Introduction to Innovation

Definition of Concepts

- **Innovation – Application of creative ideas and Inventions**
- **In the Schumpeterian sense, Innovation is any change (however incremental) to products, processes or organizational forms, and is understood in terms of systems.**
- **Thus, innovation is enacted through webs of social relations, rather than isolated events associated with heroic scientists or entrepreneurs.**

Creativity Vs. Innovation

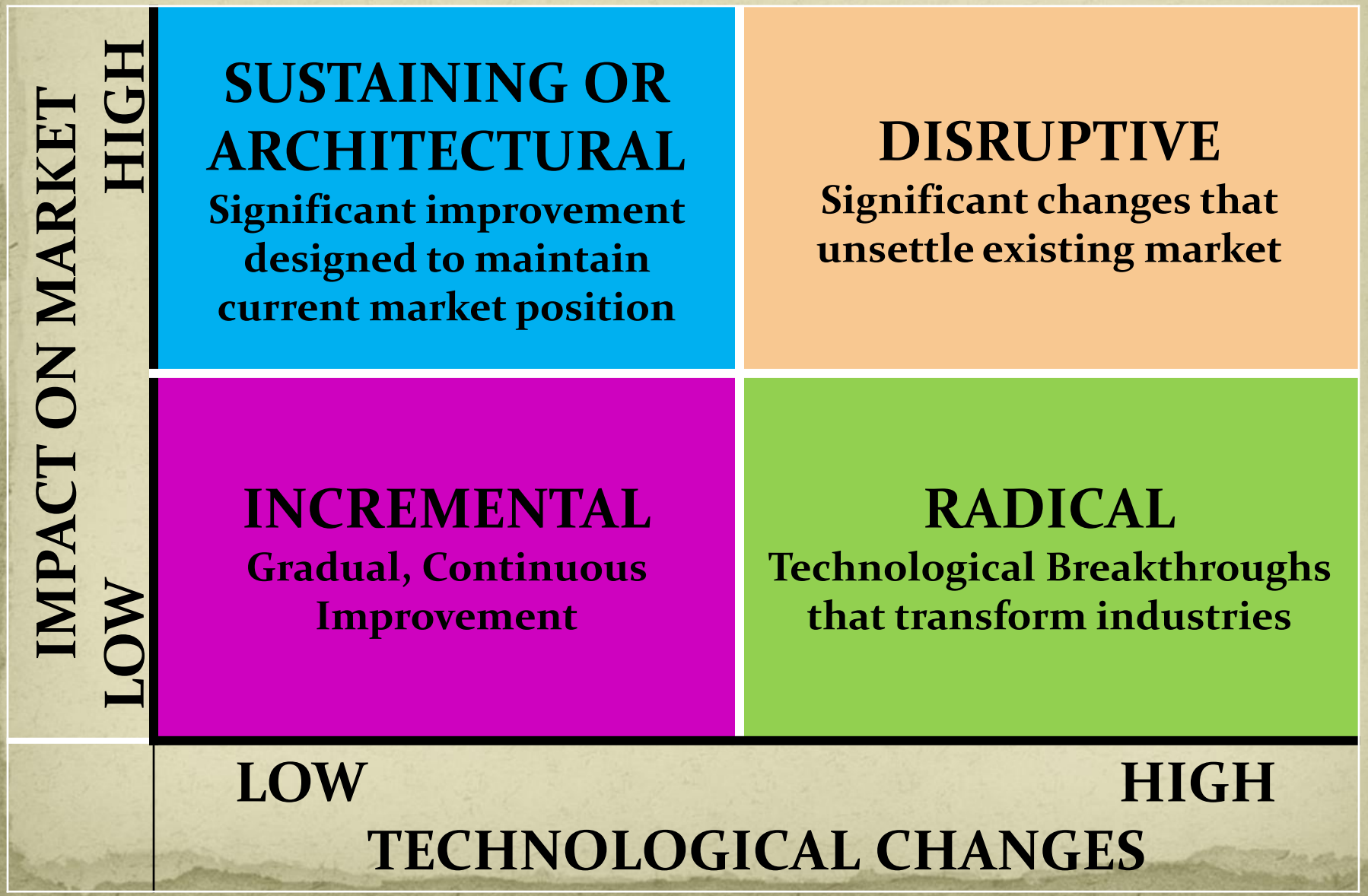
- Individual Effort
- Diverging
- Tacit
- Creative thinking emphasized

- Group Effort
- Concentrating
- Explicit
- Critical thinking emphasized

Issues in innovation:

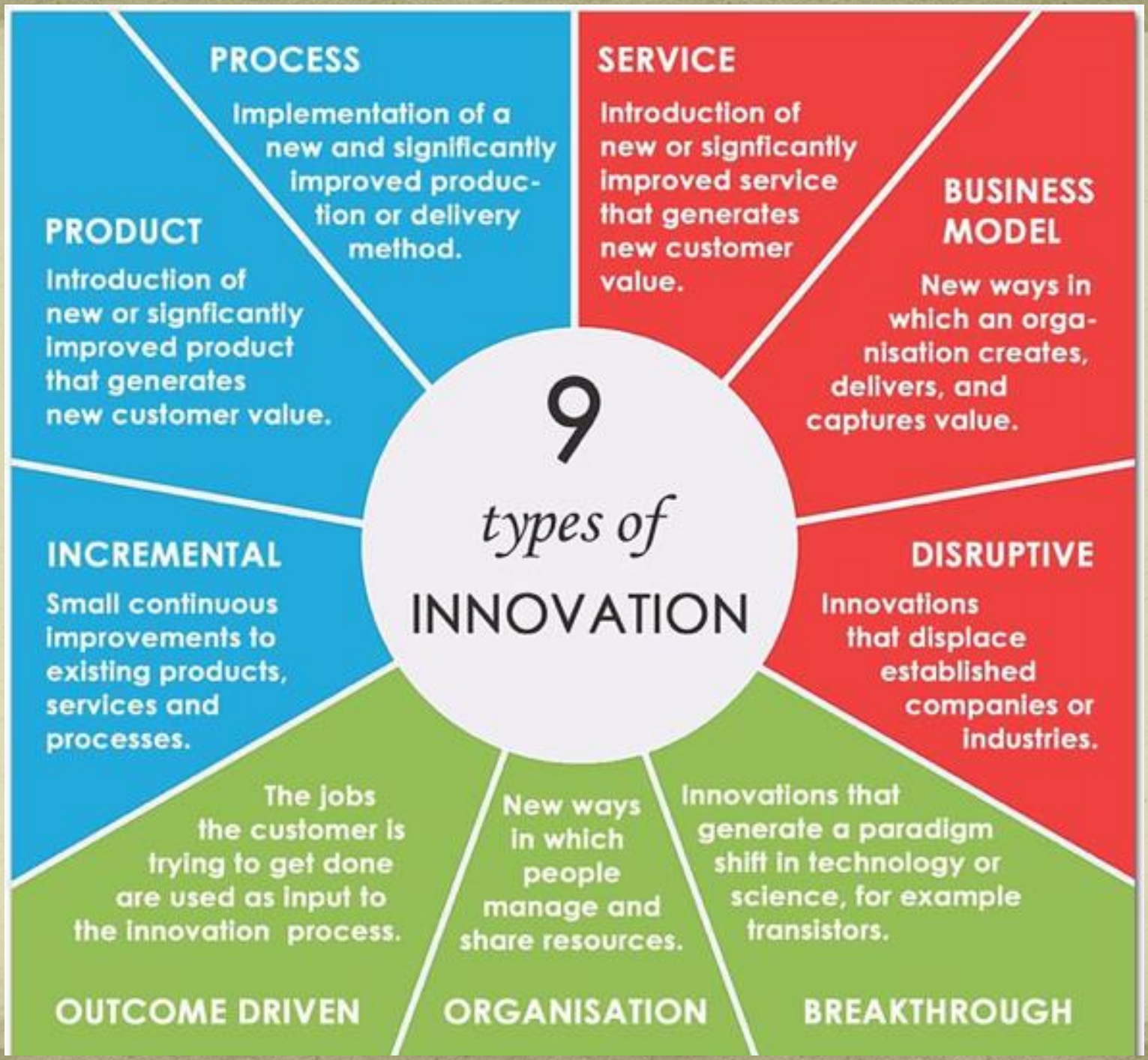
- **Technical, organizational, branding, marketing, etc.**
- **The impact of innovation, either:**
  - Radical? Create new product categories, require new competencies, render existing ideas/techniques/companies obsolete
  - Or Incremental?
- **Commercializing innovation**
  - translating knowledge into economic value
- **The diffusion of innovation**
  - how new innovations are adopted by users and spread between people and firms

DEGREES OF INNOVATION



Main areas of an organization's Innovation

- **Product Innovation –**
  - new products introduced to the market
- **Service innovation –**
  - new services introduced to the market
- **Market Innovation –**
  - new ways to enter & exploit targeted market.
- **Process Innovation –**
  - new methods, approaches, and technologies
- **Business Model Innovation**
  - a fundamental re- conceptualization of the business
- **Organizational Innovation**
  - Changing the organization's structures


PROCESS
Implementation of a new and significantly improved production or delivery method.
SERVICE
Introduction of new or signficantly improved service that generates new customer value.
PRODUCT
Introduction of new or signficantly improved product that generates new customer value.
BUSINESS MODEL
New ways in which an organisation creates, delivers, and captures value.
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types of
INNOVATION
INCREMENTAL
Small continuous improvements to existing products, services and processes.
DISRUPTIVE
Innovations that displace established companies or industries.
The jobs the customer is trying to get done are used as input to the innovation process.
New ways in which people manage and share resources.
Innovations that generate a paradigm shift in technology or science, for example transistors.
OUTCOME DRIVEN
ORGANISATION
BREAKTHROUGH

Continuum of Innovation

Imitative **Incremental** **Evolutionary** **Radical** **Revolutionary**

The secret to innovation is uncovering an unmet consumer need and the filling it in an innovative, creative way.

Two Types of Organizations

- One for exploiting existing capabilities, products through traditional means (efficiencies, processes)

- One for exploring new concepts and approaches, and for finding new opportunities for growth through adaptable, flexible approach

INNOVATION DRIVERS

INTERNAL

- Structure (e.g. little hierarchy)
- Culture/climate (e.g. trust, risk-taking)
- Strategy (e.g. vision, differentiation)
- Work design (e.g. team working, autonomy)
- Management characteristics
- HRM practices
- Technology
- Collaboration
- Research and Development aspects

INNOVATION DRIVERS - External

- Technological Advancements
- Customer expectations
- Market forces & Competitor pressures
- Globalization and Internationalization
- International & Cross-Disciplinary Collaboration
- Market structure
- Shareholder expectations
- Environmental and Sustainability Concerns
- Economic Incentives and Funding
- Education and Knowledge Transfer
- Government legislation - Regulatory & Policy Changes


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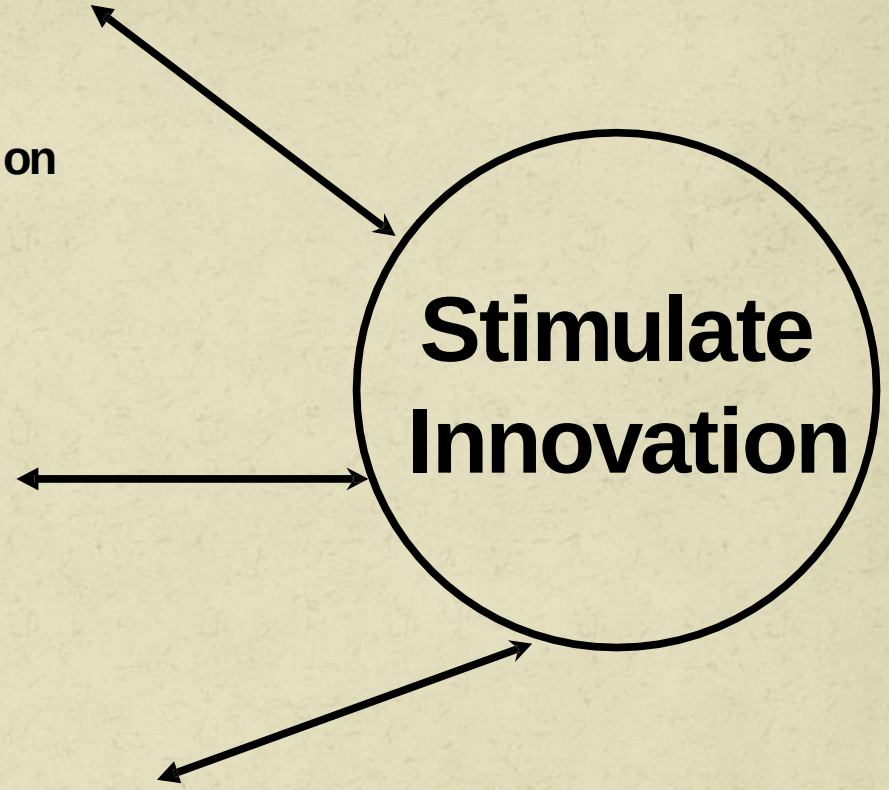
Structural Variables:

- Organic Structural
- Abundant Resources
- High Interunit Communication

Cultural Variables:

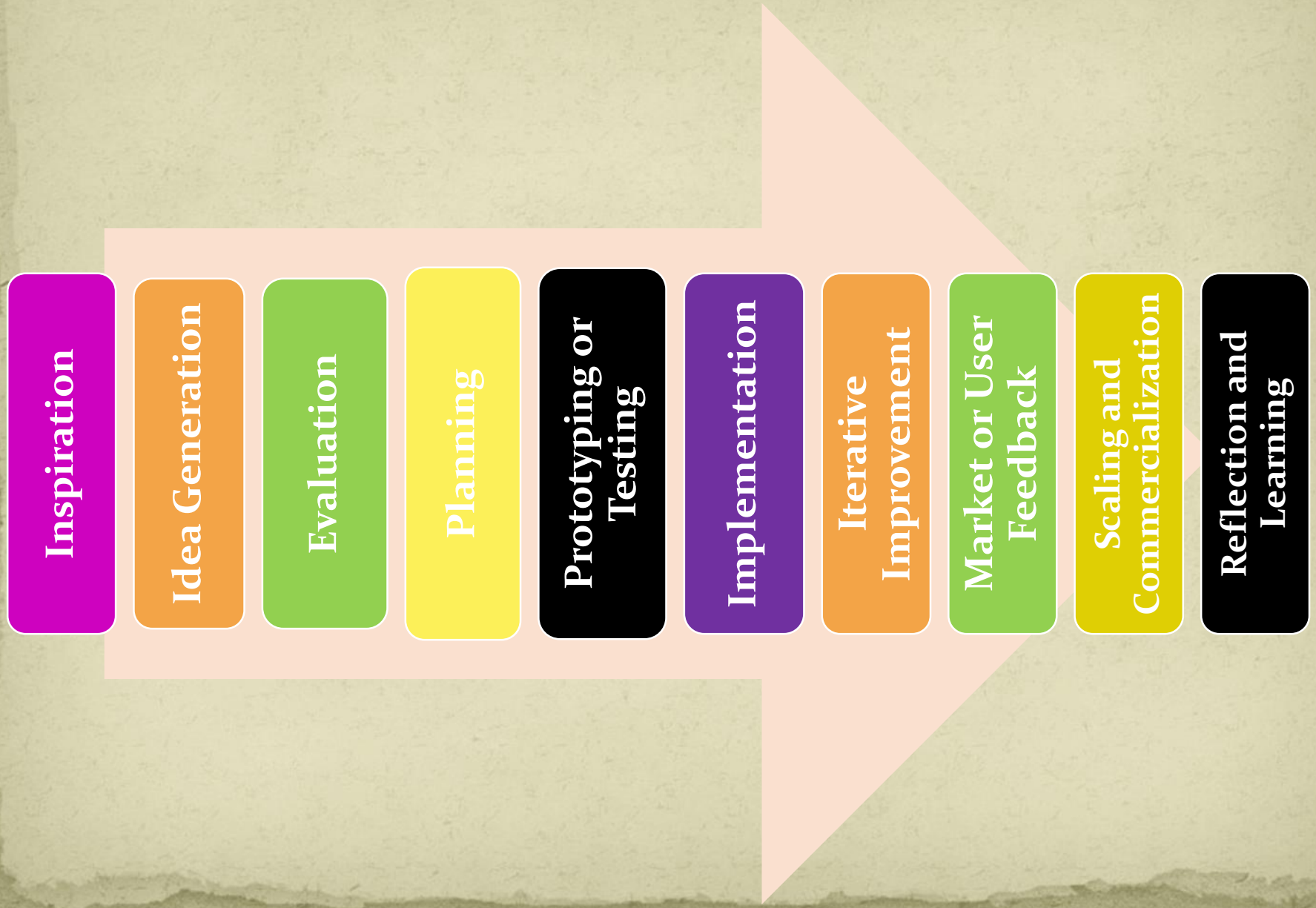
- Acceptance of Ambiguity
- Tolerance of the impractical
- Low External Control
- Tolerance of risk
- Tolerance of conflict
- Focus on ends
- Open system focus



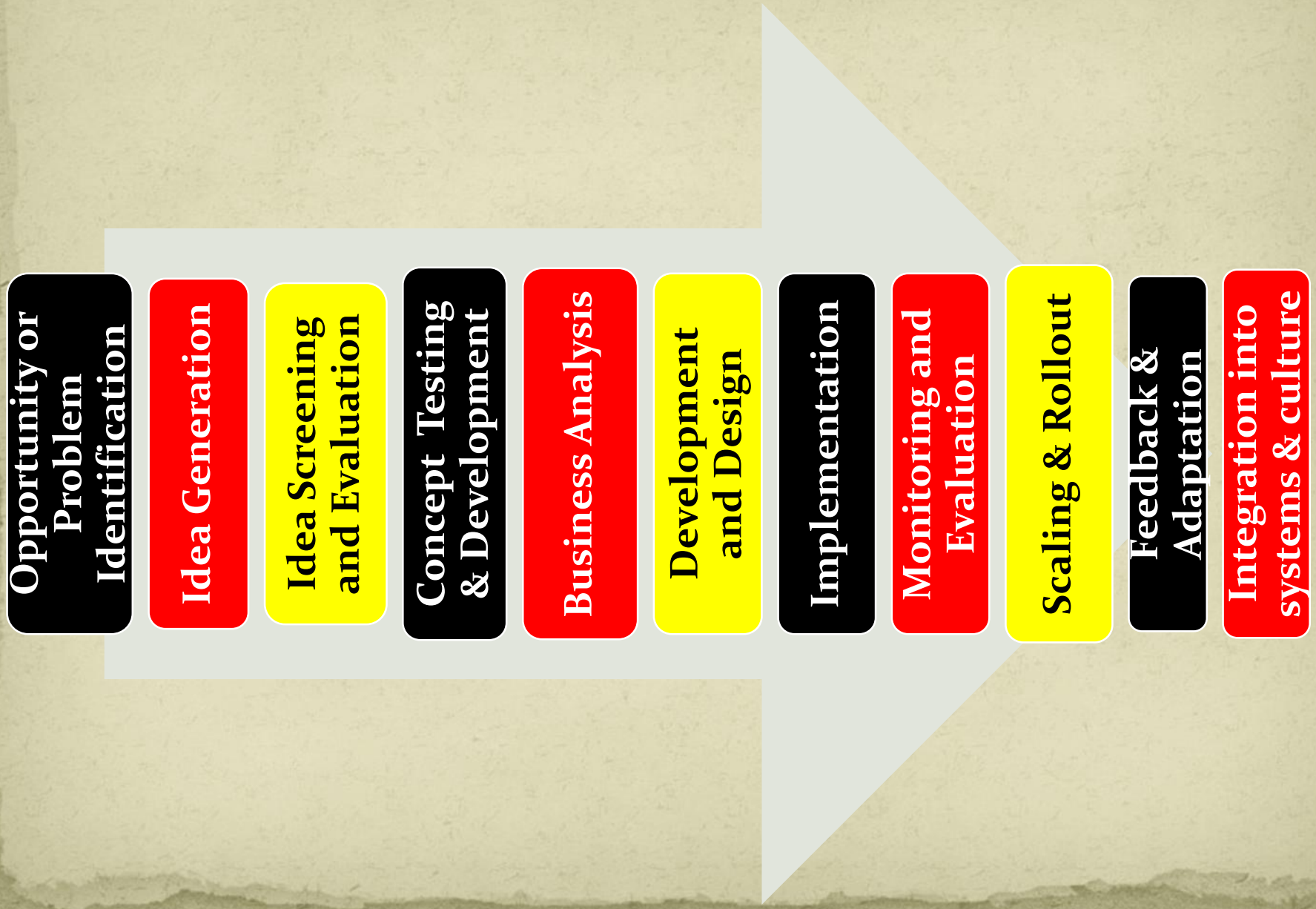
Human Resource Variable:

- High Commitment to training & Development
- High job security
- Creative people

Stages of individual innovation

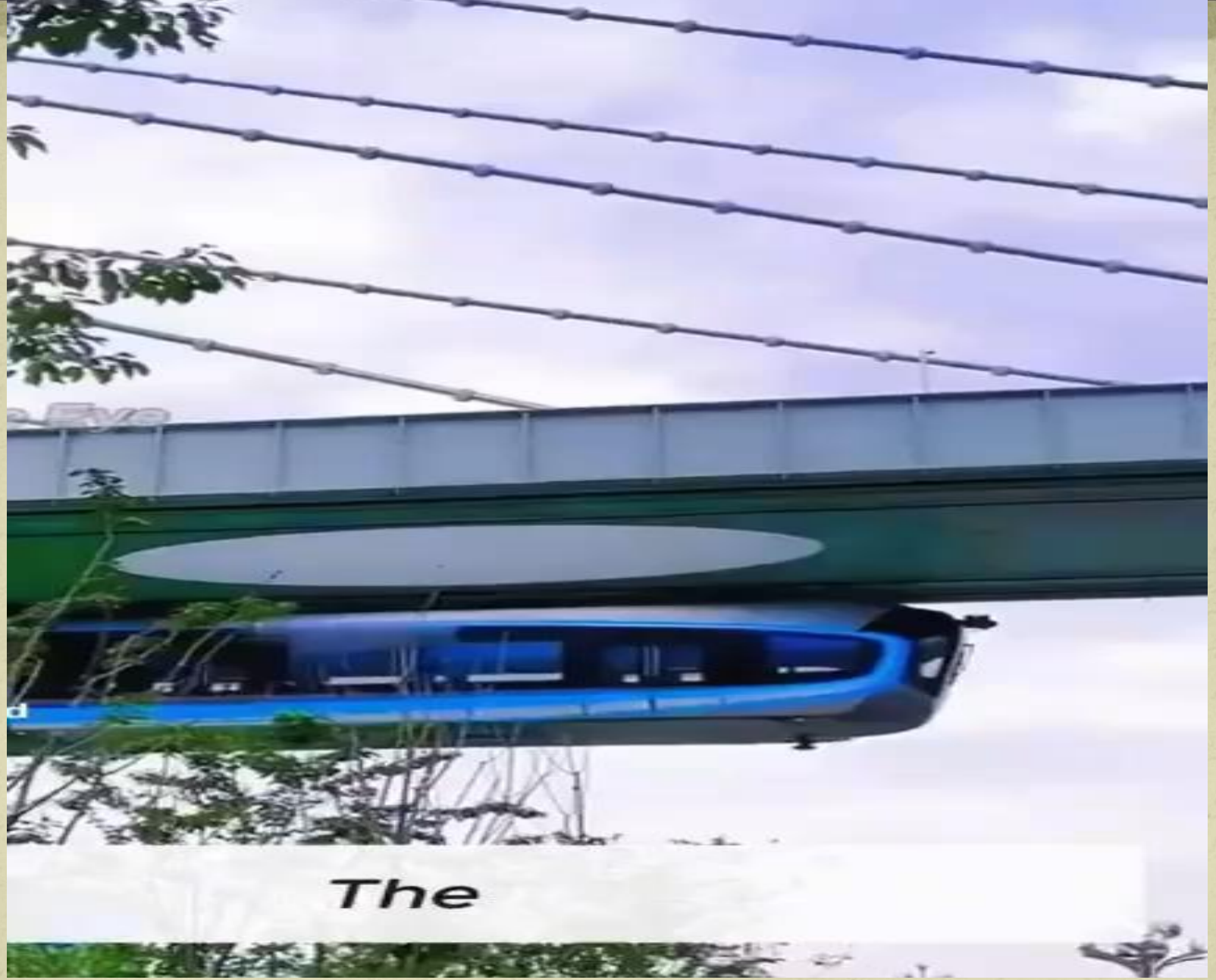


Stages of Organizational innovation



Innovation Outputs

- New Products and Services
- Process Improvements
- Technological Advancements
- Sustainable Solutions
- Intellectual Property.
- Cost Reduction and Efficiency.
- Customer Loyalty
- Brand Enhancement:
- Learning and Experience.
- Networking Opportunities.
- Innovation Culture: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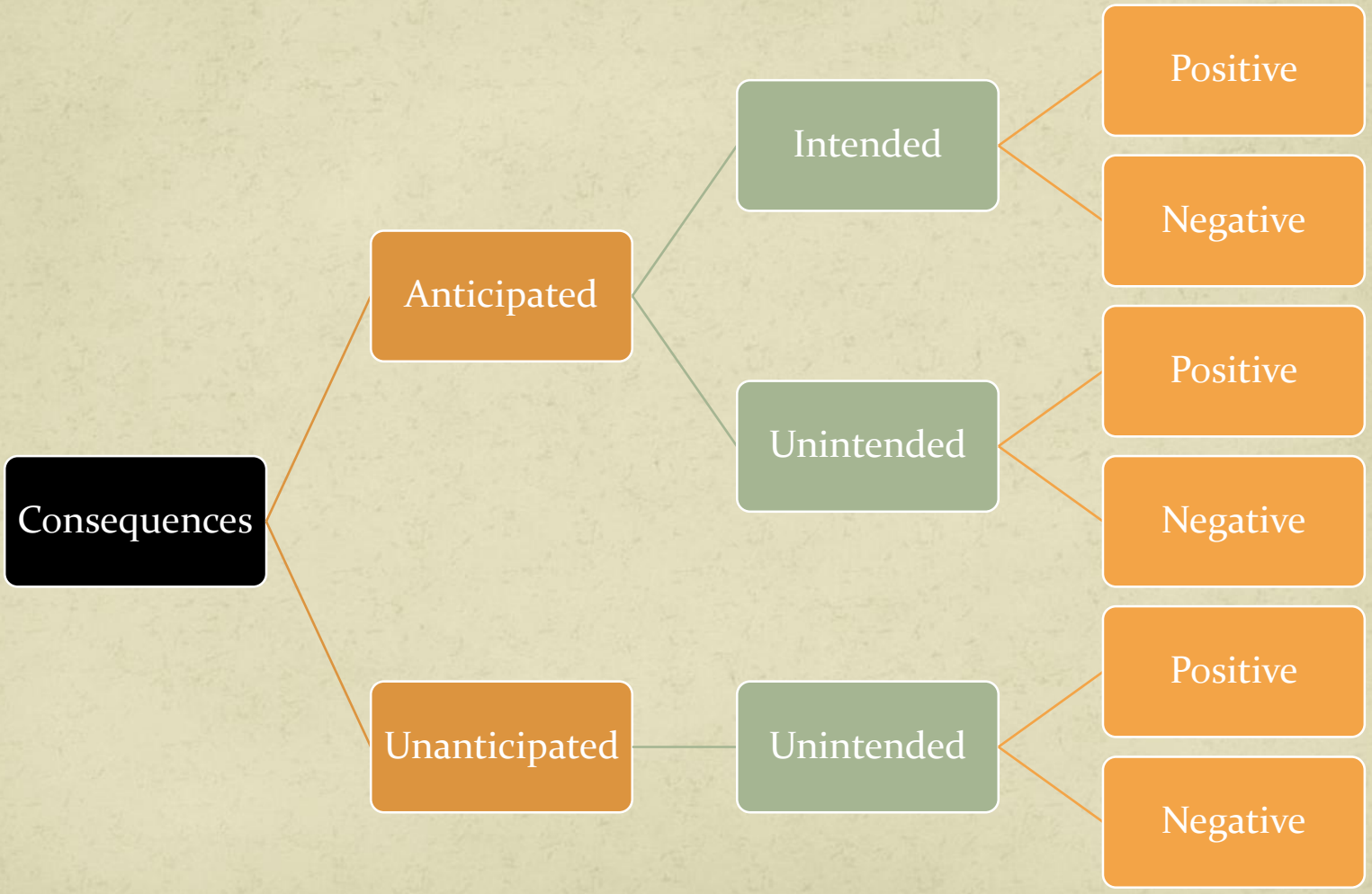
Consequences of Innovation



Consequences to Society

- Economic Growth and Prosperity.
- Improved Quality of Life.
- Increased Access and Inclusivity.
- Environmental Impact.
- Social and Cultural Change.
- Ethical and Privacy Concerns.
- Job Displacement and Reskilling.
- Health and Safety Implications.
- Globalization and Cultural Exchange.
- Legal and Regulatory Frameworks.
- Political and Social Stability
- Long-Term Sustainability

Consequences to the Individual:

- Improved Quality of Life:
- Enhanced Convenience and Efficiency
- Empowerment and Personal Growth:
- Health and Well-Being
- Inclusion and Access
- Disadvantaging others and Inequality.
- Privacy and Security Concerns
- Job Disruption and Reskilling:
- Social and Cultural Change
- Physical and Mental Health complications
- Consumer Behavior and Choices
- Ethical and Ethical Dilemmas:

Consequences to the Innovating Team:

- Team Morale and Motivation:
- Recognition and Awards
- Career Advancement
- Financial Rewards
- Pressure to Succeed Again
- Conflict and Challenges
- Resource Allocation
- Learning from Failures
- Burnout Risk
- Long-Term Impact:

Consequences to the Innovating Firm:

- **Competitive Advantage:**
- **Revenue Growth**
- **Profitability**
- **Market Expansion**
- **Strategic Positioning**
- **Talent Attraction and Retention**
- **Investor Confidence**
- **R&D Investment**
- **Risk Management**
- **Corporate Culture**
- **Responsibility and Sustainability**
- **Regulatory and Legal Considerations:**

MODELS OF INNOVATION

Linear models of innovation

Technology Push

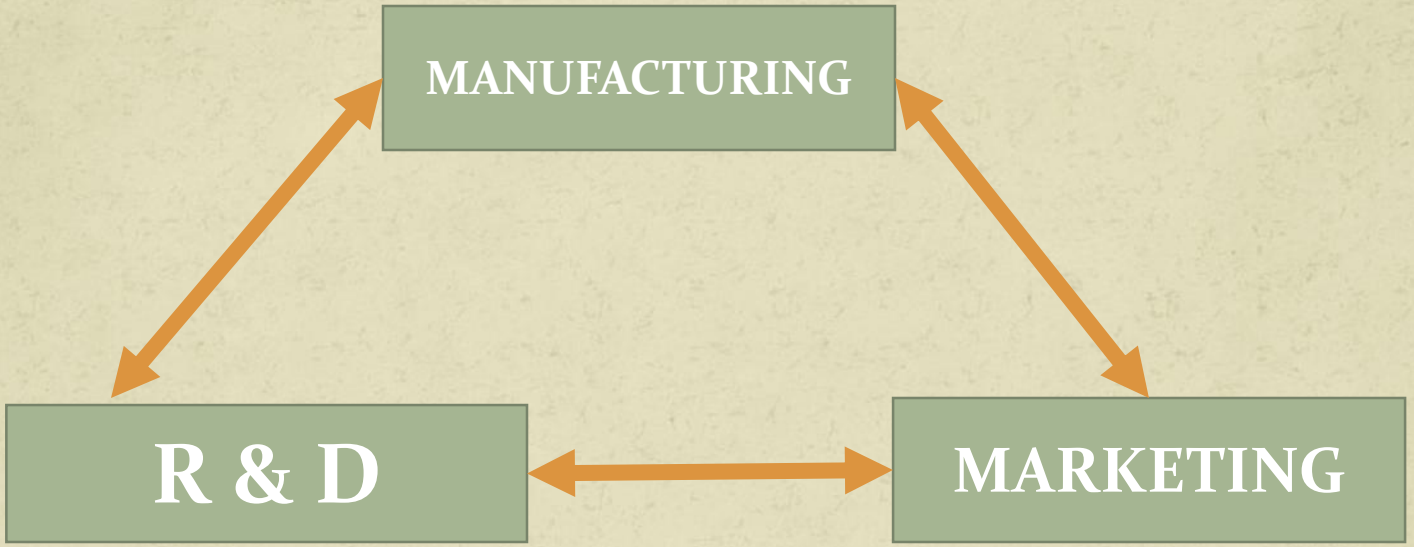
Basic Science → **Technological Development** → **Manufacturing** → **Marketing** → **Sales**

Demand Pull

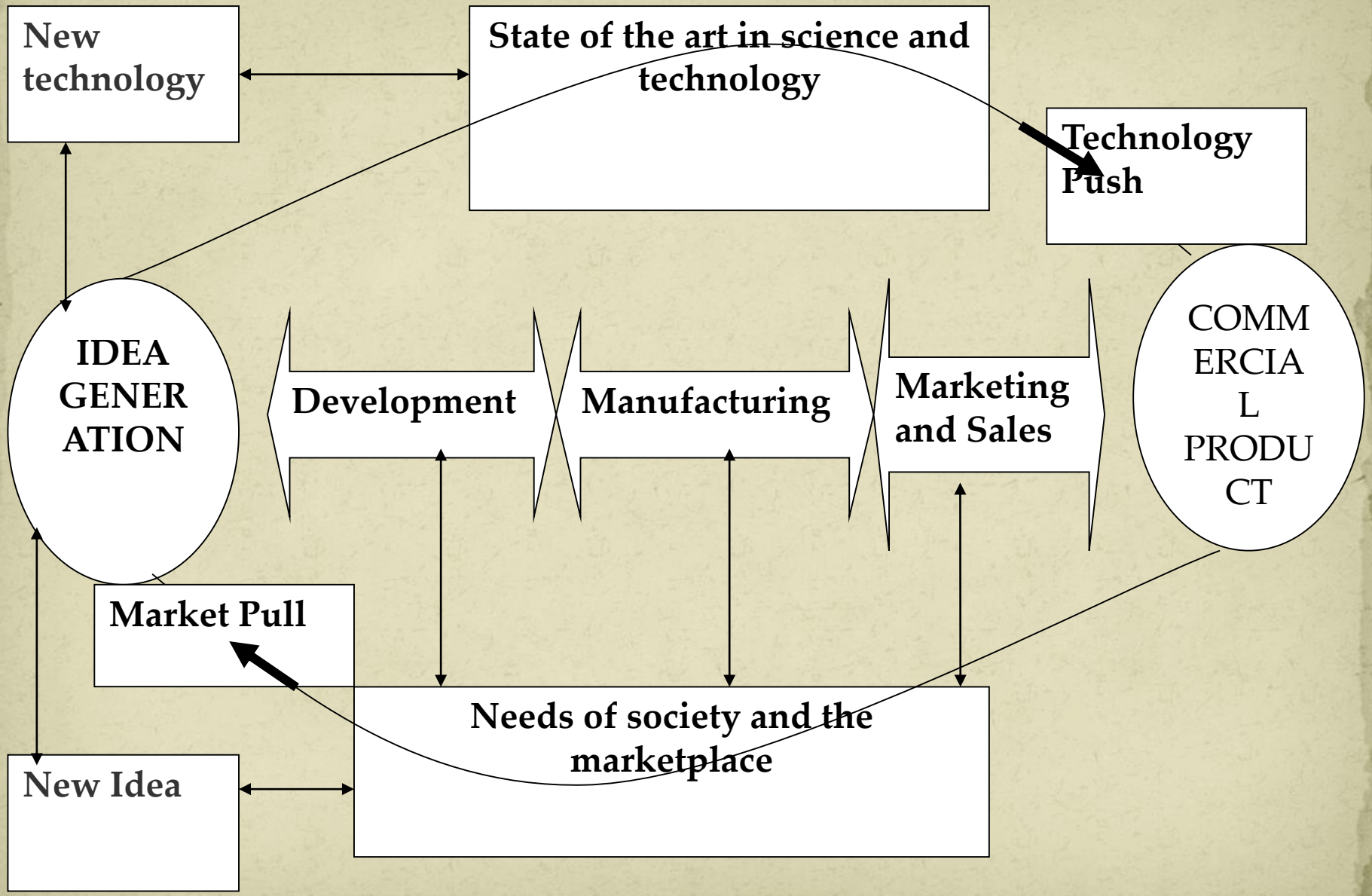
Market Needs → **Development** → **Manufacturing** → **Sales**

Model	Characteristics
Technology push	Simple linear sequential process, emphasis on R&D and science
Market pull	Simple linear sequential process, emphasis on marketing, the market is the source of new ideas for R&D
Coupling model	Recognizing interaction between different elements and feedback loops between them, emphasis on integrating R&D and marketing
Interactive model	Combinations of push and pull models, integration within firm, emphasis on external linkages
Network model	Emphasis on knowledge accumulation and external linkages, systems integration and extensive networking

Coupling Model Innovation

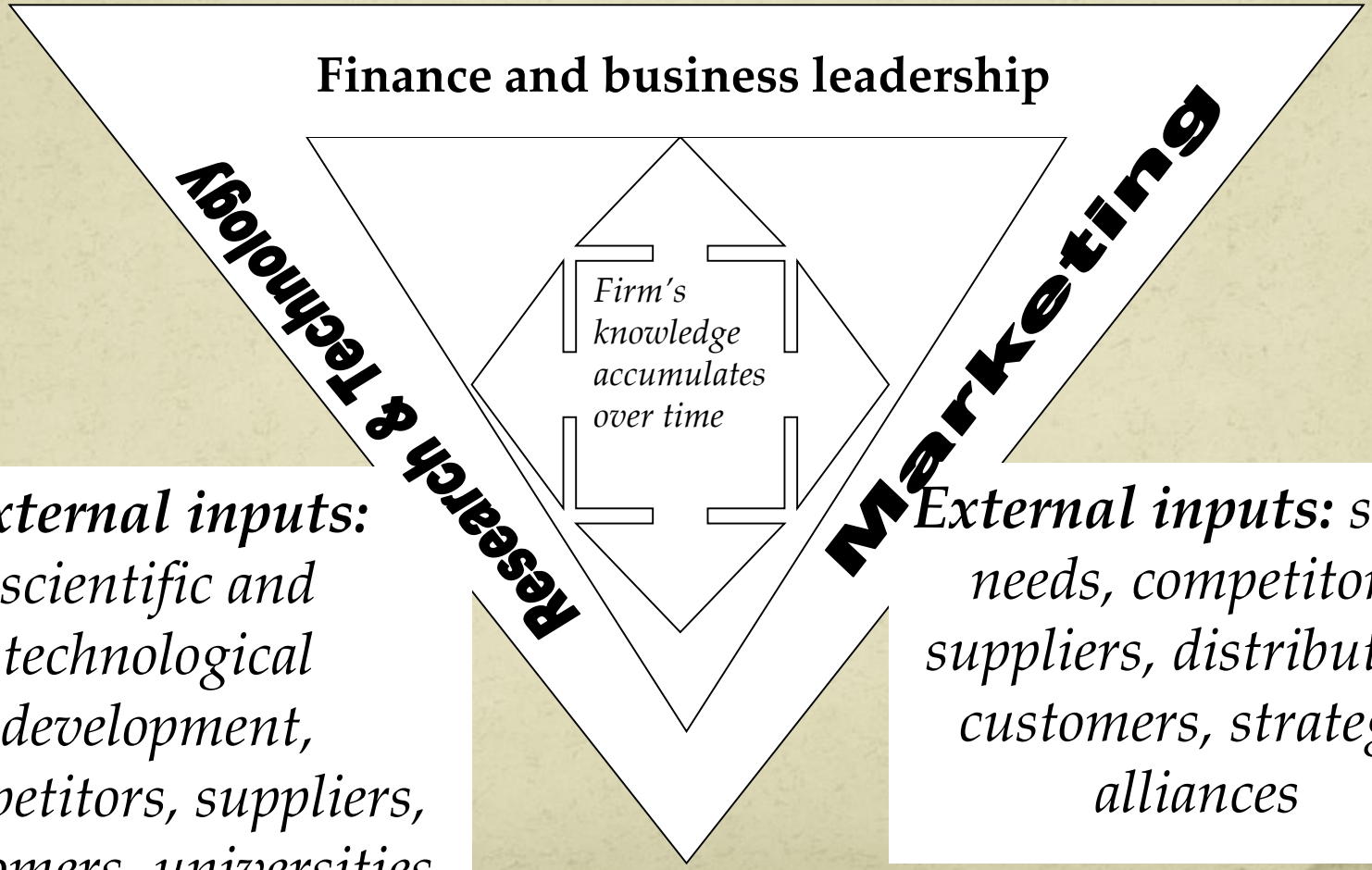


Interactive Model of Innovation



Network Model of Innovation

External inputs: *macro factors, competition, profit, growth, diversification, costs and input prices, political influences*



External inputs: *scientific and technological development, competitors, suppliers, customers, universities*

External inputs: *social needs, competitors, suppliers, distributors, customers, strategic alliances*

The Closed Innovation paradigm

- **Characterized by:**
  - Stockpiling ideas
  - Monopoly on talent
  - Long-term employment relationships
  - Long-term investments
- **Tension**
  - Long-term investment & short-term results
- **Challenges of closed innovation**
  - Fluid employee-employer relationship
  - Short shelf life for ideas
  - Difficult to monopolize knowledge

The Open Innovation Paradigm

- **Open to new ideas, alternatives, ambiguity & uncertainty**
- **New Questions:**
  - Can you profitably use other's ideas?
  - Can you profitably allow others to use your ideas?
- **Approaches**
  - Acquisition.
  - Alliances with Firms
  - Academia.
  - Collaboration - Innovative collaborative projects.
  - In-licensing - license other firms' intellectual property.
  - Customers and Lead-users.

Innovators' Dilemma

- **Well-managed companies often fail because the management practices that enable them to become industry leaders also make it difficult for them to develop disruptive technologies.**
- **Traditional Organizations:**
  - Are Designed to Produce Stable, Predictable Performance
  - Fight Unauthorized Behavior -- and Ambiguity
  - Use Specialization to Narrow Members' Focus
  - Emphasize Control and Managerial Intent, Ignoring Other Cognitive Resources

Established Firms Fail to innovate

- **Mechanistic, exploitative: set up to execute on existing operations**
  - Short run, unit-focused, execution-oriented

- **New businesses are different**
  - Exploratory, organic
  - Different markets, business models/economics
  - Different people and skills required
  - Different metrics needed

Solutions need to balance exploration and exploitation

What needs to be done …

- **Use an Innovation Value Chain View**
- **Create hybrid structure that separates & integrates**
- **Develop an innovation culture**
  - Support for risk taking, Rewards for innovation, Management role models, Challenge the status quo, Tolerance of mistake , Teamwork, Share common goals, Open information and a sense of urgency
- **Develop multiple skill sets**
- **Change the way new businesses are created**
- **Innovation champions need to develop political skills**

Consequences of Innovations

Sustaining

- Improve performance of established products
- Meet demands of mainstream customers in major markets
- Vary in difficulty, cost, time, etc.
- Established firms

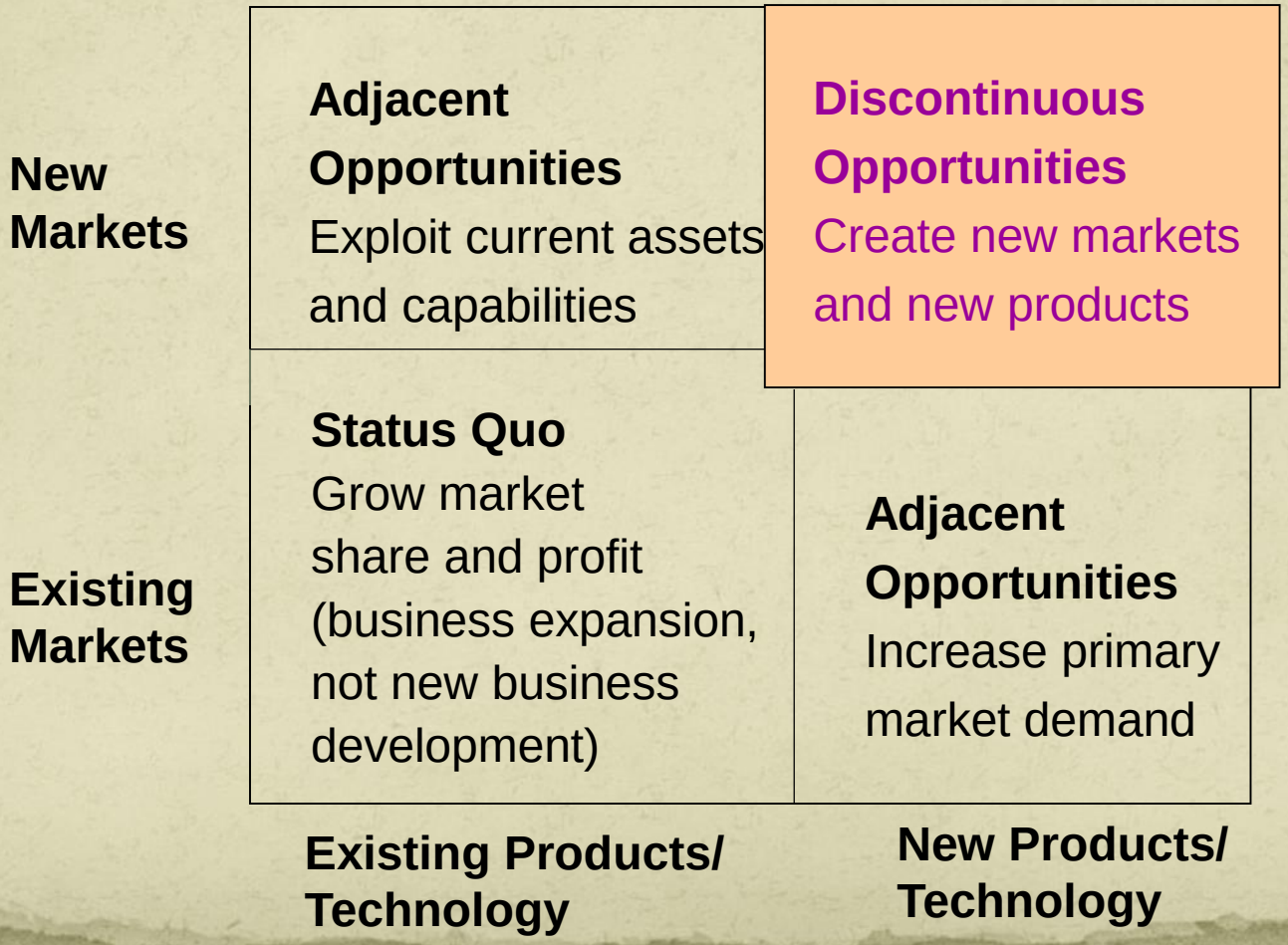
Disruptive

- Underperform established products in mainstream markets
- Have new features that fringe / new customers value
- Cheaper, simpler, smaller, more convenient to use
- Entrant firms

Major Disruptive Innovations

Period	Technological Advances
1782-1845	Steam power, textiles
1845-1892	Railroads, iron, coal, construction
1892-1948	Electrical power, automobiles, chemicals, steel, Radio, Telecommunications
1948-present	Semiconductors, consumer electronics, aerospace, pharmaceuticals, petrochemicals, synthetic and composite materials, advanced telecommunications and the Internet

Discontinuous opportunities: The source of radical innovation



New Disruptive Innovations

Extension of Human Sensory Capabilities and Intellectual Processes

- Genetic engineering
- Advanced computers/ telecommunication
- Robotics
- Artificial intelligence
- Alternative energy (solar, fuel cells, etc.)
- Advanced materials (molecular design, new polymers, high-tech ceramics, fiber-reinforced composites)

The Innovation Process

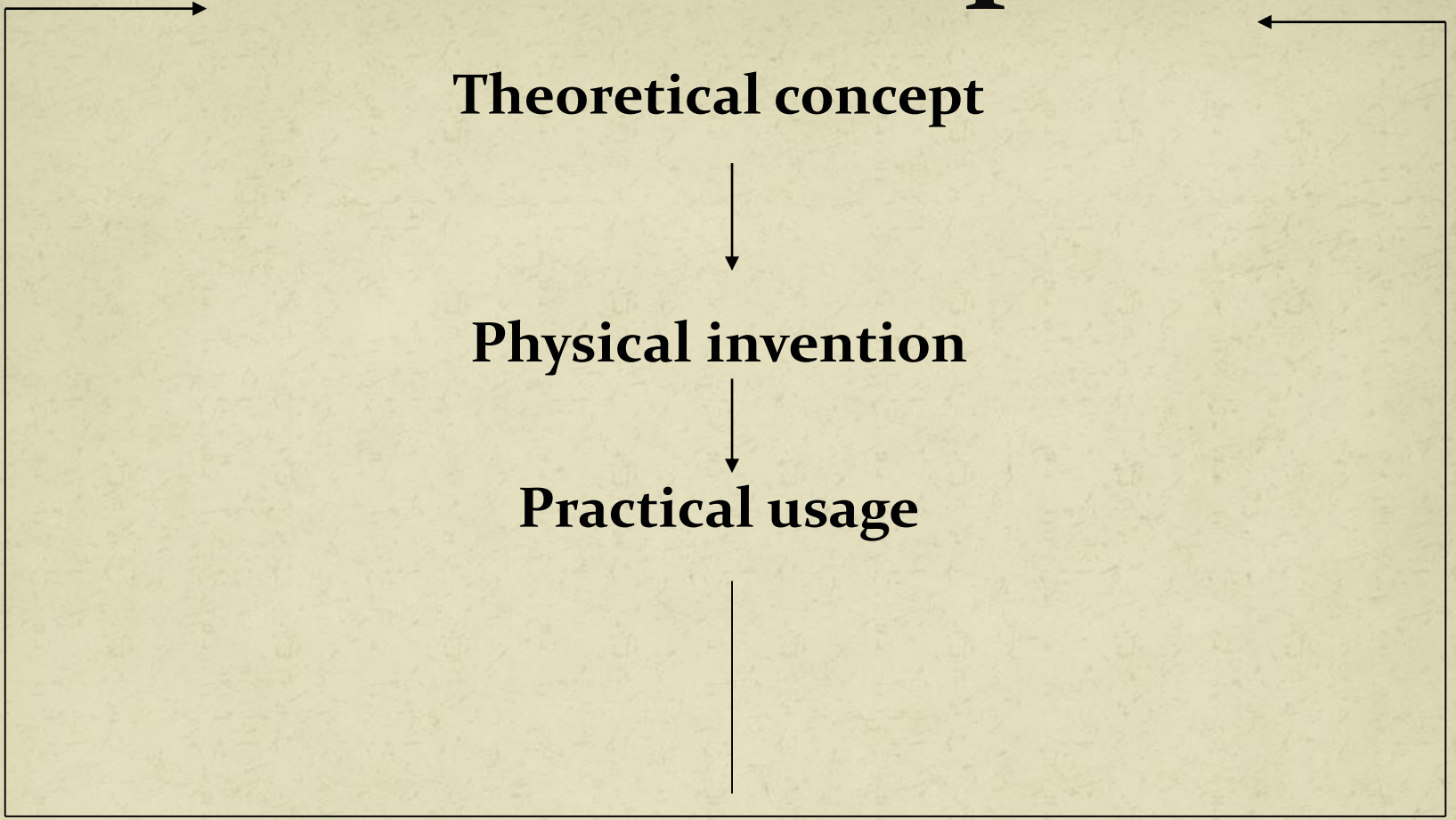
Innovation is a Knowledge-based Process

- **In the Innovation Process knowledge is used to:**
  - Discover and see innovative opportunities
  - Exploit new ideas with established knowledge and routines
- **However, the innovation process is also a knowledge creation process.**
  - A big challenge is to connect and combine the new with the old (important role for the management!)

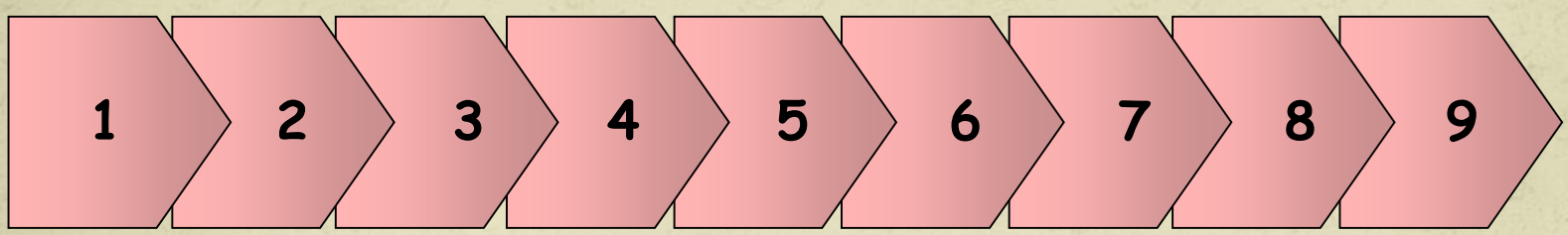
The Innovation Process

- **Is a trial & Error process – an experiment**
  - Design an experiment
  - Predict outcomes based on hypothesis
  - Measure Outcomes
  - Compare Outcomes to predictions
  - Learn from the conclusions
- **In business, ideal conditions do not exist.**
  - Results are ambiguous, experiments are expensive & influenced by external elements, Makes learning from strategic experiments difficult
- **There always setbacks and failures in innovation processes: use the knowledge that comes from failures! & Learn to tolerate and manage failures!**

Innovation as a process



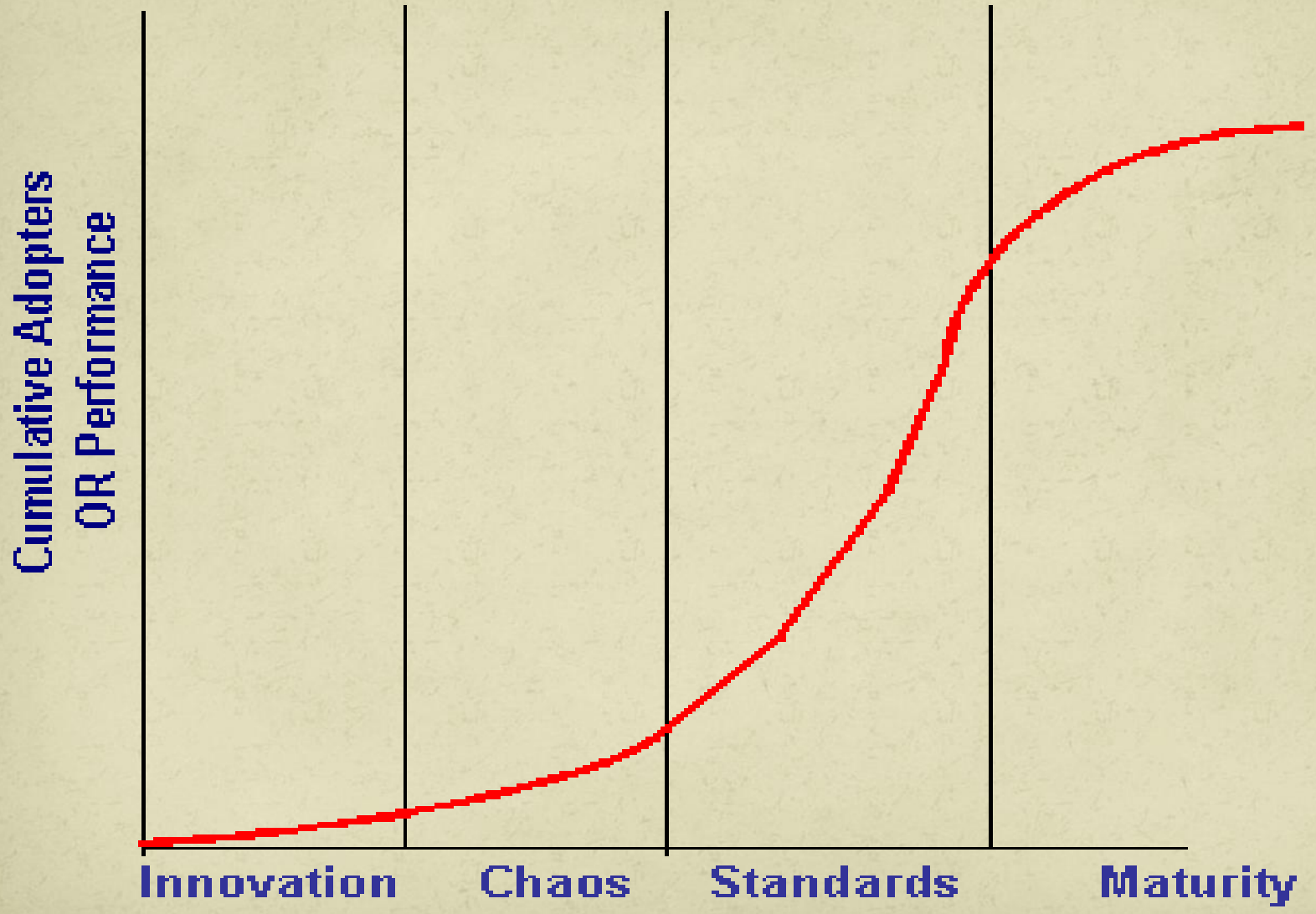
The Innovation Process



1. Scientific Suggestion and Perception of Need
2. Theory/Design Concept
3. Verification
4. Laboratory Demonstration
5. Pilot/Prototype - Full Scale Production
6. Commercial Introduction
7. Widespread Adoption
8. Proliferation
9. Death

- This is an abstraction to help you think about the process
- It won't fit all situations literally

Phases of Innovation



Key Success Factors

A successful innovation process requires:

1. An integration of technology push and market pull.
2. An integration of product innovation and process innovation.
3. The integration of all the firm's functions into a cross-functional team.
4. With a high level of communication and information sharing.

Concurrent Innovation

- **In past years firms used the "phased product planning" approach to innovations, resulting in products that were:**
  - Difficult to manufacture
  - Unresponsive to rapidly changing markets
  - Slow to appear in the market
- **Concurrent or simultaneous innovation combines all stages of the innovation process in a parallel or overlapping fashion, using cross-functional teams.**

Routinize the innovation process.

- Can we really manage innovation?
- The role of management in the process is to implement and routinize the process.
- The routines comes from internal or external sources
- Innovation management is a learned capability!

Strive to Minimizing Risk

- Focus on simple, well-trod areas
- Establish new generations of existing products
- Introduce new models
- Differentiate product rather than create different ones
- License others' inventions
- Imitate others' product introductions
- Modify existing processes
- Make minor technical improvements

Uncertainty Affecting Innovation

- **Technical uncertainty**
- **Business condition uncertainty**
- **Market uncertainty**
- **Government uncertainty**

Difficulties of Successful Innovation

- The entities that make the discoveries are not always the ones that profit from them
- Innovation rarely is instantaneous
- Diffusion is very uneven
- Since imitators face lower costs, the incentive to be innovative and entrepreneurial is not large

The Typical Innovation Journey

- Coincidental events initiate gestation of many years
- Plans presented to resource controllers in form of sales pitches
- At start, disagreement and lack of clarity abound
- Ideas proliferate, making managing difficult
- Lack of continuity among personnel creates problems
- Emotions run high, leading to frustration, setbacks, mistakes, and blame
- Problems snowball and patience of resource providers weakens
- A struggle for power ensues
- Resources may run out before dreams are fulfilled