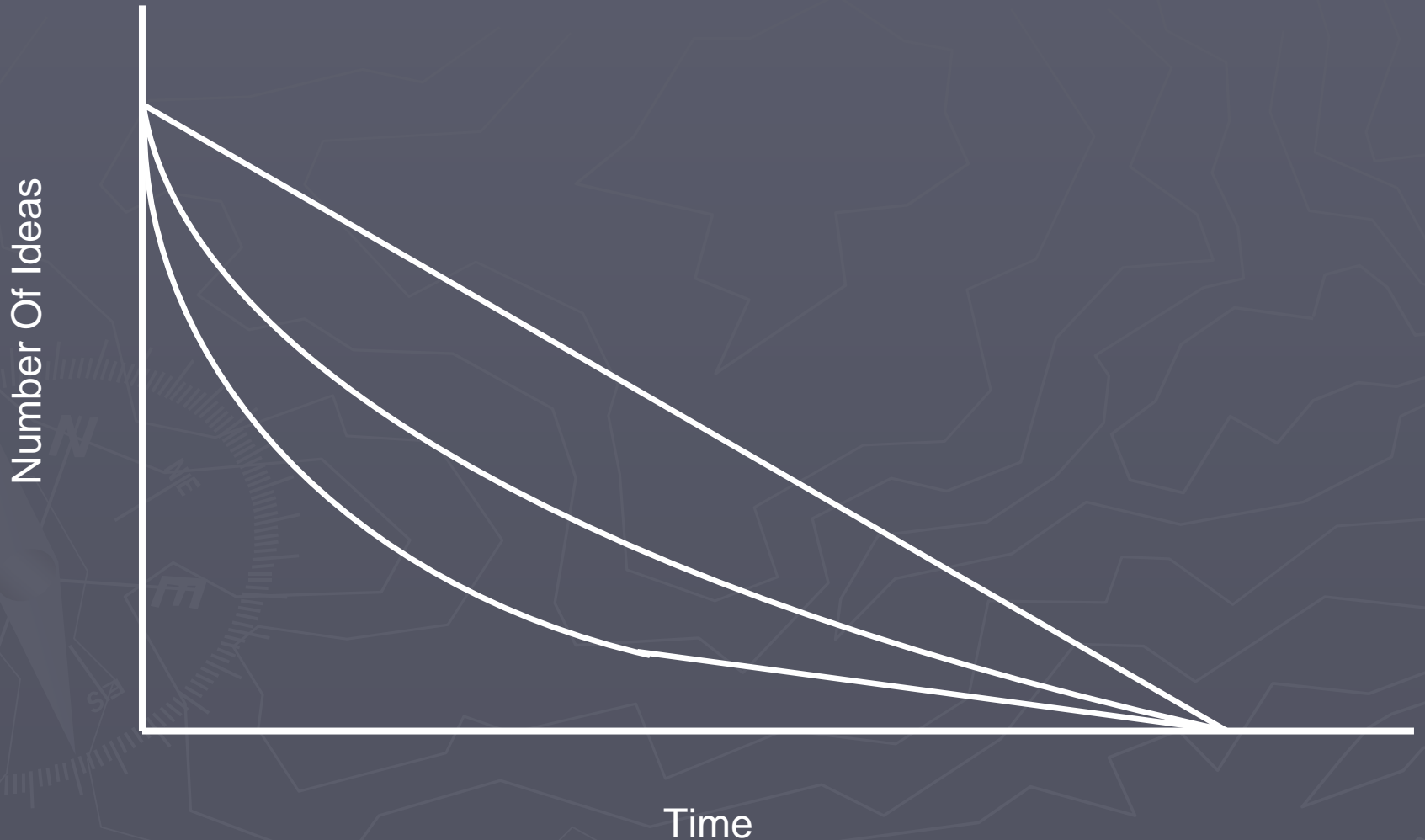
Mark Twain

40% of New Products Fail

- ▶ No Basic Need for Product
- ▶ Overall Product Does Not Meet Need
- ▶ Idea Not Properly Communicated

Mortality of New Product Ideas

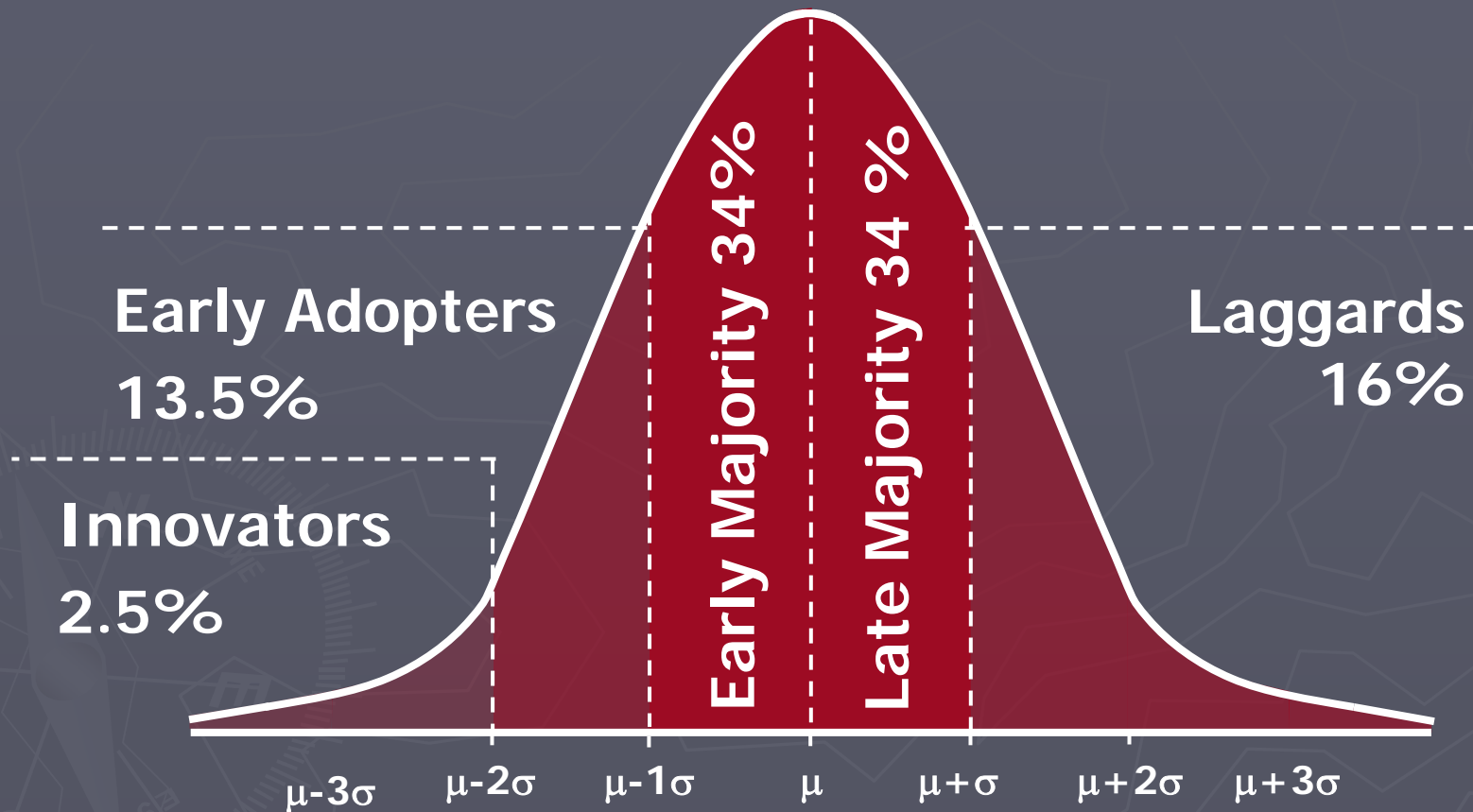
The Decay Curve



What it takes

- ▶ A system or process to weed out projects
- ▶ An understanding of how innovations are embraced

Product Adoption Patterns



Time Until Adoption

Early Adopters

- ▶ Hi Education, Income, Status, Literacy
- ▶ Empathy, Less Dogmatic, Ability to Abstract, Rational, Intelligent, Able to Cope with Risk, Aspiration, Positive Attitude to Science,
- ▶ Social Participation, Media Exposure, Information
- ▶ No Relationship to Age

Innovation vs. Imitation

- ▶ Innovators are not influenced by who already has bought
- ▶ Imitators become more likely to purchase with more previous buyers

Probability of Purchase by New Adaptor in Period t

Probability of Purchase
without influence by adopter

p

+

$$q \cdot \frac{K_t}{M}$$

Probability of Purchase
through Influence by
Adopter

M = Market Size

K_t = Cumulative number of adopters before period t

q = Effect of each Adopter on each Nonadopter
(Coefficient of Internal Influence)

p = Individual Conversion w/out influence by Adopters
(Coefficient of External Influence)

The Bass Model

Imitation Effect or Internal Influence

$$Q_t = p \cdot (M - K_t) + q \cdot \frac{K_t}{M} \cdot (M - K_t) = \left(p + q \frac{K_t}{M} \right) \cdot (M - K_t)$$

Innovation Effect or External Influence

Q_t = Number of adopters during period t

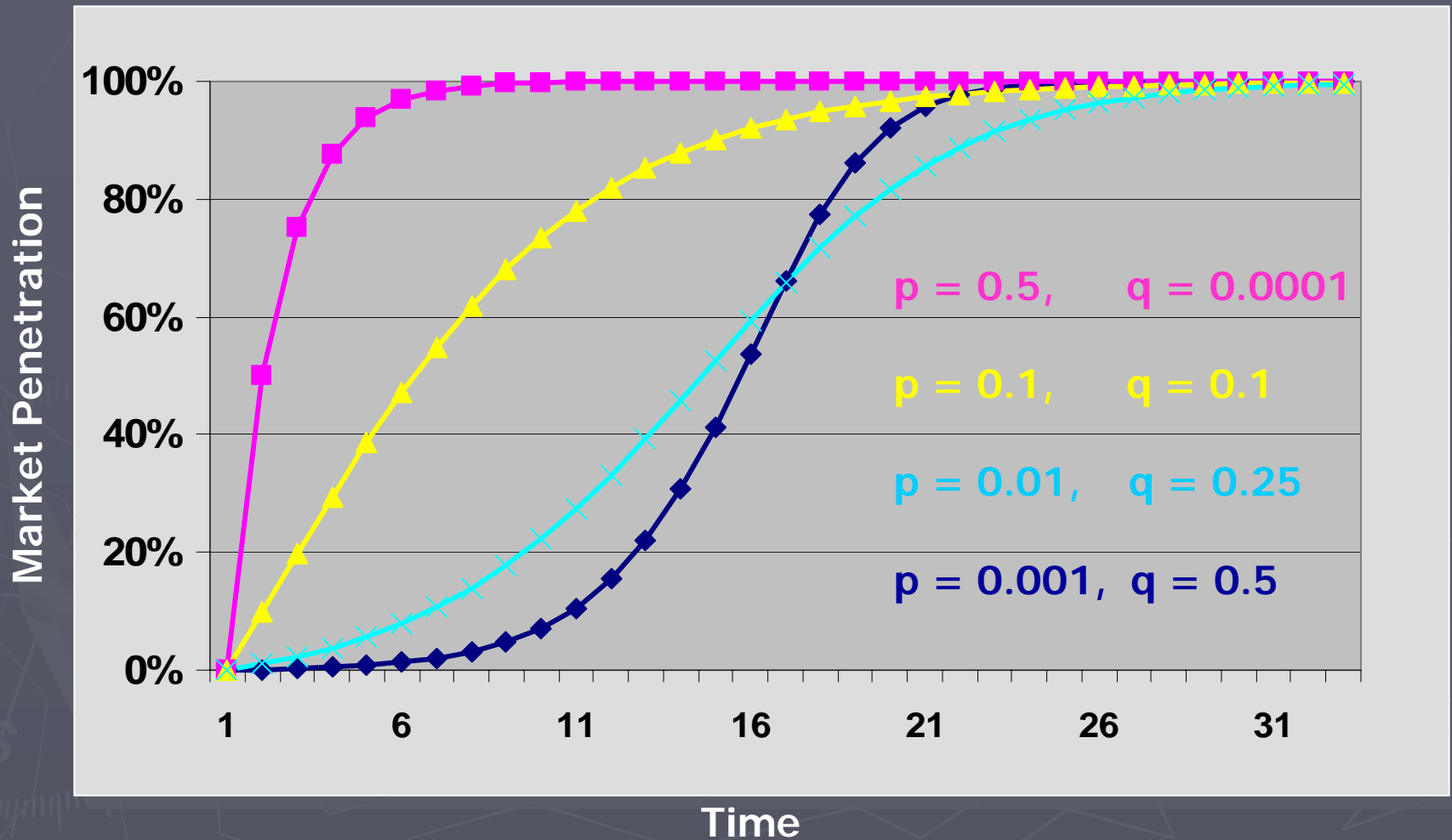
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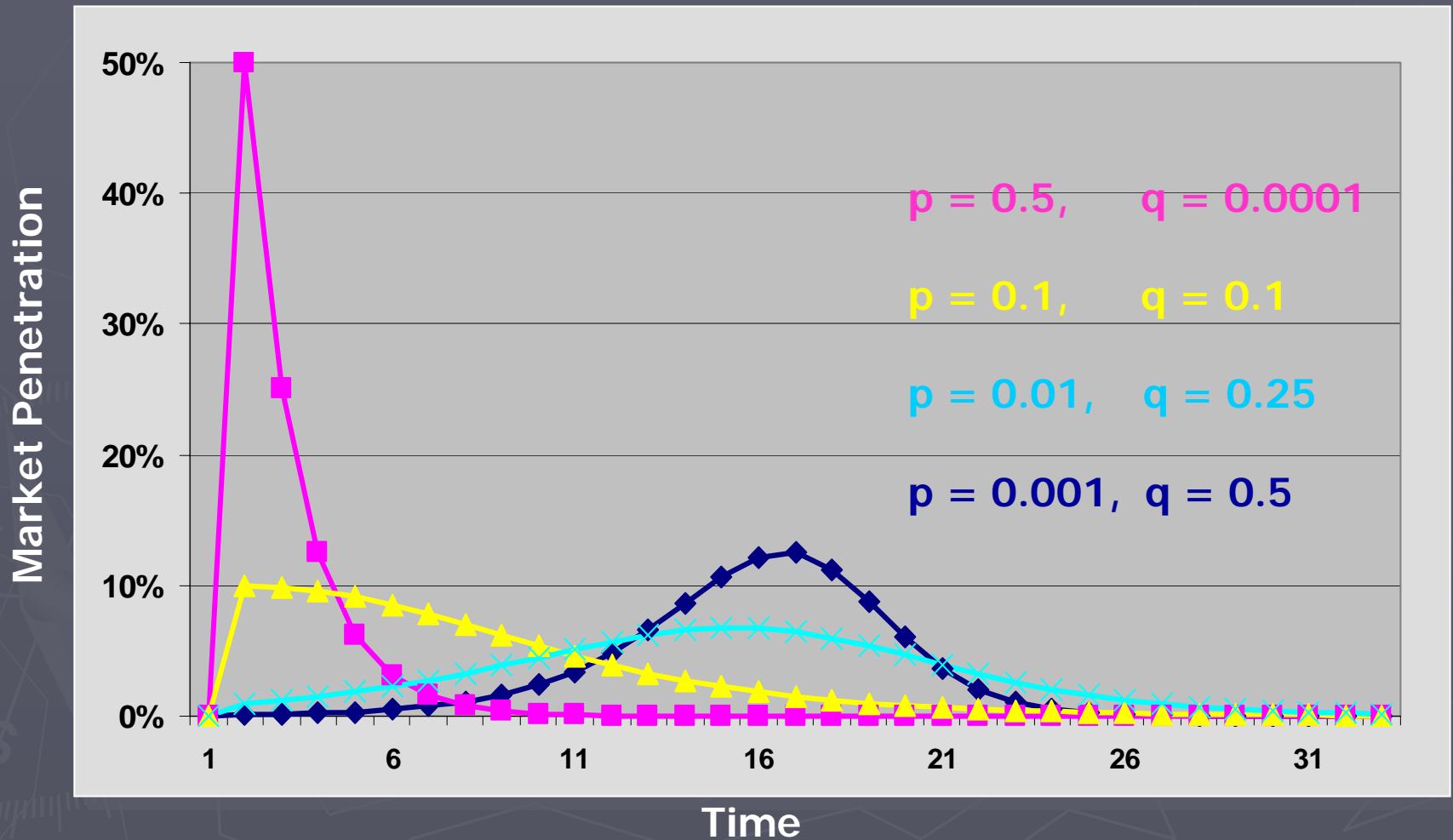
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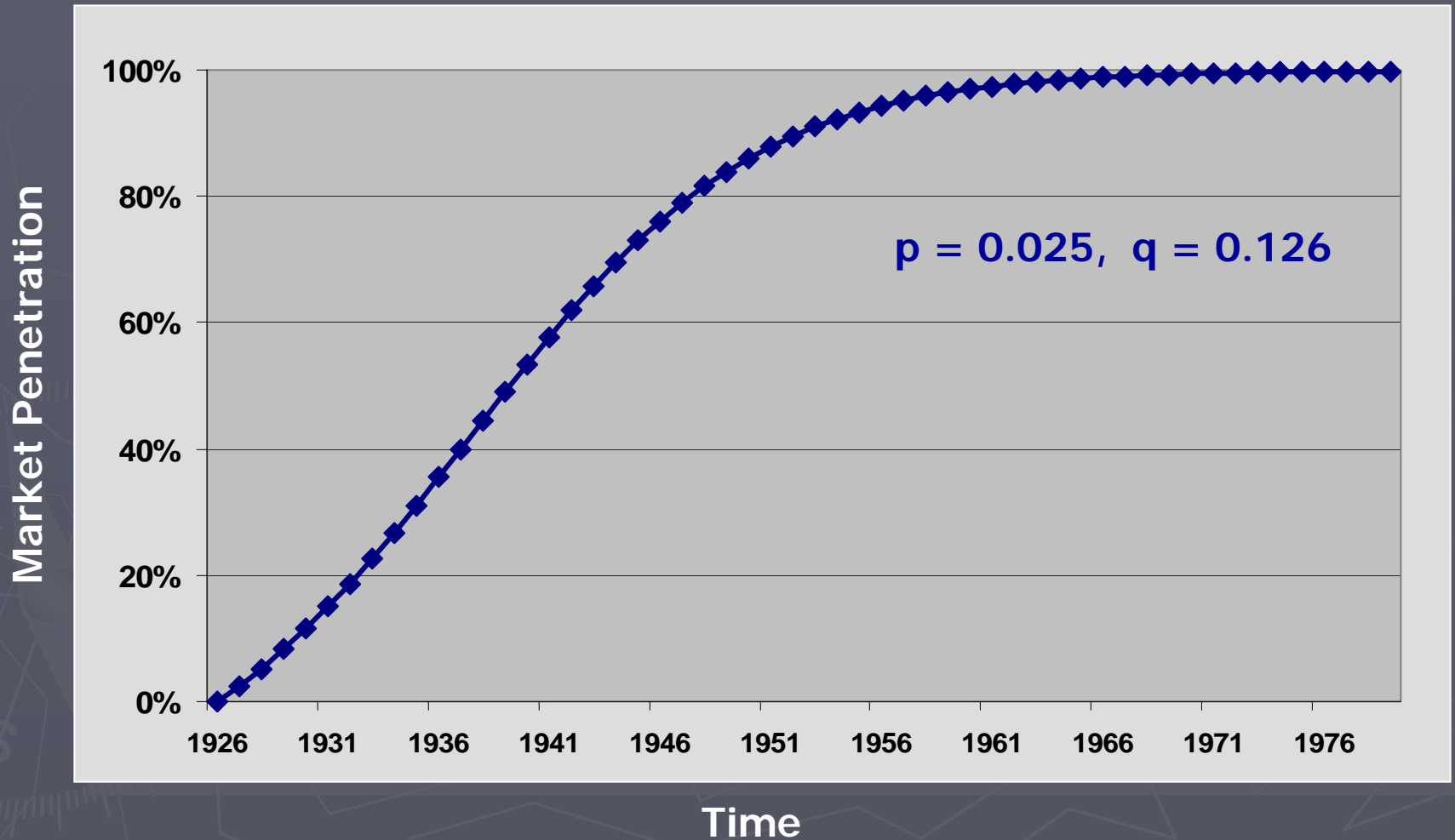
Cumulative Sales for Different p, q Parameters



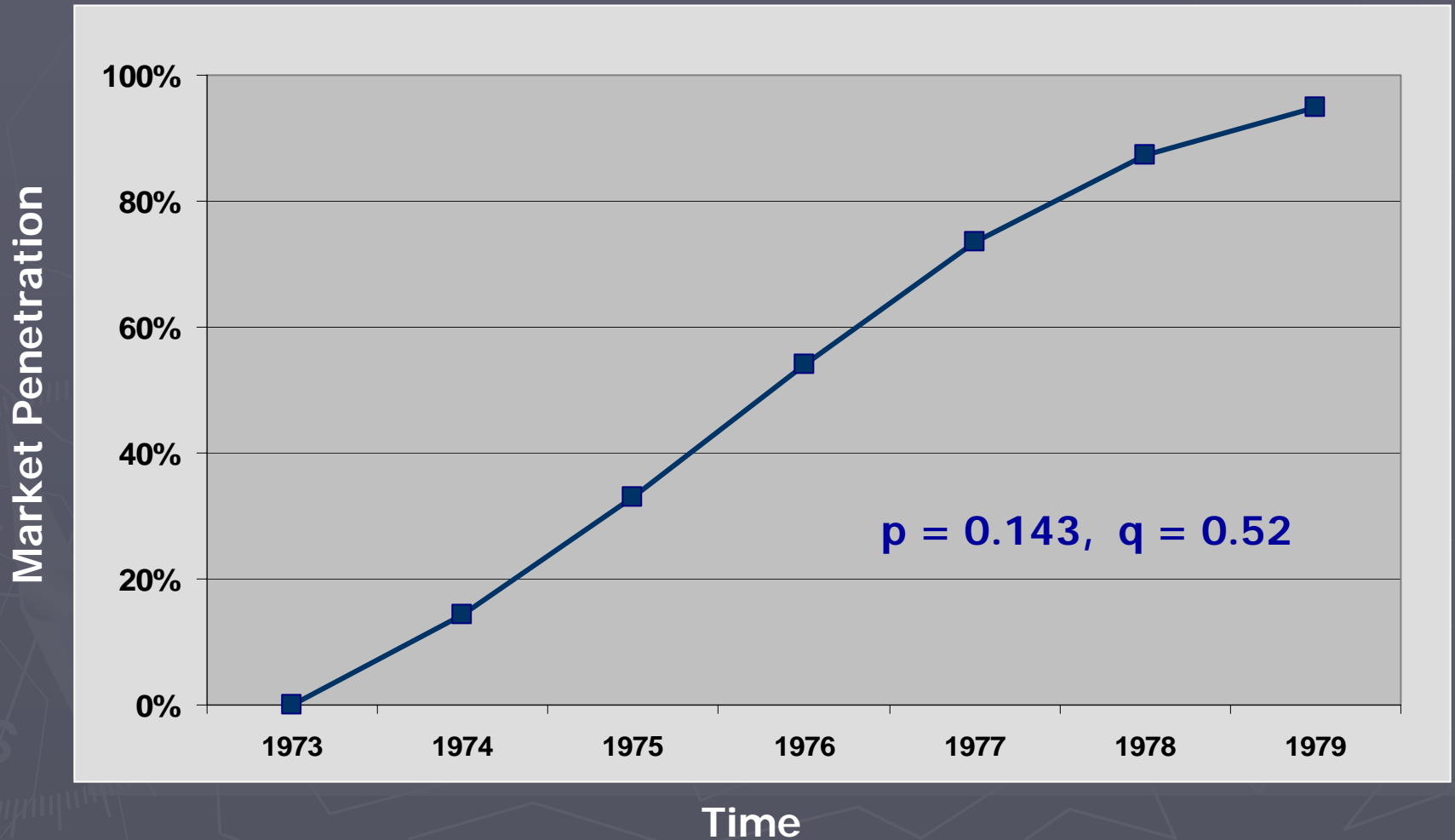
Cumulative Sales for Different p, q Parameters



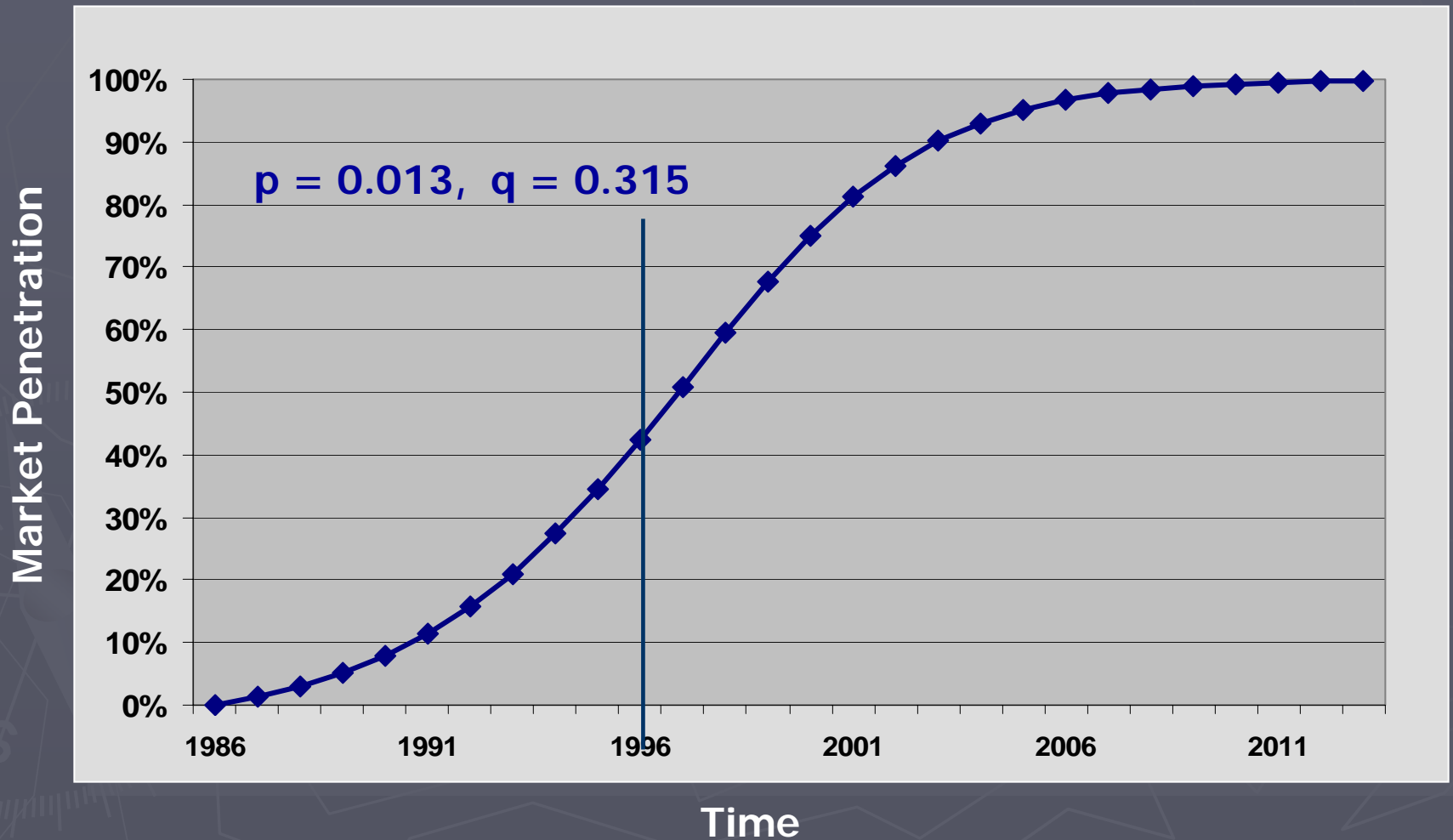
Diffusion Curve For Refrigerators 1926-1979



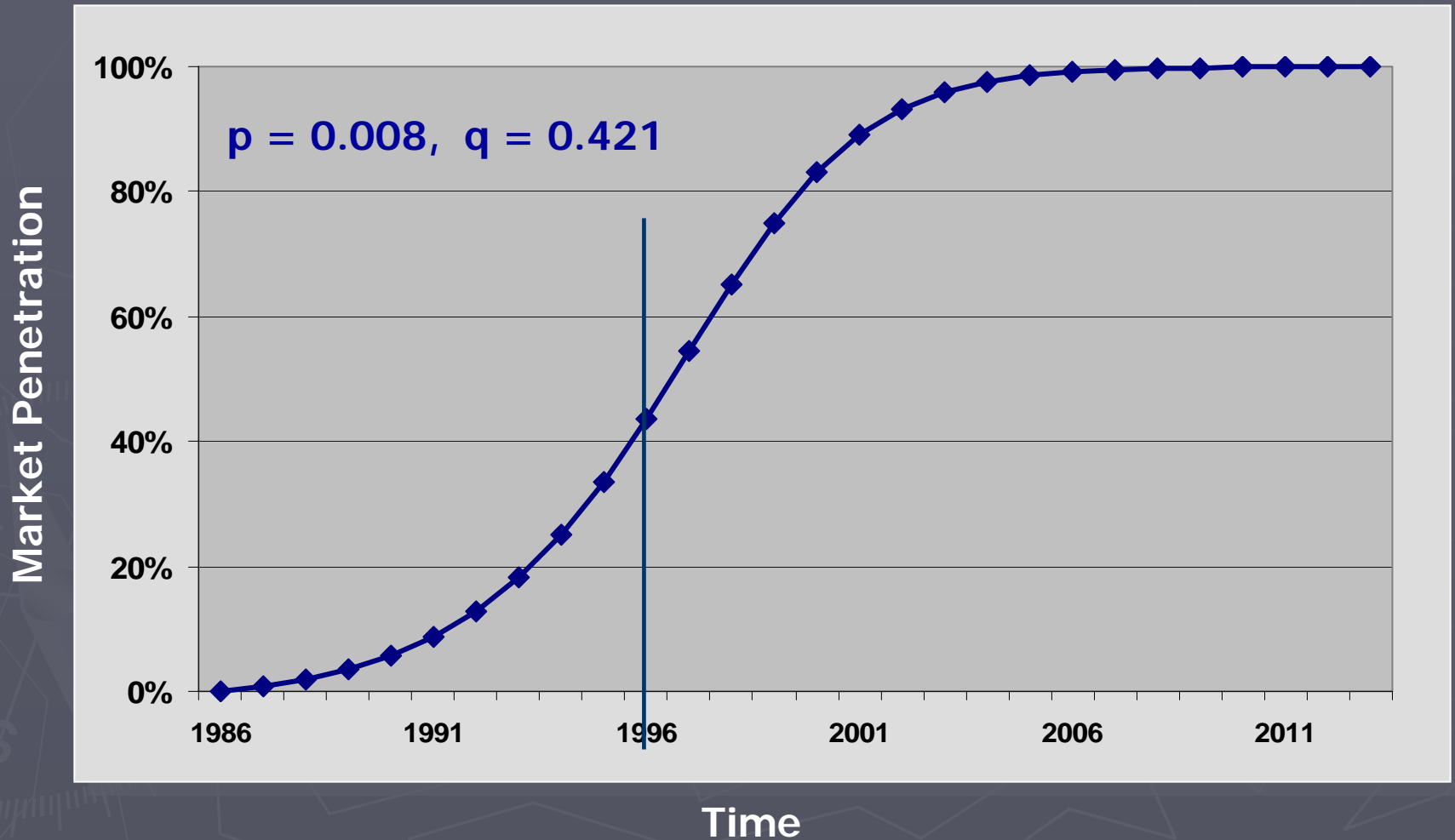
Diffusion Curve For Calculators 1973-1979



Diffusion Curve For Power Leaf Blowers, 1986-1996



Diffusion Curve For Cell Phones 1986-1996



Example: Satellite Radio

- ▶ Roughly 160 million potential listeners
- ▶ Phone Survey (6,000)
 - 96 million not willing to pay fee
 - Interested, given costs [million]

Radio [\$]	Subscription Price [\$]				
	12	10	8	5	2
400	23.7	27.4	27.5	27.6	27.7
300	24.8	28.5	28.7	28.9	29.1
250	26.6	30.7	31.2	31.8	32.6
200	31.5	36.5	37.8	40.5	42.8
150	35.6	41.6	44.1	49.1	53.0
100	45.7	54.0	58.7	68.3	77.8

Source: E. Ofek, HBS 9-505-062, 2005

Analog Products

Product	p	q
Portable CD Player	0.0065	0.66
Auto Radio	0.0161	0.41
Cellular Phone	0.008	0.42

Source: E. Ofek, HBS 9-505-062, 2005

- ▶ Factors For Assessing Analogies
 - Product Characteristics
 - Market Structure
 - Buyer Behavior
 - Marketing Mix

Deriving M, p, & q from Data

$$Q_t = p \cdot (M - K_t) + q \cdot \frac{K_t}{M} \cdot (M - K_t) = \left(p + q \frac{K_t}{M} \right) \cdot (M - K_t)$$

$$= pM + (q - p) \cdot K_t - \frac{q}{M} \cdot K_t^2$$

$$= a + bK_t - cK_t^2$$

Compute a , b , and c with Ordinary Least Square Regression, given actual sales data

$$p = a/M$$

$$q = -mc$$

$$M = -b \pm \frac{\sqrt{b^2 - 4ac}}{2c}$$

► Commercial Software

- www.mktgeng.com
- www.basseconomics.com

Limits of the Bass Model

- ▶ Static market potential
- ▶ Static geographic boundaries
- ▶ Independence of other innovations
- ▶ Simple “not adopt to adopt” framework
- ▶ Limitless supply
- ▶ No repeat or replacement sales
- ▶ Individual decision process neglected
- ▶ Deterministic



Roger's Five Factors

- ▶ Relative Advantage
 - Product performance relative to incumbent
- ▶ Compatibility
 - Consistency with existing values/experiences
- ▶ Complexity
 - Ease of Use
- ▶ Triability
 - Possibility to experiment with product
- ▶ Observability
 - Visibility of usage and impact

Example: Segway

- ▶ Relative Advantage
- ▶ Compatibility
- ▶ Complexity
- ▶ Triability
- ▶ Observability

Example: Viagra

- ▶ Relative Advantage
- ▶ Compatibility
- ▶ Complexity
- ▶ Triability
- ▶ Observability

A-T-A-R

▶ Awareness

- Who is aware of the product?

▶ Trial

- Who wants to try the product?

▶ Availability

- Who has access to the product?

▶ Repeat

- Who wants to try product again?

The A-T-A-R Model

- ▶ Units Sold = Market Potential
 - * Percentage aware
 - * Percent who try
 - * Percent who have access
 - * Percent who will repeat
 - * Number of repeats per year

Sources for A-T-A-R Data

A-T-A-R Data	Sources for Data				
	Basic Market Research	Concept Test	Product Use Test	Component Testing	Market Test
Market size	Best	Helpful	Helpful		Helpful
Awareness*		Helpful	Helpful	Best	Helpful
Trial	Helpful	Best			Helpful
Availability	Helpful				Best
Repeat	Helpful	Helpful	Best		Helpful

* Often estimated by ad agency

Source: M. Crawford & A. Di Benedetto, "New Products Management", 2003

Concept Test

(non tangible product)

A-T-A-R Data	Concept Test
Market size	Helpful
Awareness*	Helpful
Trial	Best
Availability	
Repeat	Helpful

- ▶ Weed out poor ideas
- ▶ Gauge Intention to purchase
 - (Definitely (not), Probably (not), Perhaps)
 - Respondents typically **overstate** their willingness to purchase
 - Rule of thumb, multiply the percentage responding
 - ▶ Definitely would purchase by **0.4**
 - ▶ Probably would purchase by **0.2**
 - ▶ Add up: The result is the % for trial
- ▶ Learning
 - Conjoint Analysis

Product Use Test

("tangible" product)

A-T-A-R Data	Product Use Test
Market size	Helpful
Awareness*	Helpful
Trial	
Availability	
Repeat	Best

- ▶ Use under normal operating conditions
- ▶ Learning
 - Pre-use reaction (shape, color, smell...)
 - Ease of use, bugs, complexity
 - Diagnosis
- ▶ Beta testing
 - Short term use tests with selected customers
 - Does it wor?
- ▶ Gamma testing
 - Long term tests (up to 10 years for med.)

Market Test

A-T-A-R Data	Market Test
Market size	Helpful
Awareness*	Helpful
Trial	Helpful
Availability	Best
Repeat	Helpful

- ▶ Test product *and* marketing plan
- ▶ Test Marketing
 - Limited Geographies (waning importance)
- ▶ Pseudo Sale, Controlled Sale, Full Sale
- ▶ Speculative Sale
 - Full pitch with all conditions
- ▶ Simulated Test Market
 - Stimuli, play money, pseudo store
 - 300 – 600 Respondents, 2-3 months, \$50k to \$500k

Additional Reading

- ▶ E. Rogers: "Diffusion of Innovations",
 - 5th Edition, 2003
- ▶ G. A. Moore: "Crossing the Chasm"
 - 3rd Edition 2002
- ▶ M. Crawford & A. Di Benedetto,
"New Products Management" ,
 - 7th Edition, 2003
- ▶ G. Lilien, P. Kotler, & K.S. Moorthy
"Marketing Models"
 - 1992, (fairly technical, limited availability)

Tomorrow

- ▶ Industry Leaders in Technology and Management Lecture
- ▶ James Dyson

Next Thursday

- ▶ Simon Pitts from Ford Motor Company
- ▶ Professional Behavior
 - Please be on Time!!!
- ▶ No TAs on site