Synopsis

Session 2: Leading Innovation

Presented by

Main Speaker – Dr. Young-Tzung Shih
Panelist – Mr. Jayantha De Silva
Panelist – Mr. Deepal Sooriyaarachchi
Innovation and leadership are closely related. Visionary leaders establish fertile grounds within organisations for innovative ideas to originate and flourish. They play a key role in getting rid of the innovation stifles - heavy bureaucracy and hurdles, risk averseness or loading people with so much work that they barely have time to think, let alone envisioning something new. Innovation springs from a culture that encourages everyone to come forth with new ideas. Effective leaders are able to inculcate trust amongst employees, enabling improvement in communication and acceleration of productivity, as attention is redirected towards team objectives. Trust would boost employee confidence enabling a culture to induce innovation. This session highlights the role of leadership in driving innovation.
Session (2)

Leading Innovation

Presented by

Dr. Y.T. Shih
Senior Manager
3M Corporate Research Laboratory
Singapore and SEA
3M Innovation Story

Uncommon Connections
Innovative Solutions

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Our Vision

3M Technology Advancing Every Company
3M Products Enhancing Every Home
3M Innovation Improving Every Life
Innovation is our biggest competitive advantage and the heart of 3M.

Inge Thulin, 2012
Enabling Customer Success:

3M Five Market-Leading Business Groups

**Industrial**
From purification to aerospace – changing how industry works

**Safety & Graphics**
From protecting people & information to enhancing visual & design communication

**Electronics & Energy**
Enabling tomorrow’s lifestyle today with power, communications and electronics

**Consumer**
From simplifying life at home to keeping you organized at work

**Health Care**
From preventing infections to making smiles brighter

- Sales: $29.9 B
- Net income: $4.4 B
- R&D investment $1.6 B
- International sales $19.4 B (65% of company total)
- Companies in 71 countries
- Sales in nearly 200 countries
- ~ 88,000 employees
- 200+ factories
- 55,000+ products
- 3,100+ patents issued in 2012
- 40,500+ issued & pending patents

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Culture of Innovation

- 11,000+ technical employees worldwide
- 85 laboratories globally
- 40 Customer Technical Centers
- R&D at 5.4% of sales
- 46 established technology platforms
- Technical depth & breadth
- Bring multiple technologies to each customer
- Entrepreneurial culture
- Individual initiative ~ 15% of time
- Legacy of boundaryless culture
A Century of Innovation

1921 - 3M patented and introduced Wetordry™ waterproof sandpaper – the world’s first water-resistant coated abrasive

1925 - Scotch™ masking tape introduced

1927 - Scotch™ Cellulose tape introduced

1931 - 3M began producing Colorquartz™ roofing granules

1939 - First traffic sign featuring Scotchlite™ reflective sheeting erected in Minneapolis

1945 - Scotch™ vinyl electrical tape introduced

1947 - Scotch™ magnetic audiotape introduced

1948 - 3M debuted its first surgical drape

1948 - 3M’s first non-woven product-decorative ribbon for gifts

1949 - Scotch™ magnetic film introduced

1952 - Scotchlok™ electrical connectors and Scotchkote™ insulation introduced

1954 - RCA used Scotch™ magnetic tape to record TV programs for the first time

1955 - 3M introduced the first metered dose asthma inhaler, free of ozone depleting chlorofluorocarbons.

1957 - 3M introduced Scotchshield™ window film, shatter-resistant, heat-and-cold resistant window protection.

1960 - Scotch™ Brand Magic transparent tape introduced

1969 - 3M products were used in the first moon walk on July 20. Astronaut Neil Armstrong left a footprint in the lunar dust in boots made from Fluorel™ synthetic rubber from 3M

1979 - Thinsulate™ thermal insulation introduced

1980 - 3M introduced Post-it® Notes, greatly enhancing office communication

1985 - Academy of Motion Picture Arts and Sciences gave 3M a Scientific Engineering Award for magnetic film, improving audio capabilities of movie sound tracks

1987 - 3M’s first non-woven product-decorative ribbon for gifts

1990 - New products include flexible circuits for electronic products and HFEs (hydrofluoroethers), replacing ozone depleting chlorofluorocarbons

1991 - 3M introduced Scotchshield™ window film, shatter-resistant, heat-and-cold resistant window protection.

1995 - 3M introduced the first metered dose asthma inhaler, free of ozone depleting chlorofluorocarbons.

1996 - 3M introduced Scotchshield™ window film, shatter-resistant, heat-and-cold resistant window protection.

1998 - 3M introduced the Vikuiti™ brand for light management products that make electronic displays easier to read

1999 - 3M developed Aluminum Conductor Composite Reinforced (ACCR) as a solution to thermally constrained transmission bottlenecks

2000 - 3M developed Scotch™ mask respiratory protection products

2005 - 3M developed Scotch™ mask respiratory protection products

2009 - 3M™ MPro pocket-sized projector for mobile presentations and sharing photos on the go

2010 - 3M™ Cubitron™ II using precision shaped abrasive granules creating the future of the abrasives industry

2012 - 3M LED advanced light, most energy efficient, longest-lasting light bulb

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3M’s First Customer-Inspired Innovation...

Two-toned cars were in demand …

… but a clean paint line was very hard to achieve.

3Mer Dick Drew observed this dilemma in action while visiting customers to sell sandpaper …
... and he remembered some stuff he’d seen in the laboratory...

... and went on to invent 3M Scotch Masking Tape
## 3M’s 46 Core Technology Platforms

### Successful New Product Growth Builds on Uncommon Connections

<table>
<thead>
<tr>
<th>Technology Platforms</th>
<th>Materials</th>
<th>Processing</th>
<th>Capabilities</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ab Abrasives</td>
<td>Co Advanced Composites</td>
<td>Mo Molding</td>
<td>An Analytical</td>
<td>Ac Acoustic Control</td>
</tr>
<tr>
<td>Ad Adhesives</td>
<td>Do Dental &amp; Orthodontic Materials</td>
<td>Pe Predictive Engineering &amp; Modeling</td>
<td>Pr Process Design &amp; Control</td>
<td>Ec Energy Components</td>
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<td>Am Advanced Materials</td>
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<td>Fe Flexible Electronics</td>
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<td>Nt Nanotechnology</td>
<td>Nw Nonwoven Materials</td>
<td>Su Surface Modification</td>
<td>Mi Microbial Detection and Control</td>
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<td>Ce Ceramics</td>
<td>Sm Specialty Materials</td>
<td>Po Porous Materials &amp; Membranes</td>
<td>Pm Polymer Processing</td>
<td>Md Medical Data Management</td>
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<td>Nt Nanotechnology</td>
<td>Pd Particle &amp; Dispersion Processing</td>
<td>Mr Microreplication</td>
<td>Pr Radiation Processing</td>
<td>Ec Energy Components</td>
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<td>Ec Energy Components</td>
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<td>Ps Polymer Processing</td>
<td>Su Surface Modification</td>
<td>Pr Process Design &amp; Control</td>
<td>Ec Energy Components</td>
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<td>Fs Filtration, Separation, Purification</td>
<td>Ps Polymer Processing</td>
<td>Su Surface Modification</td>
<td>Pr Process Design &amp; Control</td>
<td>Ec Energy Components</td>
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<td>Ra Radiation Processing</td>
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<td>Ec Energy Components</td>
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3M Innovation Model

**Technology Platforms**

- Abrasives
- Adhesives
- Ceramics
- Electronics, Software
- Films
- Microreplication
- Nanotechnology
- Non-wovens
- Precision Coating
- Vapor Processing

**Markets**

- Architecture & Construction
- Consumer & Office Display
- Electronics Filtration
- Health Care
- Renewable Energy
- Safety & Security
- Telecoms and Utilities
- Water Infrastructure

**Opportunity Drives Development and Utilization**

**Doing Things Only 3M Can Do**

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Transforming Technology into Consumer Brands

- Pressure-Sensitive and Microsphere Adhesives
- Non-Wovens
- Abrasives
- Filtration
- Films
- Precision Coating
- Fluoropolymers
- Colloid Science

Technology is “Consumerized” into Brands

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Art Fry used an adhesive developed earlier by Spencer Silver to create one of 3M’s most famous products, Post-it® notes.

“At 3M we’re a bunch of ideas. We never throw an idea away because you never know when someone else may need it.”

-Art Fry
Connecting Technology to Customers...

Connecting to Customers

Driving Growth Through Innovation

Anywhere and Everywhere

Developing Cutting-Edge Technology
Technology Drives Growth...

- 3M™ Brightness Enhancement Film
- 3M™ Prestige Series Solar Films
- 3M™ Scotchshield™ Film 17 Solar Panel backsheet
- 3M™ Confirm™ Laminate with Floating Image
- 3M™ Cubitron II™ Abrasives
- Scotch ® Magic™ Tape
- 3M™ Aluminum Conductor Composite Reinforced
- 3M™ Prestige Series Solar Films
- 3M™ LED Light Bulb

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3M™ Confirm™ Laminate with Floating Image
3M™ Cubitron II™ Abrasives
3M™ LED Light Bulb
Scotch® Magic™ Tape
Saves Energy
Enhanced Safety & Security
VOC free Manufacturing Process
Prevents Disturbance of Environmentally Sensitive Areas
Promotes Renewable Energy
Reduces Waste
Saves Energy
Saves Energy
…and Solves our Customer’s Sustainability Challenges
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Impact of 3M Platforms

- **Pressure-Sensitive Adhesives**: 75% of Company
- **Films**: 40% of Company
- **Microreplication**: 35% of Company
- **Filtration**: 30% of Company
- **Non-wovens**: 70% of Company

Innovation model encourages sharing and combination of platforms

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How does 3M deliver products that customers want?

3M Technology Platforms

New Technology/New Product Introduction

IDEA!

NTI Framework

<table>
<thead>
<tr>
<th>Explore</th>
<th>Qualify</th>
<th>Deploy</th>
</tr>
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<tbody>
<tr>
<td>Identify the market opportunity</td>
<td>Identify superior product concepts to meet customer needs</td>
<td>Develop the technical solution</td>
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</table>

Create

Make

Launch

[Diagram showing stages of product development]

Voice of Customer

Products Delivered to the Marketplace

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Innovative NPI

- Submicron Replication for Microneedles and Light Management
- Transparent/Conductive Electrode & EMI Shield
- Renewable Materials
- ACCR
- Auto-stereoscopic 3D Films
- Li Ion Battery Components
- Nanogold Catalysts for Personal Protection
- Ultra Vapor-Barrier Films for Solar/Display Screens
- Digital Dentistry
- Mirror Films for Solar
- High-Performance Nanoparticle Composites
- Acoustic Films
- Membrane Adsorbers (biotherapeutic purification)
- Visual Attention Management
- Renewable Materials
Our Primary Innovation Metric is NPVI

NPVI = New product vitality index (products introduced within the past five years, divided by total sales)

- Year 1 New Product Sales
- Core New Product Sales

International new products now ~70% of total
Technical capabilities around the globe identifying customer needs and developing solutions to meet articulated and unarticulated needs.
3M’s Global Reach

Just around the corner. All around the world.

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Innovation is not just about R&D, new products.
3M Innovation is driven by a system of principles, practices and infrastructure that harness the chain reaction of new ideas.
McKnight Principles

As our business grows, it becomes increasingly necessary to delegate responsibility and to encourage men and women to exercise their initiative.

“This requires considerable tolerance. Those men and women are going to want to do their jobs in their own way.”

“We encourage a health disrespect for our management in our employees.”

William McKnight (Former 3M CEO)
Mistakes will be made. But if a person is essentially right, the mistakes he or she makes are not as serious in the long run as the mistakes management will make if it undertakes to tell those in authority exactly how they must do their jobs.

“Management that is destructively critical when mistakes are made kills initiative. And it is essential that we have many people with initiative if we are to continue to grow.”

William L. McKnight, 1948
The ordinary manager has a craving for order. The leader understands that innovation is almost always an untidy process.

The ordinary manager wants proof for an idea before taking action. The leader understands the value and power of faith.

L. W. Lehr, former 3M CEO - 1980
“Creativity and Imagination have to be managed differently than other aspects of the business.”

Comments by George Buckley, former Chairman and CEO, 3M Open Publication to all 3M employees, June 2008
A Connected Global Collaboration Community

11,000+ member "grass roots" technical organization

1,100+ Technical Forum Events Globally

- 3M’s Annual Event – 3,300 participants
- The Spring Technology Symposium – 1,300 participants
- Carlton Awards Symposium – 500 participants
- Inventor Recognition Ceremony – 250 participants
- Circle of Technical Excellence & Innovation – 6,000 participants
- Virtual Technology Information Exchange – 1,700 participants
- Hundreds of Chapter Events – sometimes as few as half dozen experts meeting on specialized topics such as dynamic molecular modeling

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30+ Active Special-Interest Chapters

- Adhesives
- Nanotechnology
- Laser Processing
- Radiation Curing
- Microreplication
- New Business Development
- Photochemistry
- Life Sciences
- And more...
- Biotechnology
- Inorganic Materials
- Polymer Processes
- Product Design
- Tech Forum – Tech Council Meeting
- Tech Forum – Marketing Meeting
- New Technical Orientation Program
- New Technical Employee Poster Session
- Virtual Technology Information Exchange

Events and Recognition

- The “Annual” Technology Event
- The Spring Technology Symposium
- Carlton Awards Symposium
- Inventor Recognition Ceremony
- Tech Forum Special Programs
- Circle of Technical Excellence & Innovation

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The Annual Event

- Largest event; Everyone participates
- "Internal 3M Trade Show"
- Latest & greatest 3M technologies
- Opportunities to help solve problems
- Delivered electronically to Worldwide Labs
One of 3M’s premier global recognition events

Excellence and innovation in individual technical achievement

Excellence and innovation for team-driven technical achievement

Peer-driven Recognition Program
The Nobel Prize for 3M scientists

3M’s Hall of Fame for technical people

Named after 3M’s fifth president, Richard P. Carlton, who in 1921 became the company's first employee with a technical degree

Honoring those who have made outstanding scientific and technical contributions to 3M

Founded in 1963

173 members

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3M 15% Culture

- It is a culture/philosophy not a time sheet measurement
- Enables employees to explore new technologies and/or new markets
  - Usually related to existing work
- Enables employees to leverage technical specialists
- Does not need management approval
- Teaches employees leadership and new skills
- Diversity in how employees utilize their 15% time

Many innovative 3M products were initially developed with 15% Time
Dual Ladder System

Specialist ↔ Supervisor
Senior Specialist ↔ Manager
Division Scientist ↔ Senior Manager
Corporate Scientist ↔ Technical Director
3M Innovation is driven by a system of principles, practices and infrastructure that harness the chain reaction of new ideas.
3M’s Shared, Leveraged Innovation Model

- Tech Forum
- Tech, Eng, & Mfg Councils
- Corporate & Division Scientists
- CRPL, CRML, SEMS, CRAL
- 15% Culture
- China, India ... Support Teams
- CTOC, ETOC, ATOC

3M Unique
“Research is the transformation of money into knowledge.”

“Innovation is the transformation of knowledge into money.”
THANK YOU

Email: ytshih@mmm.com
Appendix
Questions to Ask about Innovation

Does everyone in your organization know how to define innovation as: New Ideas + Action that = Results?

Who are the inventopreneurs in your workplace? How can you or your team do the work of an inventopreneur or find ways to support such activities?

Does your organization have an oral history of stories that helps employees to learn about innovation?

What are your technology platforms?

Are long-term research groups in touch with customers and flexible enough to support short-term development when necessary? Do research projects with a short-term focus leave room for longer term efforts?

Does the company recognize innovative achievements in a meaningful way?

What volunteer employee activities foster innovation and how can these activities be encouraged without being suffocated?

Do you understand and continue to cultivate what you are good at, while simultaneously embracing new ideas and technologies?
Does everyone in your organization know how to define innovation as:

New Ideas + Action that = Results?
Who are the inventorpreneurs in your workplace?
How can you or your team do the work of an inventorpreneur or find ways to support such activities?
Does your organization have an oral history of stories that helps employees to learn about innovation?
What are your technology platforms?
Are long-term research groups in touch with customers and flexible enough to support short-term development when necessary?

Do research projects with a short-term focus leave room for longer term efforts?
What volunteer employee activities foster innovation and how can these activities be encouraged without being suffocated?
Does the company recognize innovative achievements in a meaningful way?
Do you understand and continue to cultivate what you are good at, while simultaneously embracing new ideas and technologies?
Connecting uncommon connections is the underlying philosophy towards leading innovation. This creation of uncommon connections should be done internally with your organization and externally with your customers – this philosophy is echoed by 3M’s vision statement and innovation is not just something 3M wants to do it has been in their ‘blood’ for over a century.

When examining the history of 3M it is important to note that 3M started in 1902 and close to five years later they were almost bankrupt because they weren’t able to address the real need of their customers, in order to rectify this they spent USD 5,000 to start their first laboratory. Not until 1925 did the company initiate on a new product line (originally 3M was a sandpaper company), 3M encountered customers seeking to paint cars in two tone colors, in order to approach this need 3M sent employees to talk with business owners on this particular need in order to appreciate this market need, this resulted in the creation of 3M Scotch Masking Tape.
When examining how a particular product can be further innovated over time to reach other customer bases, Dr. Young-Tzung Shih elaborated that one of the core strategies of 3M is to innovate on existing products in order to expand their potential customer bases and tap new markets. As highlighted in the Scotch masking tape example, 3M team members were able to expand the potential scope of this adhesive product by iterating on the product in order to meet a specific stated or perceived demand from a customer segment, thus leading to the creation of Post-it Notes.

Success of new products built through innovation is measured through a statistic utilized by 3M called the New Product Vitality Sales. When examining the revenue of the company you find that the company generates approximately USD 30 million every year, and astounding 30% of that revenue is generated from products introduced in the past five years.

In order to ensure that innovation is encouraged throughout the company, 3M has established labs and research centers around the globe. Further, when examining innovation in 3M it’s not just a core focus of the company to concentrate on solely product innovation but also on service, distribution, strategy, sales, etc. innovation. Leading innovation in 3M is purpose driven supported by the already enacted systems (principles, practices and infrastructure).
One of the key principles of 3M is the McKnight (past Chairman of the Board of 3M) principle which states that responsibility should be delegated and men and women should be encouraged to exercise their initiatives, further it was emphasized that the employees should have a healthy disrespect towards the management. This principle may result in a high-level of mistakes, in emphasizing this point Dr. Young-Tzung Shih stated that in the 30 years he has been with 3M for every ten projects nine will be failures, however from those nine failures one project materialized that had commercial benefit.

Currently, 3M has approximately 11,000 employees, with each employee provided the opportunity to view monthly tech forums that can sign on any time and review trending technology from the company at technology shows (tech forums), and assistance can be provided through networking. Within 3M there are over 30 active special interest chapters that conduct several events every year with recognition being provided to contributing members, this can potentially be an area where innovation can be encouraged within outside firms as well.

Within 3M innovation is encouraged further through the use of a philosophy of 15% time, this allows an employee to have utilize time during the week to work towards the creation of new products/services or innovating existing products/services.
In order to provide the necessary recognition towards their technical teams 3M has created a dual ladder system that provides a career path for technical personnel. This career path fosters communication and dialogue between key areas of the company and the technical teams thus allowing technical team members to work close with teams from the marketing division.

It is important however to note that research and development should be aimed at transforming knowledge/creativity into money. If no perceived value is coming out of research and development efforts the process should be reevaluated to ensure prioritization is given towards projects that result in monetary value.
2nd Session on 25th Oct. 2013

LEADING INNOVATION

Presented by

Jayantha De Silva
Vice President South Asia, MD IFS Sri Lanka
INNOVATION Vs. CHANGE
INNOVATION Vs. CHANGE

‘Leadership’

‘Innovation distinguishes between a Leader and a Follower’ - Steve Jobs
LAYERS OF INNOVATIVE LEAD-INS

- International
- National
- Industrial
- Individual
DOERS
SUPPORTERS
BENEFICIARIES
PARTNERING INNOVATION
‘The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach’ - Michelangelo
THANK YOU

Speakers contact details
Email: jayantha.desilva@ifsworld.com
Mobile: 0777344446
Mr. Jayantha De Silva emphasized that while we all appreciate innovating we currently are lacking in our ability to drive that innovation or partner with that innovation to ensure its success. It was also discussed that change comes through innovation, however innovation may not come through change as change is not always supported by people.

The single most important attribute to facilitate innovation and change occurring at the same level is to foster excellent leadership within the organization. In examining the concepts of ‘doer’, ‘supporter’ and ‘beneficiary’, we all are at least a beneficiary of innovation; however, senior managers of the business world should strive to at achieve a supportive role as well towards innovation.
Session 2

Leading Innovation

Presented by

Deepal Sooriyaarachchi
Commissioner SLIC
“Invention”

• New
• Inventive Step
• Industrially Applicable
innovation
• Questioning

Observing

Networking

Experimenting

Associational Thinking
Velcro

George De Mestral 1948
“if I had 20 days to solve a problem, I would spend 19 days to define it.”

Albert Einstein
Access To Water
Carrying Q Drum
Discovery Competencies

- Observing
- Questioning
- Experimenting
- Networking
- Associational Thinking

Innovator’s – Prof Hal Gregorson- INSEAD
Delivery Competencies

• Analyzing
• Planning

• Detail Oriented Implementation
• Self Disciplined execution
Product Innovations

Process Innovations

Technological Innovations

Business Model Innovations
THANK YOU

depalsmiles@gmail.com
Innovation Matrix

<table>
<thead>
<tr>
<th>Well Defined</th>
<th>Not Well Defined</th>
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<tbody>
<tr>
<td><strong>Breakthrough Innovation</strong></td>
<td></td>
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<tr>
<td>Skunk Works</td>
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<td>Mavericks</td>
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<td>Open Innovation/Prizes</td>
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<td><strong>Sustaining Innovation</strong></td>
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<td>R&amp;D Labs</td>
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<td>Outsourcing</td>
<td></td>
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<td><strong>Basic Research</strong></td>
<td></td>
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<tr>
<td>Research Divisions</td>
<td></td>
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<tr>
<td>Research Grants</td>
<td></td>
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<td>Academic Affiliations</td>
<td></td>
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<td><strong>Disruptive Innovation</strong></td>
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<td>VC Model</td>
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<td>Innovation Labs</td>
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<td>15% / 20% Rule</td>
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Problem Definition

Domain Definition
Innovation Matrix

- **Breakthrough Innovation**
  - INNOCENTIVE
  - P&G

- **Sustaining Innovation**
  - Apple
  - TOYOTA

- **Basic Research**
  - parc
  - IBM Research

- **Disruptive Innovation**
  - Google
  - 3M

**Domain Definition**

- **Problem Definition**
  - Well Defined
  - Not Well Defined

- **Not Well Defined**
  - Basic Research

- **Well Defined**
  - Sustaining Innovation
Synopsis – Session 2: Leading Innovation (Contd.)

Panelist – Mr. Deepal Sooriyaarachchi

Invention is doing something new, which is useful and probably a machine that can be used. To patent an invention it must be new, take an inventive step and be industrially applicable. Innovation can only occur when an idea is created and converted to cash.

In examining the stages of innovation one can observer the following distinct steps: Observing; Questioning; Experimenting; Networking; and Associate thinking which is not connected.

In examining the observation step, it is important to be sensitive towards the environment where the observation is taking place in, in order to iterate on this point Mr Deepal Sooriyaarachchi highlighted the example of water carriers. When examining these water carriers certain individuals may link the creation of a well as the solution to their problem, however, if one was to speak with and understand the point of view of these water carriers one would understand that it might not be the distance that they had to travel but the way they transported water – this observation led to the creation of water tanks that could be rolled as opposed to carrying, thus providing a innovative solution to their problem.