



## The Role of Knowledge Management in the Organizational Innovation Processes: The Case of 3M

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## Innovation is difficult

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- One of the most difficult challenges in Innovation:  
Black Box Approach
  - Every company understands the importance of innovation.
  - However, innovation remains a black box.
  - No one knows how to manage black box processes.
- "Innovation is a must to survive in our environment....All of my [executive] colleagues understand the need for innovation and are 100% supportive of employees who innovate....Yet, I cannot say that we have an organizational process for innovation...Innovation happens, but I cannot outline the process to you because I do not think we have one."

– CEO, Information Technology Organization

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## Driving Questions

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- What are the stages of the innovation process in organizations?
- What are the various issues that organizations face?
- What are the differences between organizations with mature innovation processes and those with immature or nonexistent innovation guidelines?

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## Innovation Process: 5 Major Stages

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Generation Mobilization
Advocacy Screening
Experimentation
Commercialization
Diffusion Implementation

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## Generation and Mobilization

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- Idea Generation:
  - The process whereby new ideas are created through
    - Redefinition of concepts
    - Changes in processes
    - New components of products and service
    - The offering of brand new products and services
- Mobilization:
  - The stage where modifications to any existing products, processes, services or frameworks of thought lead to the movement of ideas from one location (physical or logical) of the organization to another.
- Idea sources may be:
  - Internal
  - External (e.g. customers, business partners, academia, government, or competitors)
- Some ideas may be created from scratch; some others transported from allied or foreign domains

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## Maturity Indicators

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- Organizations with mature innovation programs
  - a) Have clearly articulated guidelines to help in the recognition and construction of ideas.
  - b) Find a balance between emphasizing play and emphasizing need.
  - c) Are more likely to explore ideas from a wide array of sources and open to ideas no matter where they originate
  - d) Know how to connect sources of ideas and nurture ideas from sources.
  - e) Hold some people, teams or units responsible for idea generation.
- Immature organizations are more likely to seize good, immediately applicable ideas, but not to reward sources for ideas, or ideas that complement the direction of the organization without being immediately applicable.

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## The case of 3M

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- 3M is a company where close to 50 different technology platforms co-exist to synergistically create over 60,000 different products in areas as diverse as abrasives and biotechnology, medical care and adhesives, solar energy and mining, electricity and drug delivery, light management and acoustics (and much more)
- Cross-pollination of ideas across platforms has historically been one of the sources of innovation in the past – and also of competitive advantage.
- Multiple avenues to help serendipity:
  - Tech Forum
  - E-Tools
  - COPs
- Examples:
  - Wet-dry sandpaper /Masking tape
  - Scotchgard™ in oil wells
  - New paper cutter
  - Post-it picture printing paper
  - “Nomad”™ carpets in mining
  - Anti-dust applications
  - Low-weight ceramic electrical cables

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## Advocacy and Screening

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- The process of identifying the potential benefits and problems with any particular idea at a particular time
- Advocacy and screening encompasses evaluation of potential opportunities and allows ideas to undergo a period of refinement.
- To increase the likelihood of success, both advocates and screeners must be present in an organization and have the collaborative skills to interact productively.

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## Maturity Indicators

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- Organizations with mature innovation programs
  - a) Have clear-cut protocols for the evaluation and screening of ideas.
  - b) Know how to balance appropriately between immediate and longer term ideas.
  - c) Know how to advocate and screen for ideas that have varying degrees of impact.
  - d) Let their employees have numerous avenues through which to advocate for and get feedback on their ideas.
  - e) Recognize that advocating for ideas is a risky and time-consuming process.
  - f) Provide rewards to those who advocate for ideas in addition to rewards and recognition for idea generators.
  - g) Take great care in building transparent evaluation and screening protocols.

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## The case of 3M

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- Idea hopper with 6-sigma tools to evaluate best candidates for further analysis
- Record of invention
- Internal selling process (intrapreneurial)
- 15% time available to foster innovation
- Idea champions critical to the process
- Feedback along the way is easily available; culture is strongly open to sharing and supporting each other's ideas.
- R&D is taken very seriously
  - At heart, 3M is an engineering company
  - Basic science vs. applied science
- Different awards and recognitions supporting the evaluation process

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## Experimentation

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- This process determines which ideas are technically and structurally possible at the present.
  - An iterative process
    - At each stage of the experimentation process an idea must be re-evaluated by advocates and screeners alike.
  - Experimentation can be resource-consuming.
  - Experimentation is an unstructured process.
- Major outputs:
  - Identification of ideas for commercialization
  - Libraries of ideas not being pursued

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## Maturity Indicators

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- Organizations with mature innovation programs
  - a) Encourage experimentation.
  - b) Have identified ways to creatively use technology.
  - c) Have a sanctioned process for experimentation.
  - d) Have a clear and known process by which a prototype is constructed, tested, evaluated, refined, and improved upon.
  - e) View the experimentation process both as a necessity and as an asset.

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## The case of 3M

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- Best ideas are evaluated for moving from lab to production (scale up)
- Complete set of labs: division labs for product development, process and material labs to support scale-up for manufacturing
- Products can be killed in this stage
- Prototype manufacturing lines are available for experimentation in small volumes
- Intellectual property carefully kept (both for successful ideas as well as those not pursued)

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## Commercialization

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- The commercialization process focuses on the potential impact of an idea.
- During this stage, ideas are packaged into products and/or services that have internal or external market value.
- Part of the work of commercialization is to establish the specifications of an idea.
  - The promises and potentials of the earlier stages of innovation must be discarded so that the actual benefits of the new innovation can be perceived and communicated.
- Documentation, both of the commercialization process and of the demonstrable and communicable aspects of the innovation, becomes crucial. The very act of documenting an innovation's benefits establishes a base for communicating value.

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## Maturity Indicators

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- Organizations with mature innovation programs
  - a) Are more likely to be able to package their new ideas within existing products and services without disrupting current customers, services or offerings.
  - b) Understand the difference between idea creation and idea commercialization.
  - c) Have clear and robust linkages between experimentation and commercialization efforts.
  - d) Experiment frequently with minimal cost.

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## The case of 3M

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- Stage gate process based on 6-sigma processes has been implemented for new product development and introduction
- Ancillary systems provide support for the whole process
- Training is available for all appropriate stakeholder levels
- Commercialization of a given product is done by multiple divisions
- Typically products sold through wholesalers or other intermediaries; however, sales force is very strong in its interaction with ultimate users to influence their choice / specification of 3M products

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## Diffusion and Implementation

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- Diffusion is the process of generating buy-in and acceptance for a new innovation.
- Implementation is the process of setting up the structures, maintenance and resources to allow the innovation to develop and be utilized or produced.
- 3 useful strategies for diffusion of ideas:
  - Targeting key actors to align the company for knowledge management
  - Building on existing initiatives and actively focusing on knowledge networks to generate momentum
  - Communicating a purposeful message that aids the cultural and mental transition
- Knowledge Brokers
  - Key figures who bring new ideas to the table within an organization or as representatives of a partner company or outside organization
  - They know the specific context and application.
  - Using knowledge brokers is an effective way to formalize and systemize this stage of innovation.

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## Maturity Indicators

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- Organizations with mature innovation programs
  - a) Know how to enable change.
  - b) Are likely to turn back to the social networks developed during earlier phases of innovation.
  - c) Are likely to have already established customer segmentation policies that helped drive the earlier screening and prototyping stages.
  - d) Use technologies to enable the diffusion and implementation process.
  - e) View the implementation and diffusion process as an opportunity to identify next set of needs for customers.

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## The case of 3M

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- Social network analysis is utilized to understand interactions among large number of scientists, sales force, and other key stakeholder groups
- Strong informal networks do exist; they are supported by many formal structures in the R&D, Commercialization, and Manufacturing segments of the business
- Very frequent workshops are available: new technologies, opportunities or just courses spreading technical state of the art are common (i.e., web handling, vacuum processing, etc.)
- Worldwide asynchronous poster sessions detailing innovative solutions are held multiple times a year; replication of these in different geographical or area markets are encouraged.

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## Conclusion

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- The innovation process is:
  - the backbone against which innovative efforts can take shape.
  - The context around which ideas are mobilized from thought to action.
- All ideas must go through the entire innovation process.
- In many cases, having a sanctioned and organization-wide framework for innovating may be a strategic competitive differentiator.

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## Questions and Comments

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