

Creating an Environment...



...for Innovation at 3M

Larry A. Wendling
3M Corporate Research Laboratory

Company Overview

- Sales: \$25.3 billion
- Net income: \$3.5 billion
- 6% to sales R&D Investment
- 63% of sales outside the United States
- Sales in 200 countries
- Over 79,000 employees
- 55,000+ products
- 489 U.S. patents issued in 2008

Six Market Leading Businesses



Consumer &
Office

Display &
Graphics

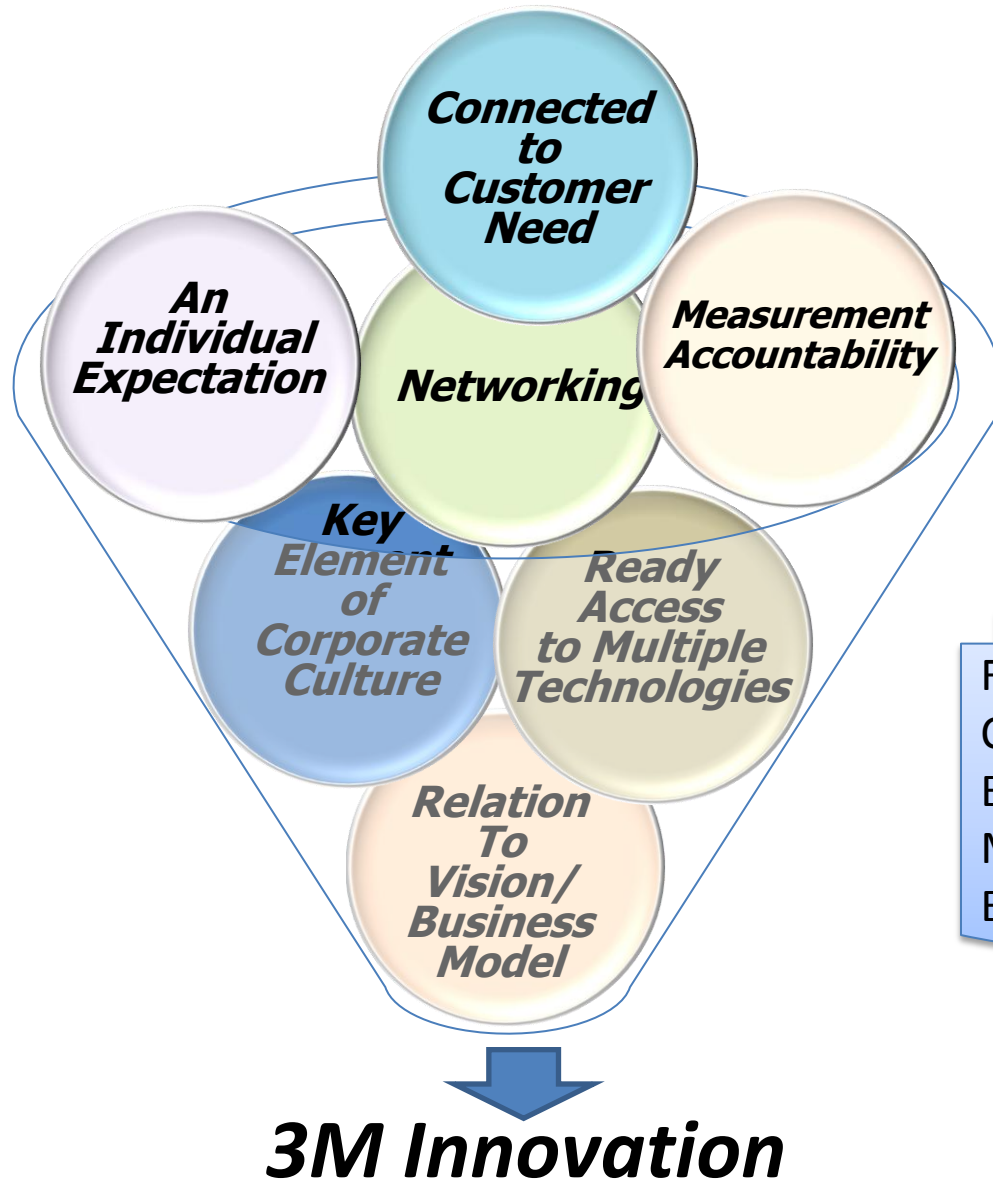
Electro &
Communications

Safety, Security &
Protection Services

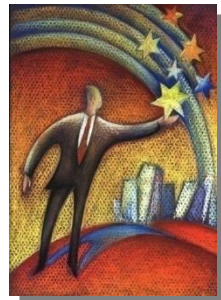
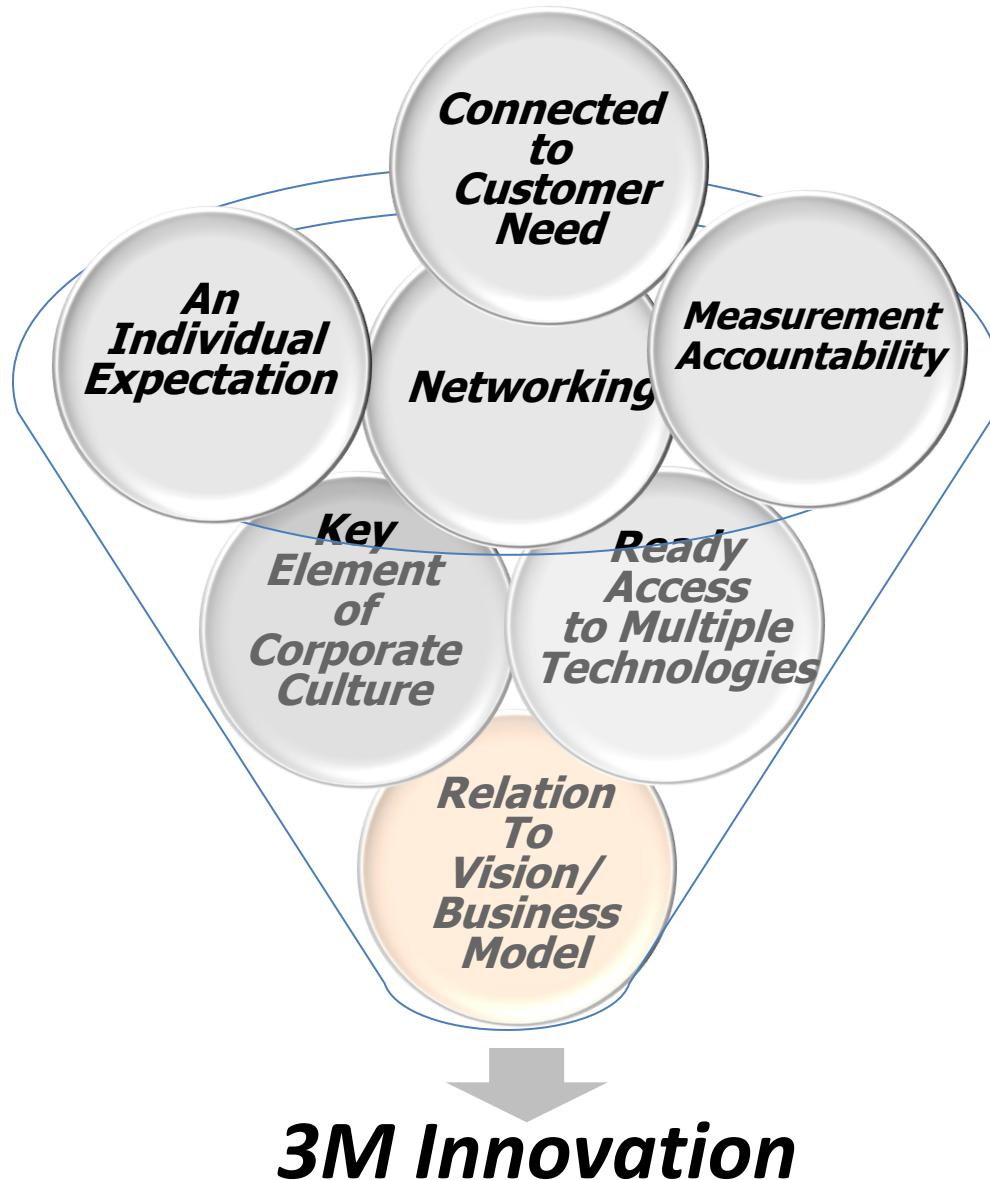
Health
Care

Industrial &
Transportation

7 Elements of *Innovation*



7 Elements of *Innovation*



Legacy of *Innovation*



Innovation is 3M's Business Model

Organic Growth Remains Top Priority

- More predictable and profitable
- What our company is based on
- It's what our culture drives and expects

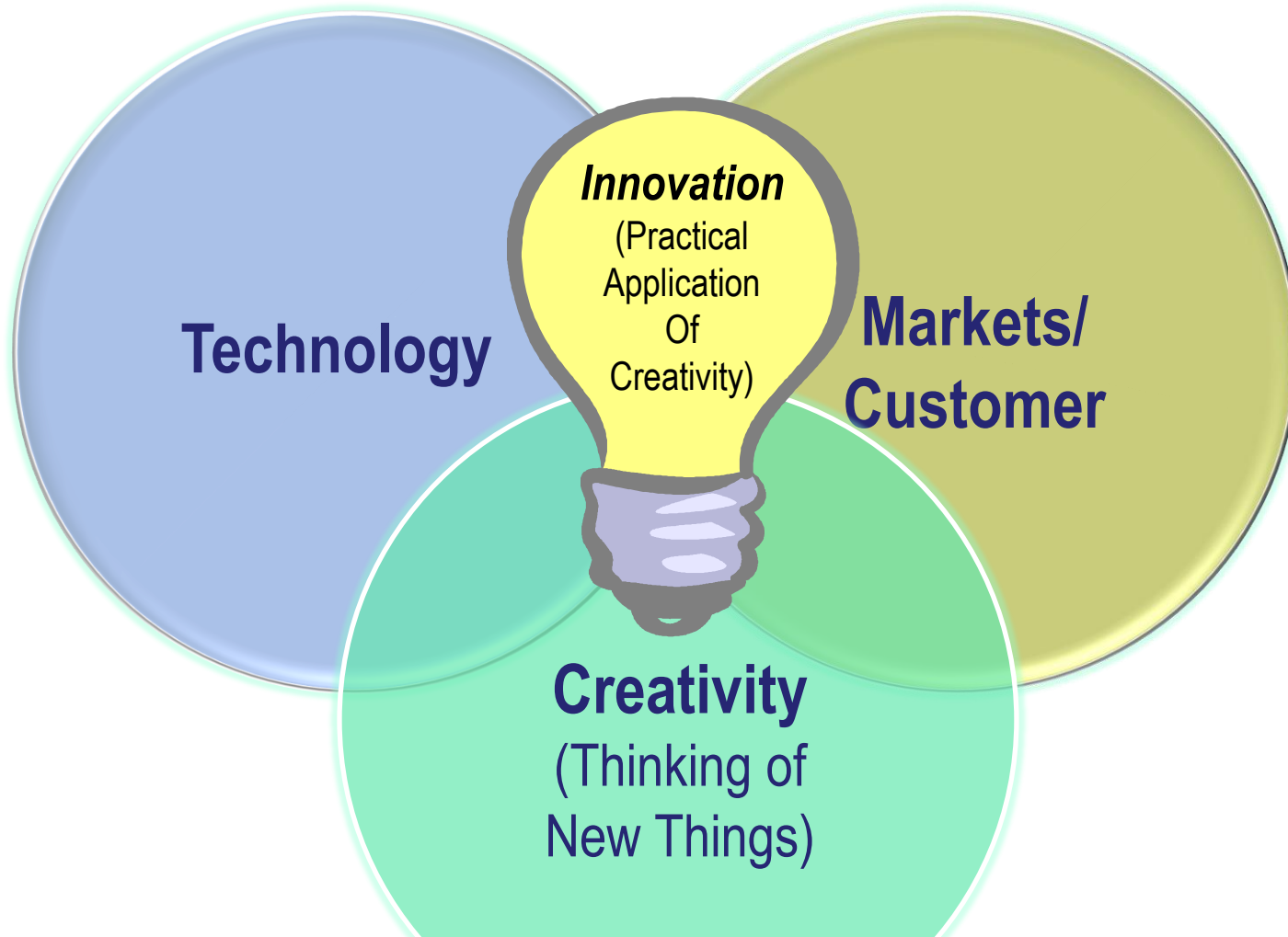
The Core 3M Strength

Innovation = Practical Application And Use of Creativity & Discovery

- ***Creativity***: The aptitude of the mind to construct or formulate ideas, concepts, or images in which the essential newness or freshness is embodied in new relationships, associations, or linkages.
- ***Innovation***: Is the use or application of creativity to get a practical output which is new or novel (e.g., a new product or process).

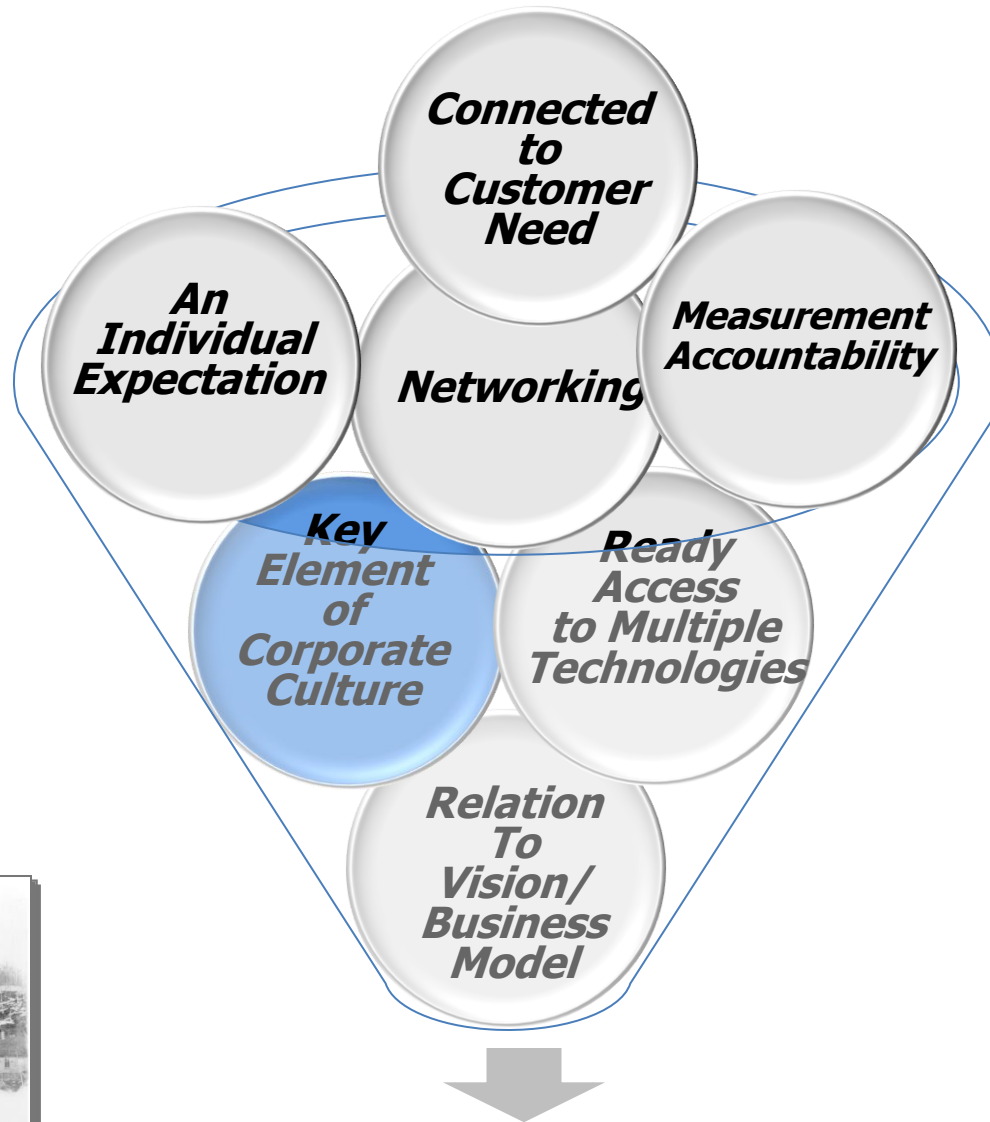


The *Innovation* Process



Commercialization is Implicit to 3M Innovation

7 Elements of *Innovation*



3M Innovation



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.

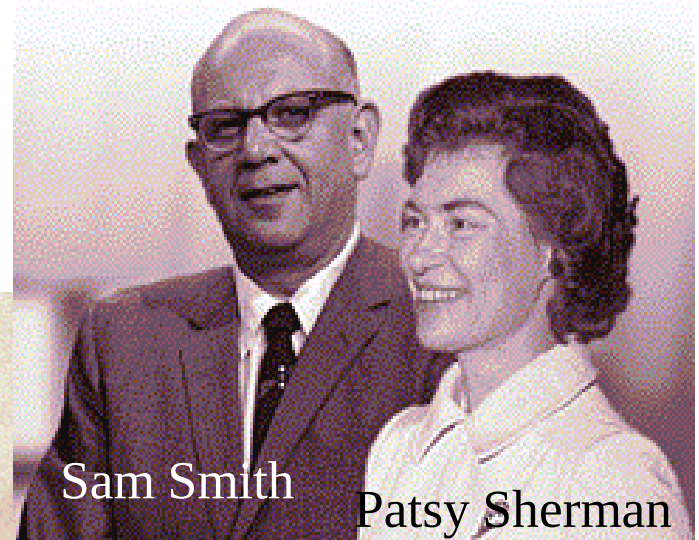


Mistakes will be made. But if a person is essentially right, the mistakes he or she makes are not as serious in the long run as the mistakes management will make if it undertakes to tell those in authority exactly how they must do their jobs.

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.**”

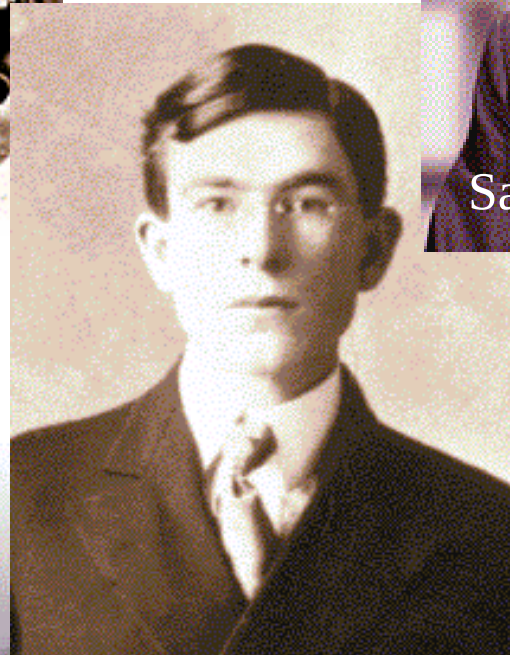
- William McKnight, 1948

Beginnings

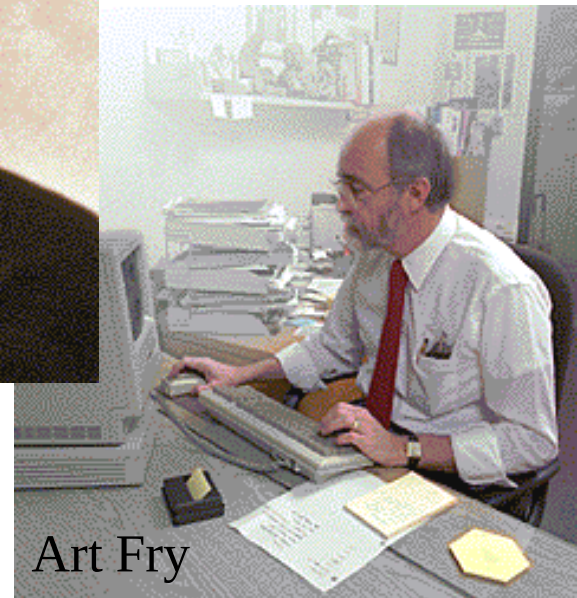


Sam Smith

Patsy Sherman



Richard Drew

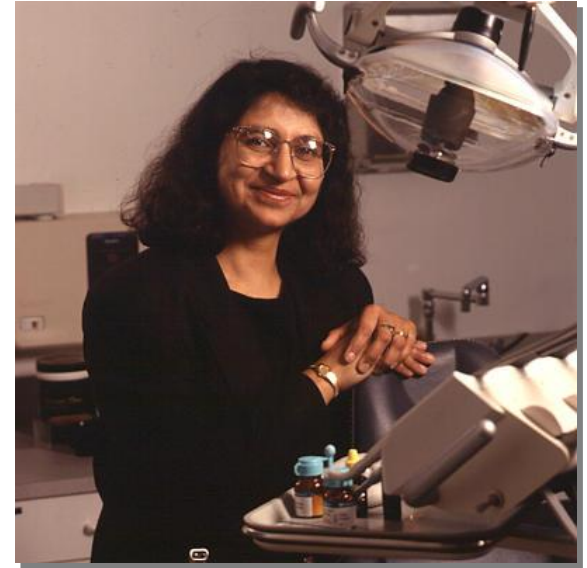


Art Fry

3M Heroes of *Innovation*

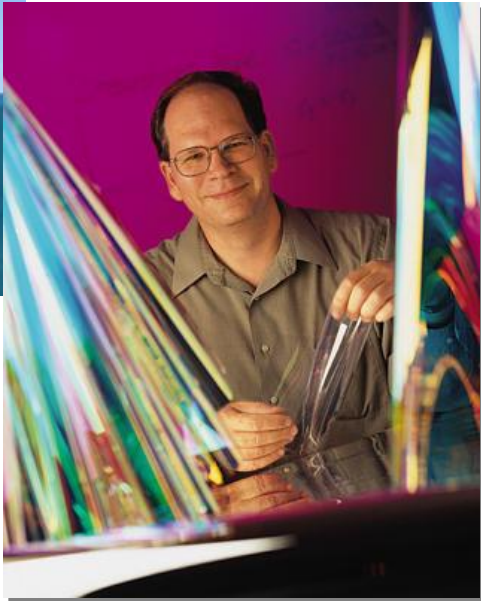
■ Dr. Sumita Mitra Corporate Scientist

- ACS Award for Creative Invention granted in 2005 for development of Filtek™ Supreme©
- ACS Heroes of Chemistry Award 2009



■ Dr. Andy Ouderkirk Corporate Scientist

- Inducted into the National Academy of Engineering in 2005 for development of Multilayer Optical Film

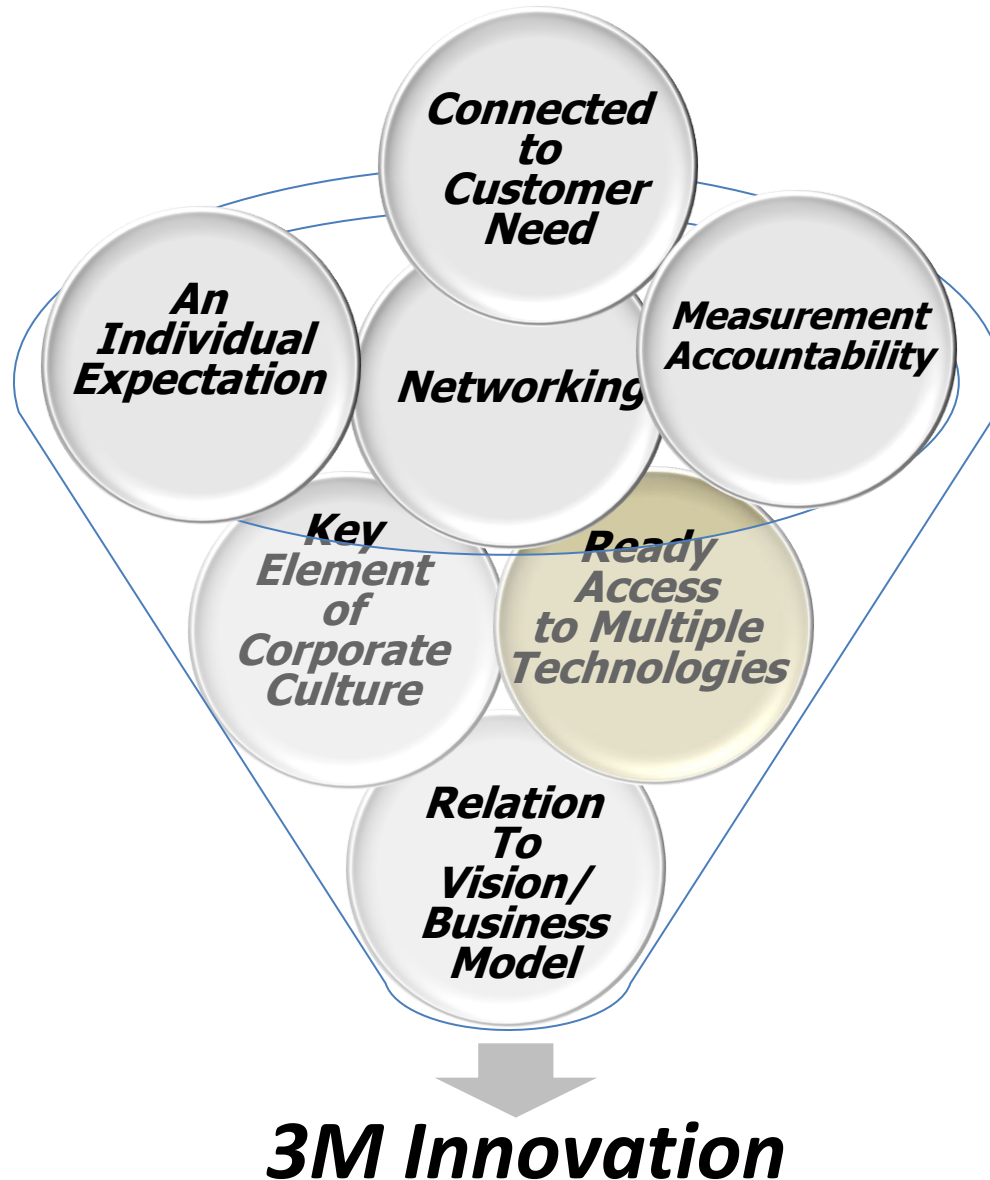


Culture of *Innovation*

- 7,100+ technical employees around the world
- R&D at ~6% of sales
- Technical depth and breadth
- Bring multiple technologies to each customer
- Entrepreneurial culture
- Individual initiative ~15% time
- Legacy of boundaryless culture



7 Elements of *Innovation*



45 Core Technology Platforms

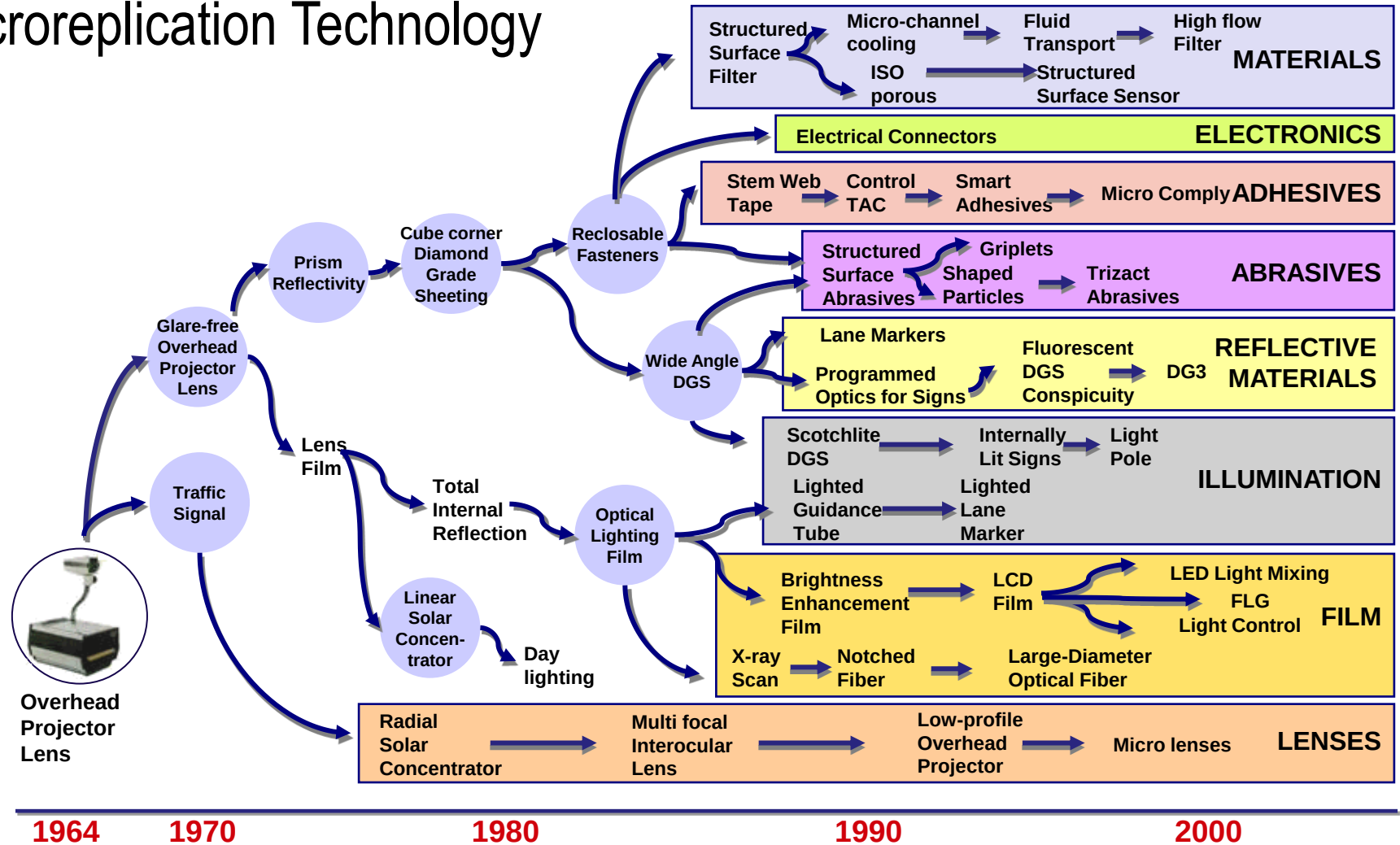
Materials								Applications		Bio
<u>Ad</u> Adhesives	<u>Ab</u> Abrasives							<u>Ac</u> Acoustic Control	<u>Im</u> Imaging	<u>Bi</u> Biotech
<u>Am</u> Advanced Materials	<u>Ce</u> Ceramics							<u>Di</u> Display	<u>Lm</u> Light Mgmt	<u>Dd</u> Drug Delivery
<u>Fi</u> Films	<u>Do</u> Dental & Orthodontic Materials	Processing			Software, Analysis and Control		<u>Ec</u> Energy Components	<u>Mf</u> Mechanical Fasteners	<u>Md</u> Medical Data Mgmt	
<u>Fl</u> Fluoro-materials	<u>Em</u> Electronic Materials						<u>Mr</u> Micro-replication	<u>Pd</u> Particle & Dispersion Processing	<u>Rp</u> Radiation Processing	<u>We</u> Accelerated Weathering
<u>Nw</u> Nonwoven Materials	<u>Me</u> Metal Matrix Composites	<u>Mo</u> Molding	<u>Pm</u> Polymer Processing	<u>Su</u> Surface Modification	<u>An</u> Analytical	<u>Is</u> Integrated Systems & Design	<u>Fe</u> Flexible Electronics	<u>Po</u> Porous Materials & Membranes	<u>Se</u> Sensors	
<u>Sm</u> Specialty Materials	<u>Nt</u> Nano-technology	<u>Pe</u> Predictive Engineering & Modeling	<u>Pp</u> Precision Processing	<u>Vp</u> Vapor Processing	<u>As</u> Application Software	<u>Pr</u> Process Design & Control	<u>Fc</u> Flexible Converting & Packaging	<u>Tt</u> Track and Trace	<u>Wo</u> Wound Mgmt	
Materials		Processing			Software, Analysis and Control		Applications		Bio	

CRL is primary keeper of 3M's technology platforms

3M's uniqueness is having access to multiple technology sets

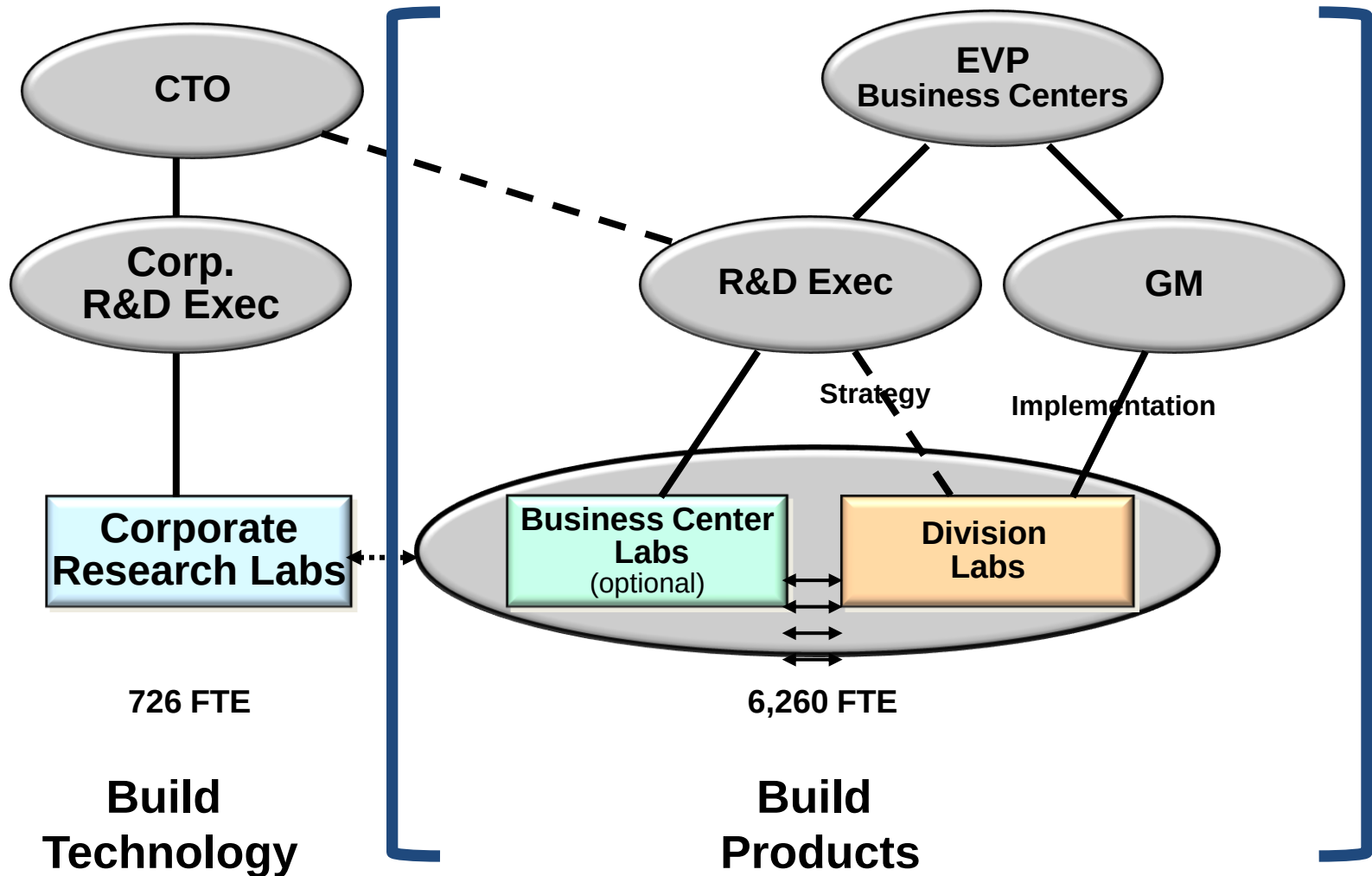
Product & Technology Migration At 3M

Microreplication Technology



Technology-Driven Business Building

3M Global Technical Operations



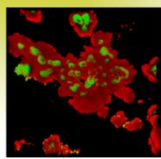
CRL Strategy

- 
- Develop differentiated technology to drive/support 3M's future businesses
 - Align technology with high growth markets
 - Provide technology to support Big B core growth
 - Acquire external technology
 - Develop a global technology plan
 - Serve as an entry point for high potential technical staff on a global basis. Re-prime the hiring pipeline on a global basis

3M Corporate Research Materials Laboratory

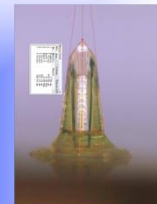
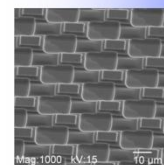
Biological & Sensor Technologies

- Microbial Detection & Control
- Sensor Materials
- Bio-energy
- Separation Materials



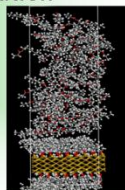
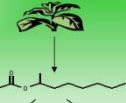
Applied Physics

- Microstructured Surfaces
- LED Lighting
- Optical Materials
- Electronic Materials



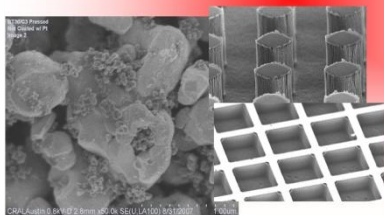
Adhesives, Advanced Materials & Modeling

- Adhesion Science
- Polymers
- Organic & Macromolecular Synthesis
- Materials Modeling and Characterization



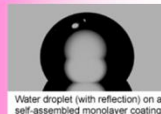
Electro-Materials

- Electro-Polymer Composites
- Electrochemistry
- Optics & Structured Surfaces



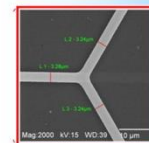
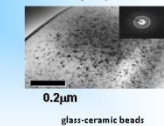
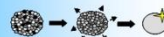
Performance Materials and Coatings (PMC)

- Fluorochemical Fluids, Gases, Monomers & Additives
- Performance Coatings
- Adhesive Release Materials
- Energy Materials
- Surface Science, Struc./Prop., Characterization



Nanotechnology & Inorganics

- Nanoparticles & Nanocomposites
- Nanocatalyst
- Inorganics & Ceramics
- Self Assembled Materials

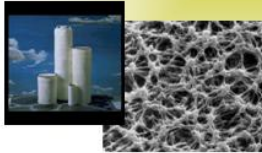


Aluminate glasses

3M Corporate Research Process Laboratory

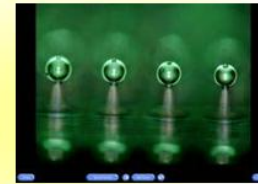
Nonwovens, Membranes & Ultrasonics

- Meltblown
- Card & Bond
- Ultrasonics
- Membranes Development



Precision Coating & Web Processing

- Coating
- Web Handling
- Drying & Curing
- Ultra Clean Coating
- Structured Coating



Advanced Materials & Radiation Processing

- Nanomaterials Processing
- Specialty Chemical Processing
- Radiation Processing
- Laser Processing

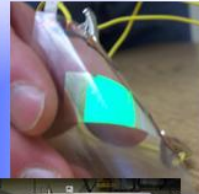


Custom security solutions to help protect property, information, and life.

Technology Focused Clusters

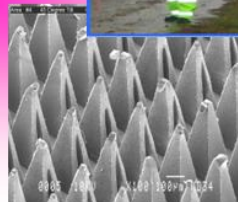
Vapor Coating & Surface Modification Processes

- Organic Vapor
- Particle Processing
- Plasma Processing
- Surface Modification



Polymer Processing & Precision Replication

- Extrusion/Co-Extrusion
- Compounding
- Precision Replication
- Precision Molding



Measurement & Inspection Systems

- Automated Inspection
- Sensors & Measurement



3M Corporate Research SEMS Laboratory

Integrated Systems

- New customer solutions by combining software, electronics, materials and mechanical devices
- Data management and workflow functions to detect, analyze and transmit actionable business information
- User interfaces and industrial design to create an overall customer experience
- Commercialization capabilities, including regulatory compliance and design for manufacturing



Application & Platform Software

- Mesa Software Platform
- Data Warehousing, Mobile, Reporting
- Sharepoint, Silverlight
- GUI, BI, Web 2.0, ESL
- .NET, Vista, Windows 7
- Agile Development



Regulatory Compliance

- Design for Safety & Durability
- EMC Certification
- Global safety & regulatory
- Risk & hazard analyses
- WEEE/RoHS/REACH support
- Environmental, HALT, drop testing



SEMS Technology Expertise

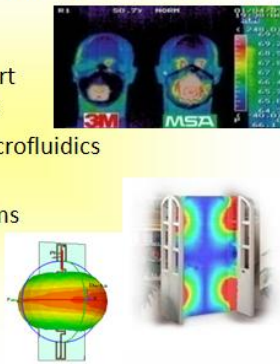
Electronics Applications

- Wireless Networks
- RF, Analog, Digital
- Antenna, Tags, Readers
- Control, Measure & Test
- Analog & Digital systems



Predictive Engineering & Analysis

- Structural analysis
- Heat & Mass Transport
- Computational Fluids
- Filtration science, microfluidics
- Electromagnetics
- Coupled-field problems
- Systems modeling



Design & Vision Science

- Visual attention, conspicuity
- Usability: Software & Hardgoods
- Culture & trend analysis
- Human performance research
- Aesthetics - Color, Finish, Materials



Mechanical Systems

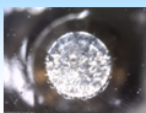
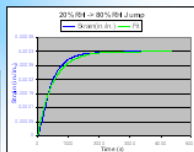
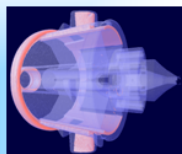
- Mechanical systems design, development, & commercialization
- Product verification, validation, reverse engineering
- Rapid prototyping
- Injection molding
- Microfabrication
- Manufacturing support



3M Corporate Research Analytical Laboratory

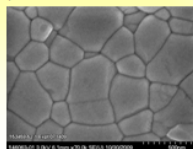
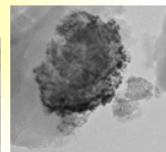
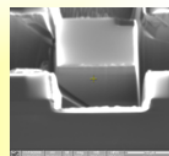
Polymers & Material Science

- Thermal Analysis
- Mechanical
- Electromagnetics
- Viscoelastic Properties
- Abrasives
- X-Ray Diffraction



Nanocharacterization

- Nanoscale structural and chemical analysis capabilities
- Nano-scale mapping: AFM
 - Large format & property-dependent measurements
- Microscopy
 - FESEM
 - TEM: High resolution (atomic scale) imaging
 - Electron tomography
- FIB sample prep
- Profilometry
- Particle Analysis



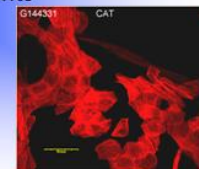
Intellectual Property Support & Protection

- Litigation Support
- Claim Substantiation
- Infringement
- Competitive Analysis
- Reverse Engineering



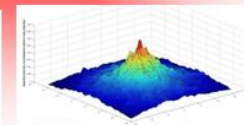
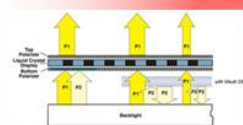
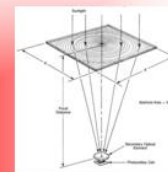
Bioanalytical & Separations/Mass Spec

- Microbiology
- Tissue Proteomics & Imaging
- Immuno Assay
- Ultrapermutation Measurements
- Outgassing/Odor
- Trace/Residue Analysis
- "Green" Chemistry
- Materials of Public Interest



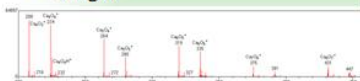
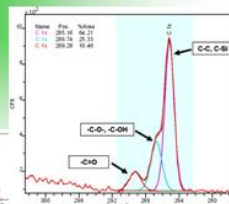
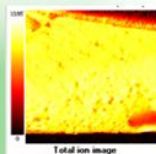
Optical Properties

- Ellipsometry
- Interferometry
- Scatterometry
- Refractive Index



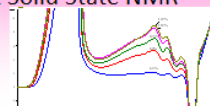
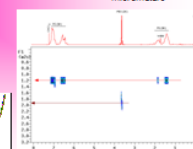
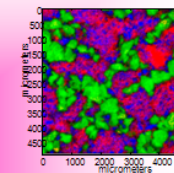
Surfaces & Interfaces

- Surface chemistry mapping
- Surface contamination
- ESCA
 - Interface Depth Profiling
 - C60 Ion Gun
- TOF-SIMS
- Auger

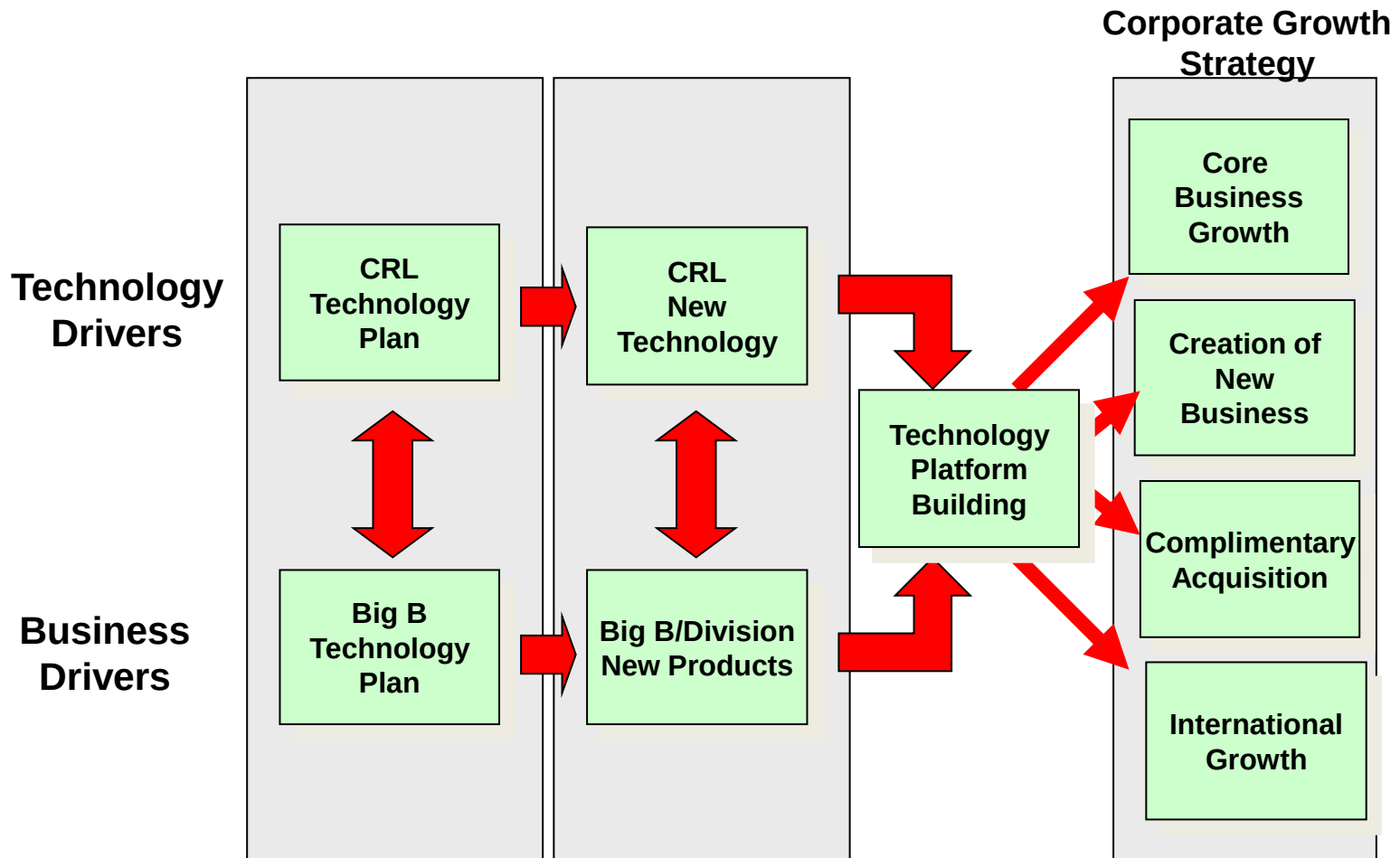


Chemical, Elemental & Molecular Analysis

- FTIR, Confocal Raman
- Ion Chromatography
- ICP, XRF
 - trace element analysis at ppb and ppt levels
- GC-MS, HPLC
- Solution & Solid State NMR



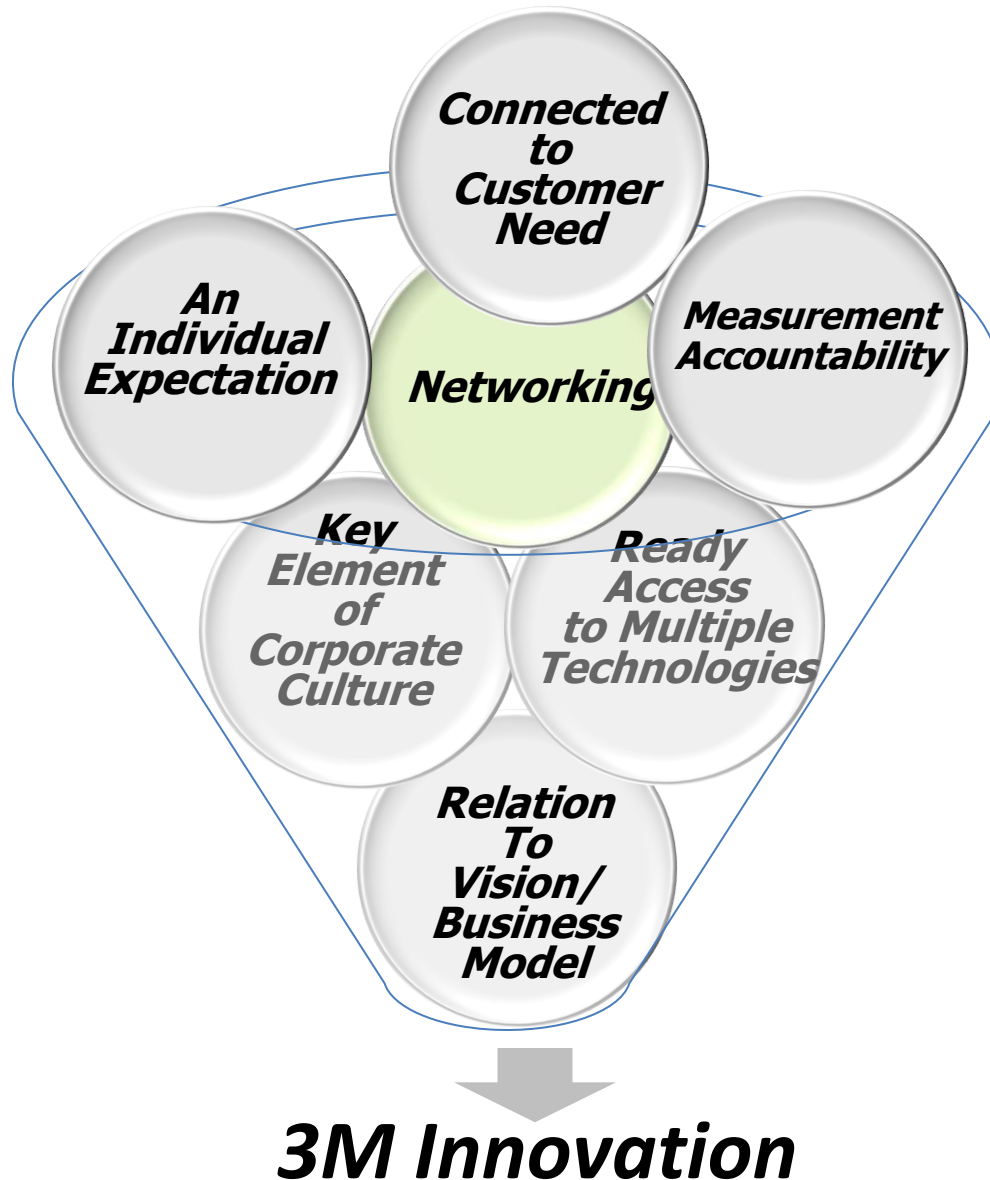
Technology/Business Alignment



Technology / Market Development



7 Elements of *Innovation*



What is Tech Forum?



**The Ultimate
Professional Society**



**3M's Competitive
Advantage**

The 3M Tech Forum is a principal organization for productive **technical interaction** at the interpersonal **"grass roots"** level.

Through **networking & communication**, TF fosters an **environment of creativity and cooperation** that leads to **innovation and growth**.



Founded in 1951

Membership Eligibility

Membership in the 3M Tech Forum will be limited to regular full-time and part-time 3M employees who are engaged in technical work and who have signed a 3M employee agreement.

4900 members in St. Paul

9200 members Globally

Tech Forum Activities

■ 30+ Active Special-interest Chapters

- Imaging
 - Nanotechnology
 - Project Management
 - Adhesives
 - Microreplication
 - New Business Development
 - Photochemistry
 - Life Sciences
 - Biotechnology
 - Inorganic Materials
 - Polymer Processes
 - Product Design
- ... and more...*

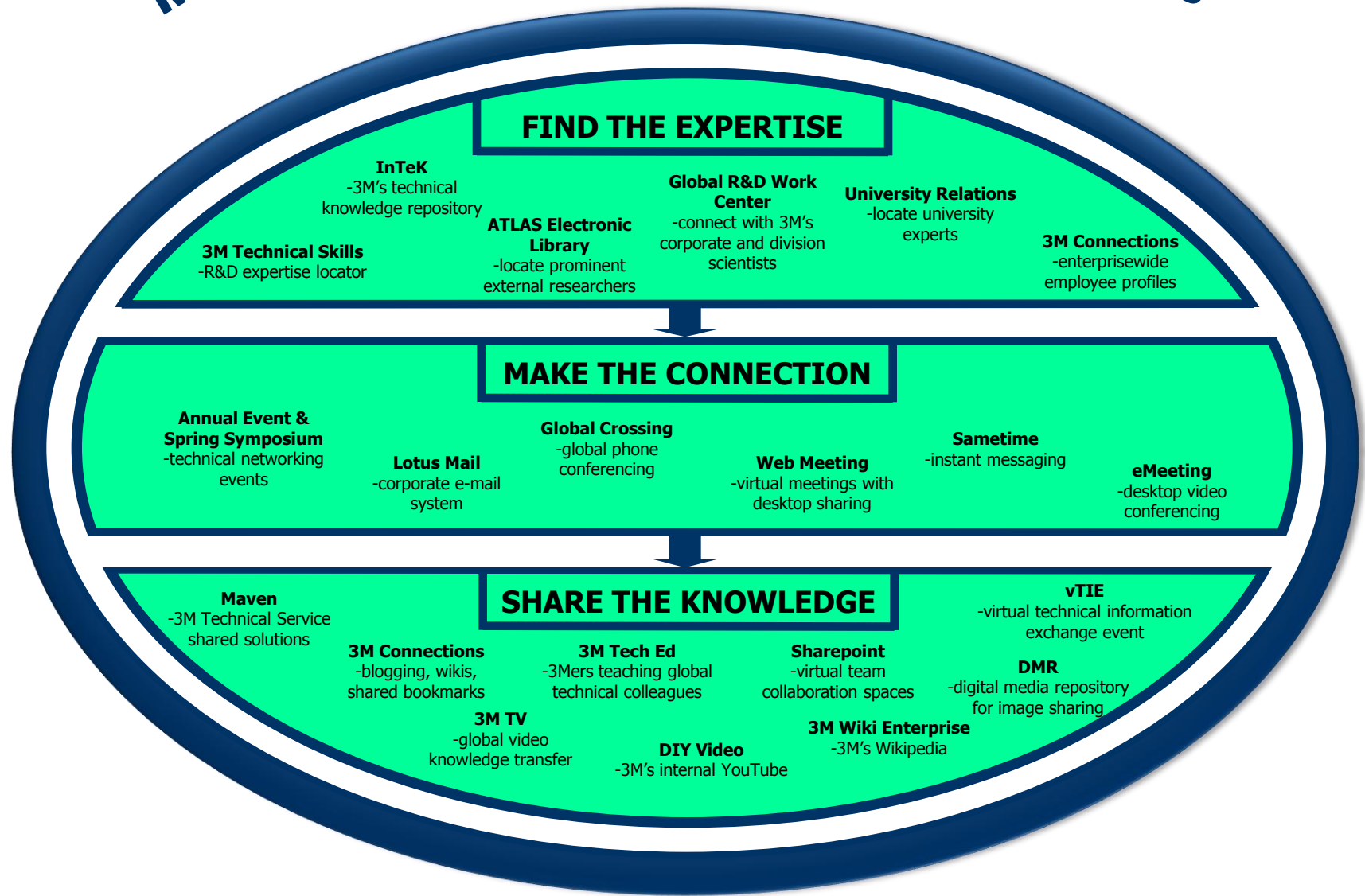
■ Events and Recognition

- Technical Information Exchange / Annual Event
- Virtual and in-person technology and knowledge sharing events
- Worldwide expert network
- New technical employee orientation
- Inventor recognition events
- Circle of Technical Excellence & Innovation awards
- Carlton Society

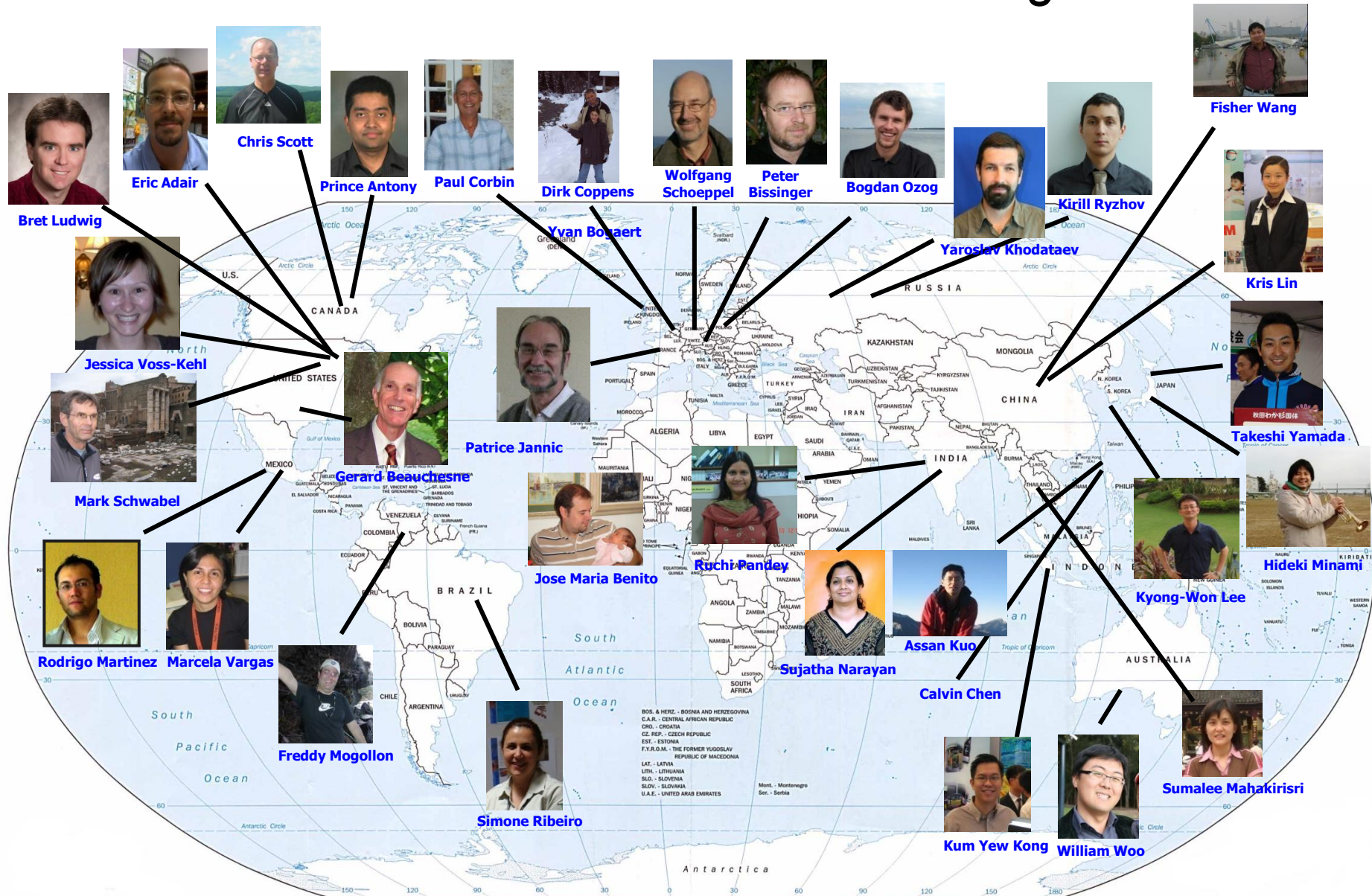
One Tech Forum Event/Day in St. Paul

3M Networking

Making Connections, Finding Answers

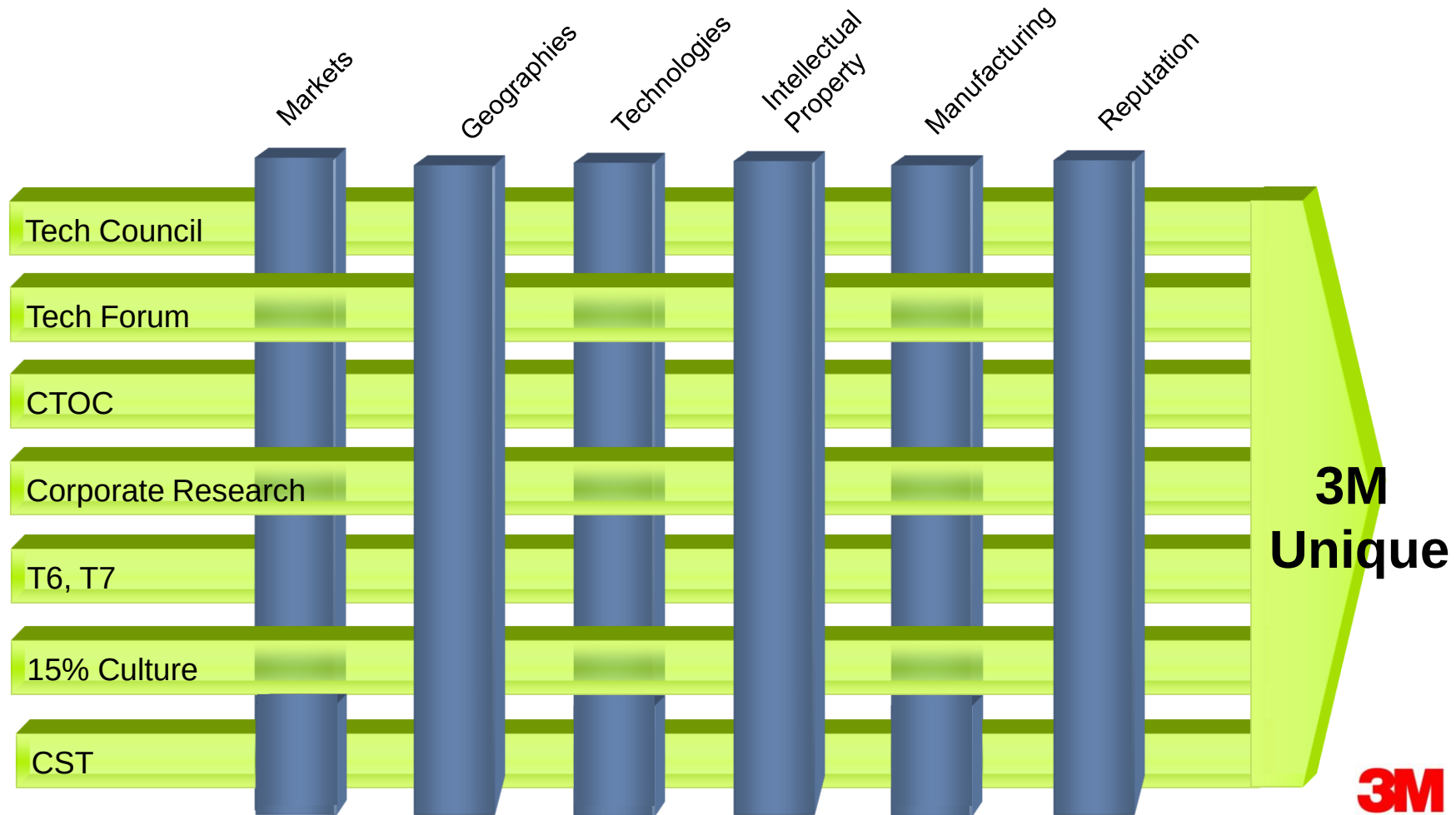


Global Tech Forum Networking



3M's Secret Weapon

The Key to Innovation



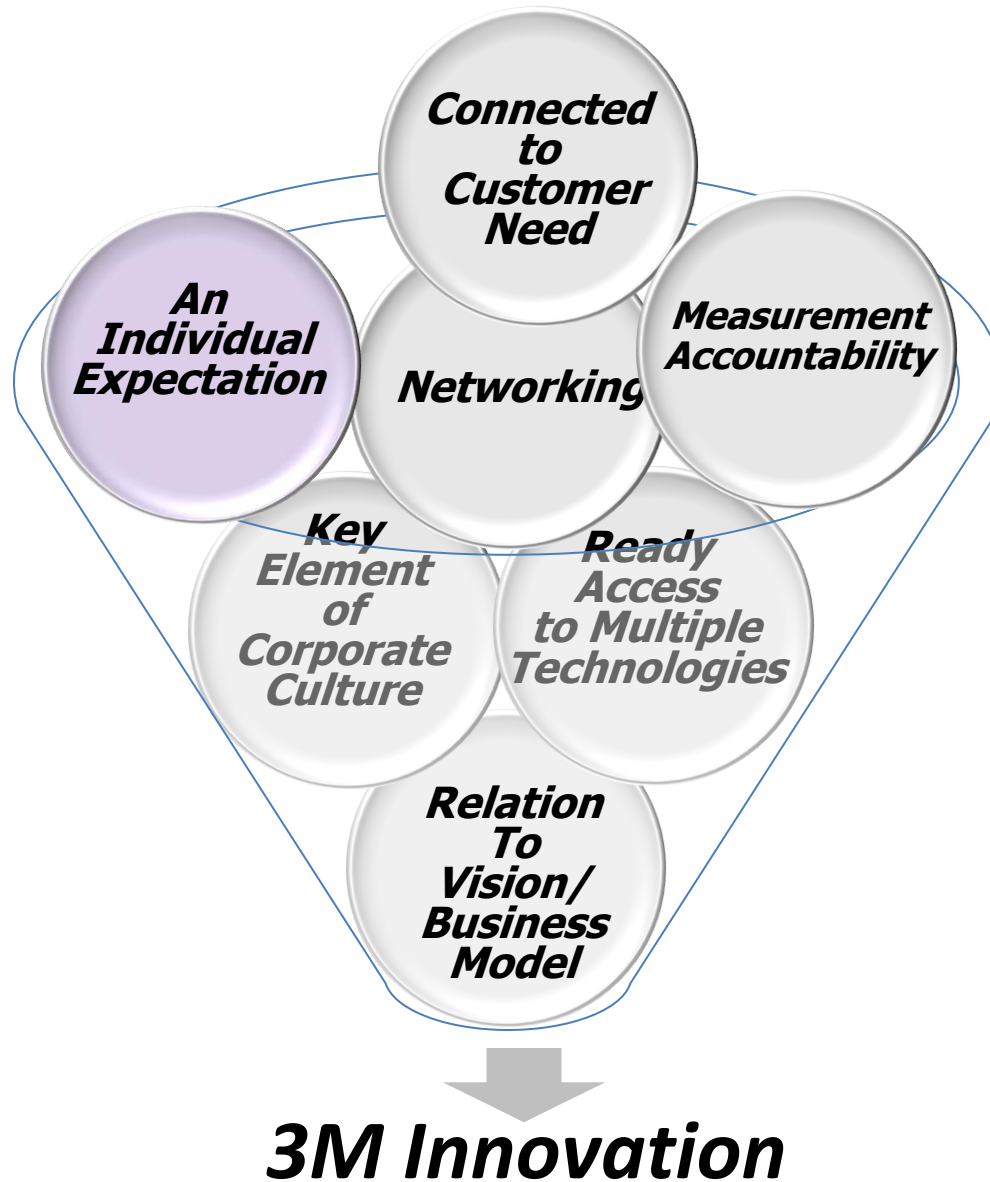
**One Impassioned & Empowered R&D Organization
Transcending Organizational Boundaries**

3M
TECH FORUM

Innovating **In**fluencing **In**spiring **In**vincible

Are you **In** ?

7 Elements of *Innovation*



Personal Expectations

■ *Dual Ladder*

3M has two parallel career paths in the technical organization. In addition to management, there is a technical path which is identical in prestige, position, compensation and perks. It allows employees to be promoted without abandoning what they do best -- research and development.

The highest level on the technical

3M's former CEO Allen Jacobson
System, "Some innovative people
budget forecasts. What these people need is a system that rewards
them for their innovative abilities, without forcing them into a manager's
desk, where they'll be miserable."

Career progression is tied to

- *technical content*
- *commercial contribution*
- *and recognized leadership*

Rewards & Recognition



Circle of Technical Excellence & Innovation

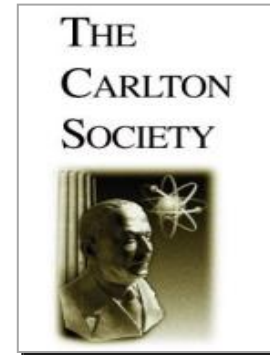
- Annual Award
- ~330 Individual Awards Globally
- ~ 75 Team Awards Globally
- Peer Nomination/Selection



3M Genesis

Genesis Grant

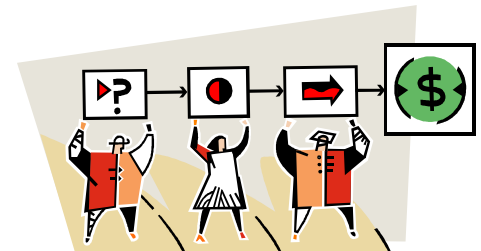
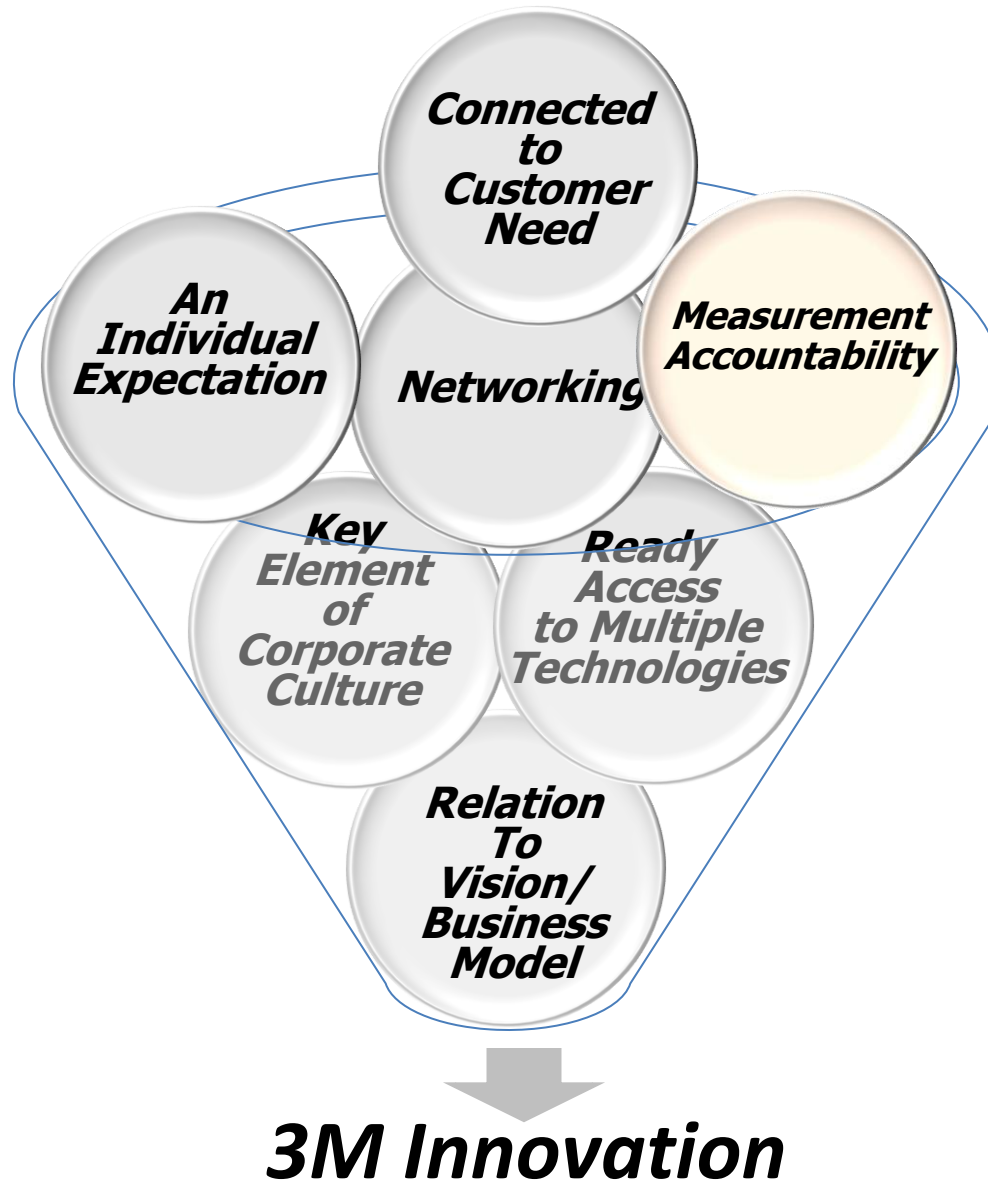
- \$50-100K Grants to Support Non-Job Related Innovation
- ~15-20 Awards Annually
- Creates New Products
- Reinforces Culture



Carlton Society

- 3M's Hall of Fame
- Peer Nomination
- 170 Total Members

7 Elements of *Innovation*

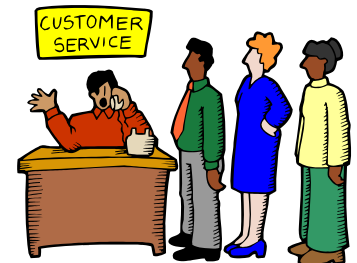
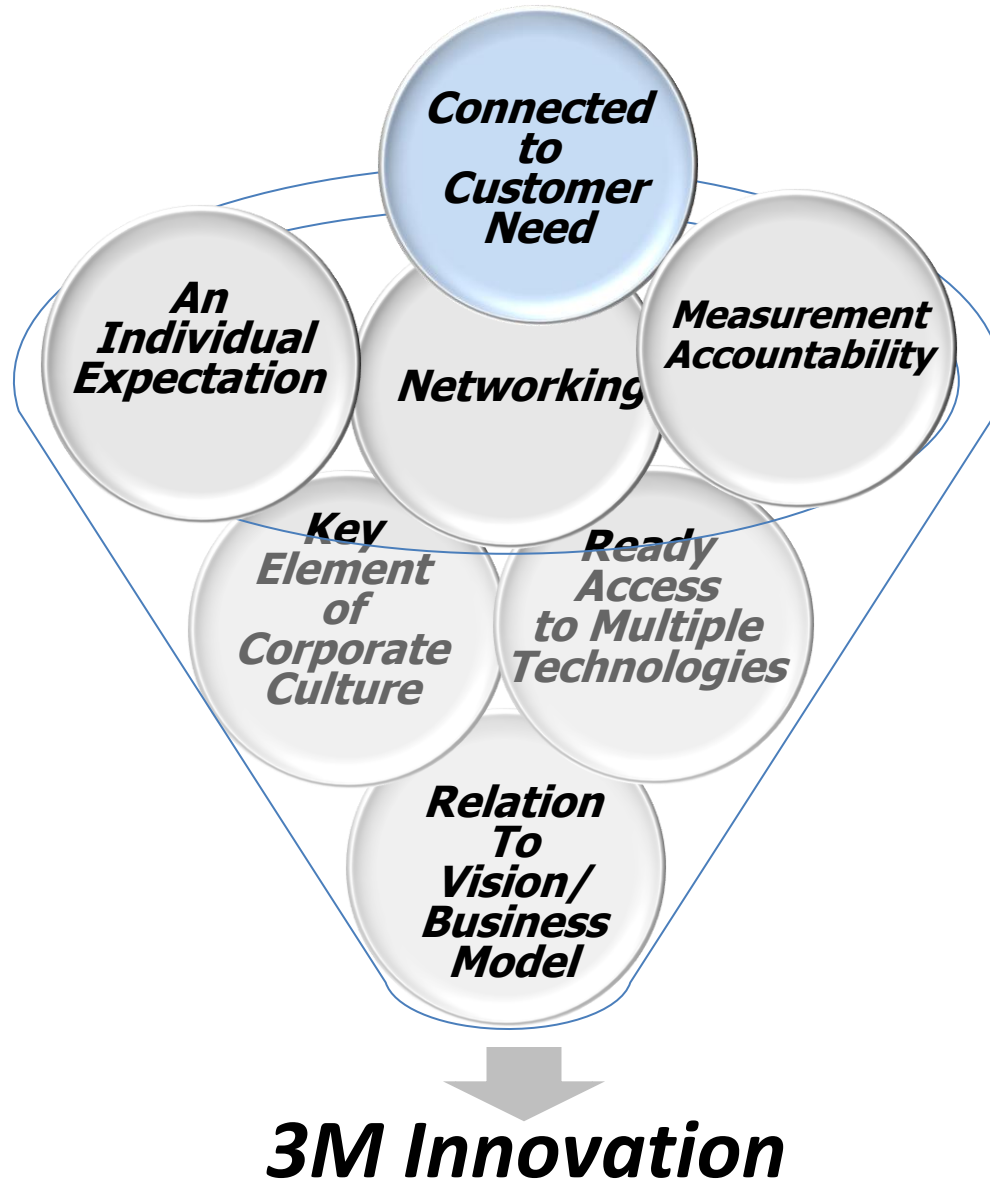


3M R&D Balanced Scorecard

Financial	• Top Line New Product Revenue Growth • R&D Spend
Business Processing	• Product Speed to Market • Deliver on Financial Forecasts • Technology Introduced into Products
Intellectual Property	• Number of Annual Patents Issued



7 Elements of *Innovation*



3M's First Customer Inspired Innovation...

Two-tone cars were in demand...

But a clean paint line was very hard to achieve...



Which 3Mer Dick Drew observed while visiting to sell sandpaper...

...and he remembered some stuff he'd seen in the laboratory...



Customer Technical Centers ...

Japan



Brazil



U.S.

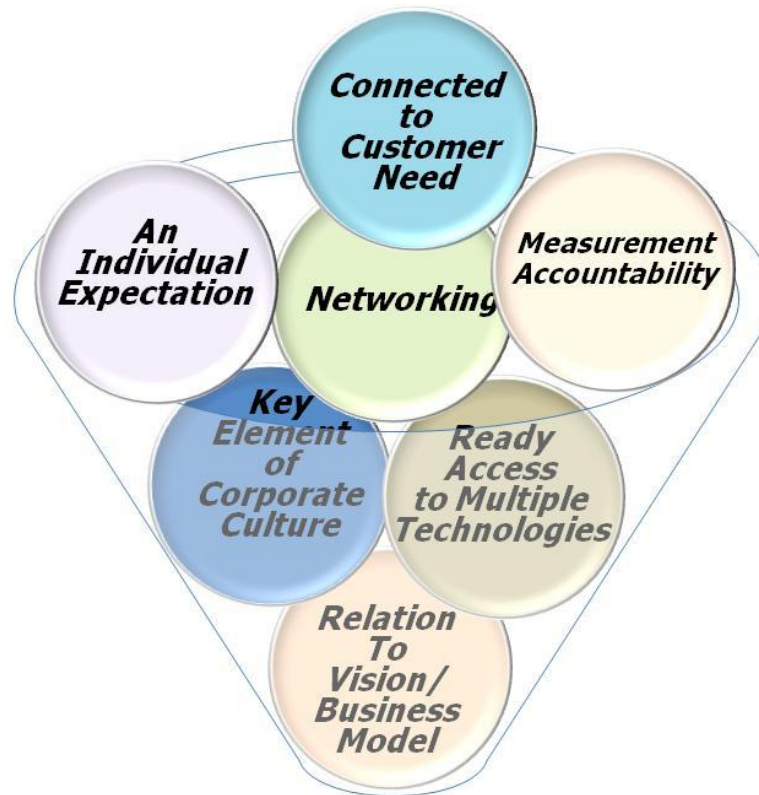


Mexico



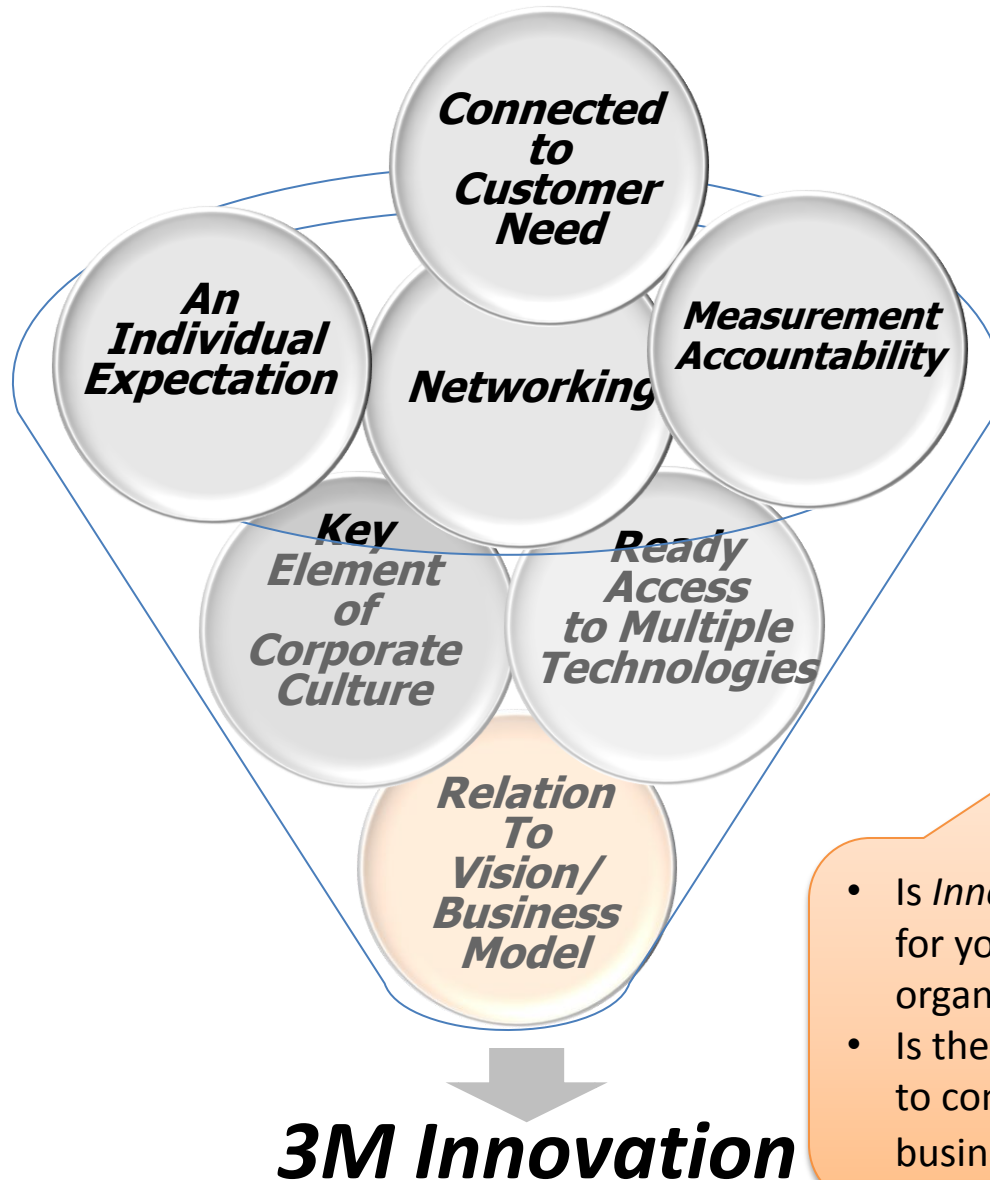
...Places to Innovate

Questions / Thoughts for the next few days...



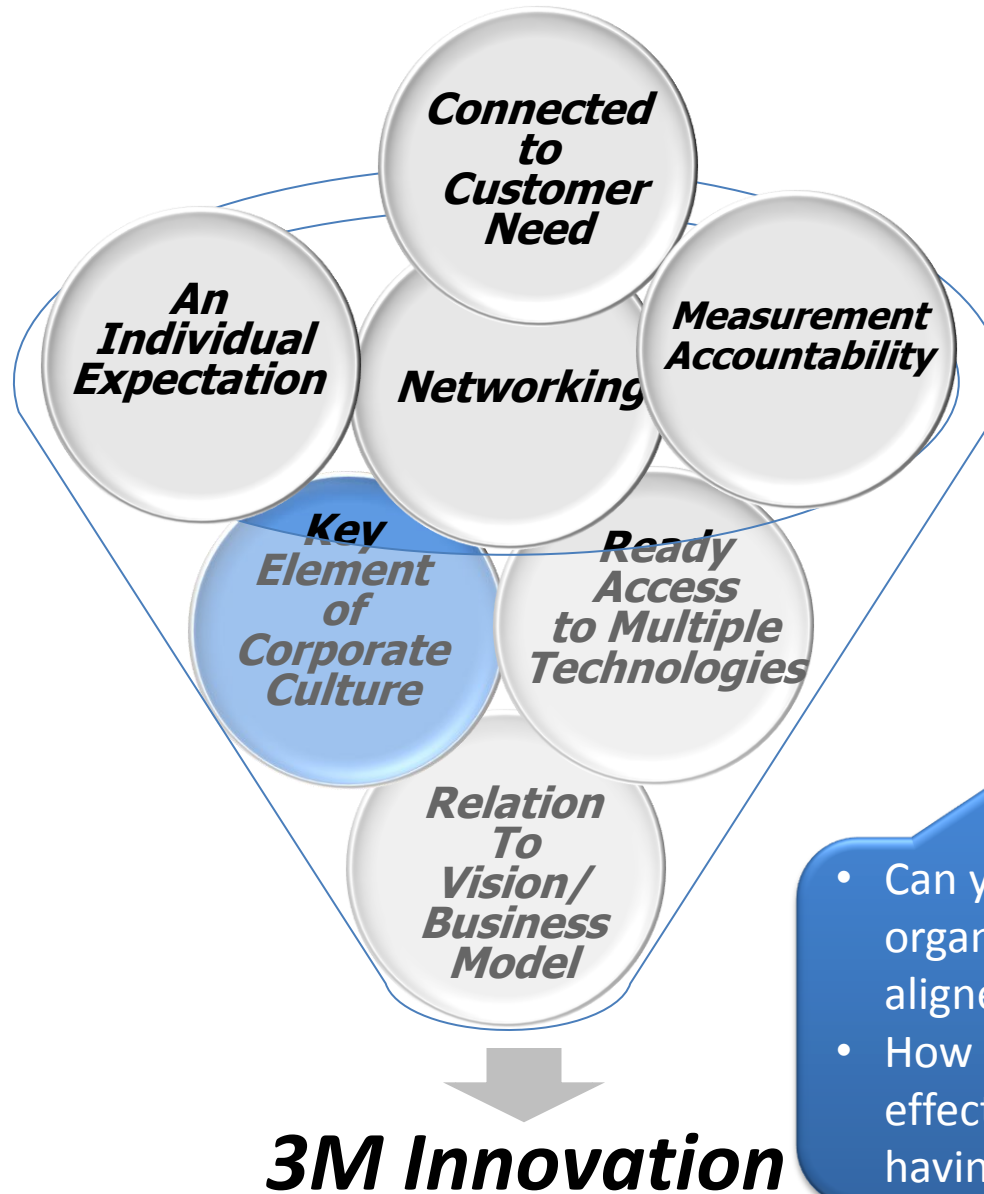
7 Elements of *Innovation*

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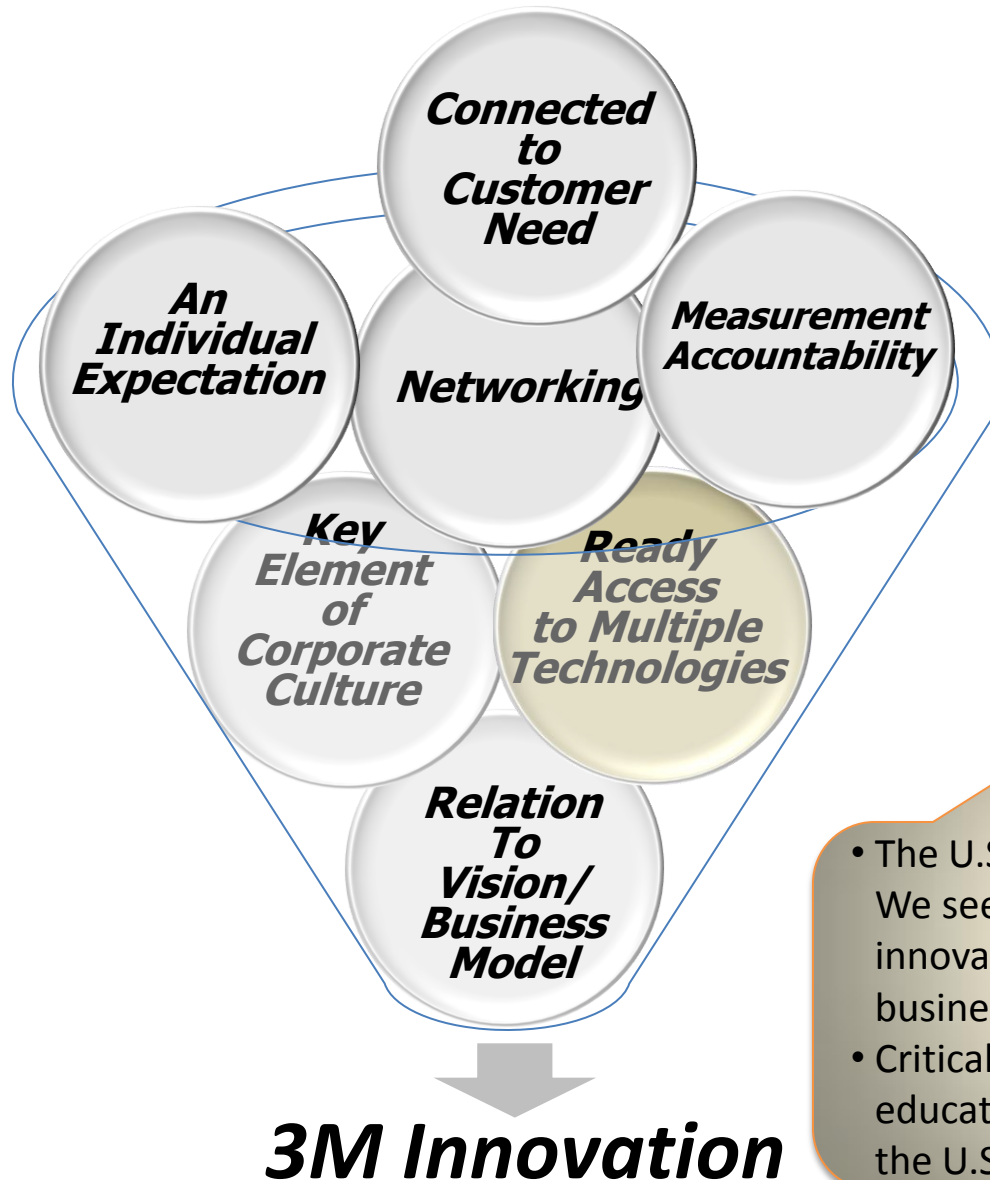
- Is *Innovation* the primary driver for your respective organizations?
- Is there a path from *Innovation* to commercialization and business building?

7 Elements of *Innovation*



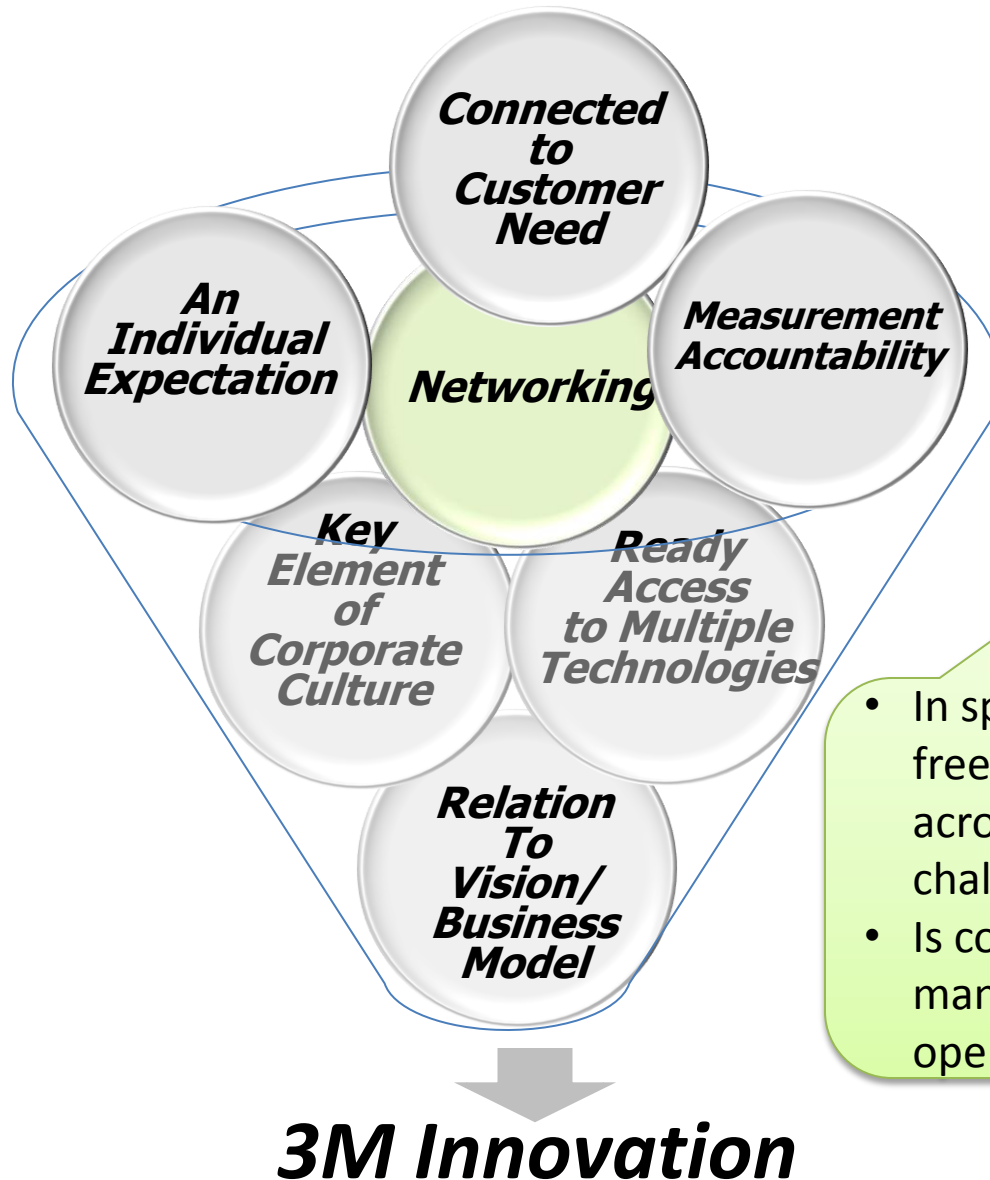
- Can you define your organization's culture? Is it aligned with *Innovation*?
- How do we innovate effectively across entities having different cultures?

7 Elements of *Innovation*



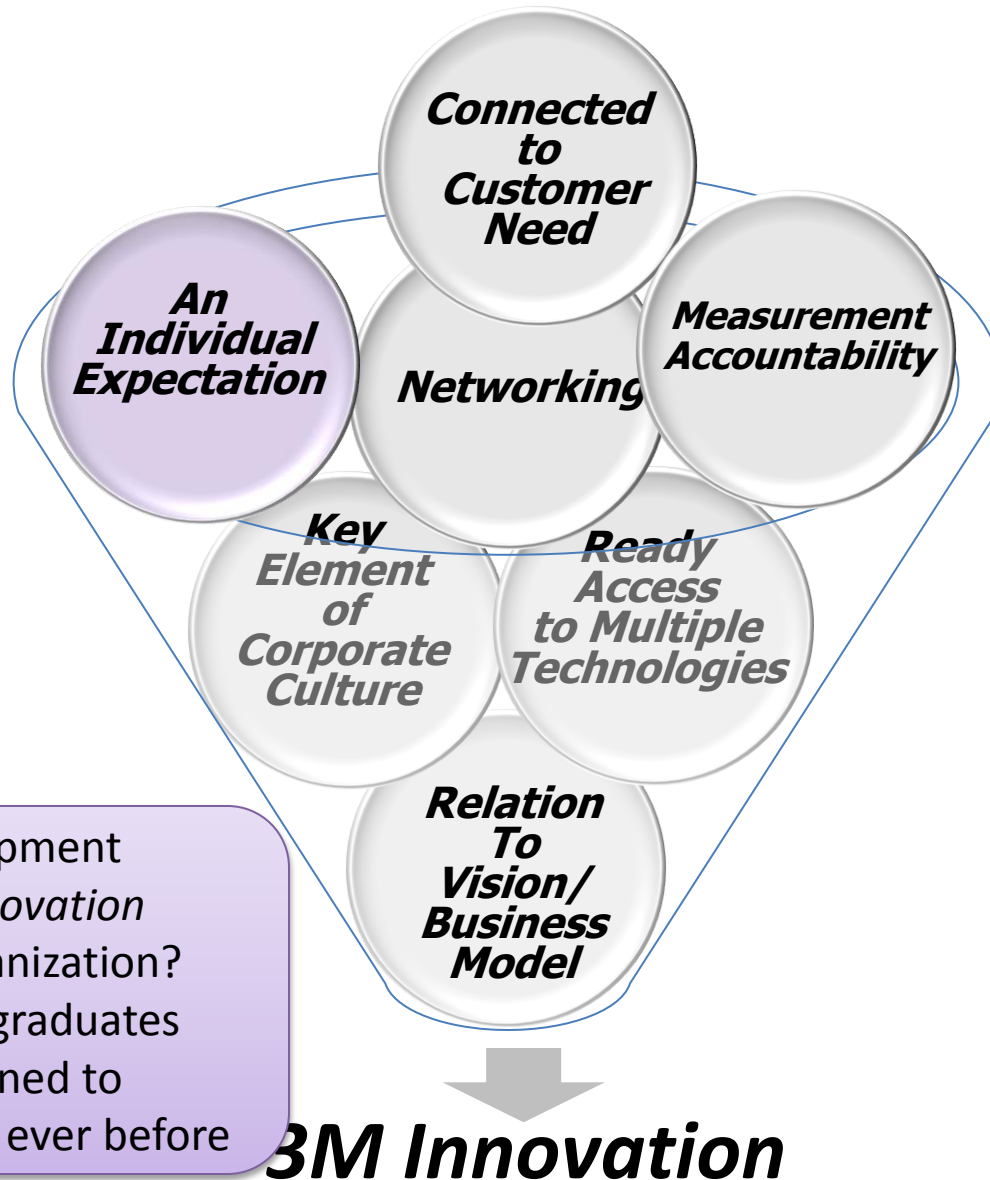
- The U.S. has the technology. We seem to lack the incentive to innovate, commercialize, and build businesses
- Critical to allow foreign nationals educated in the U.S to remain in the U.S.

7 Elements of *Innovation*



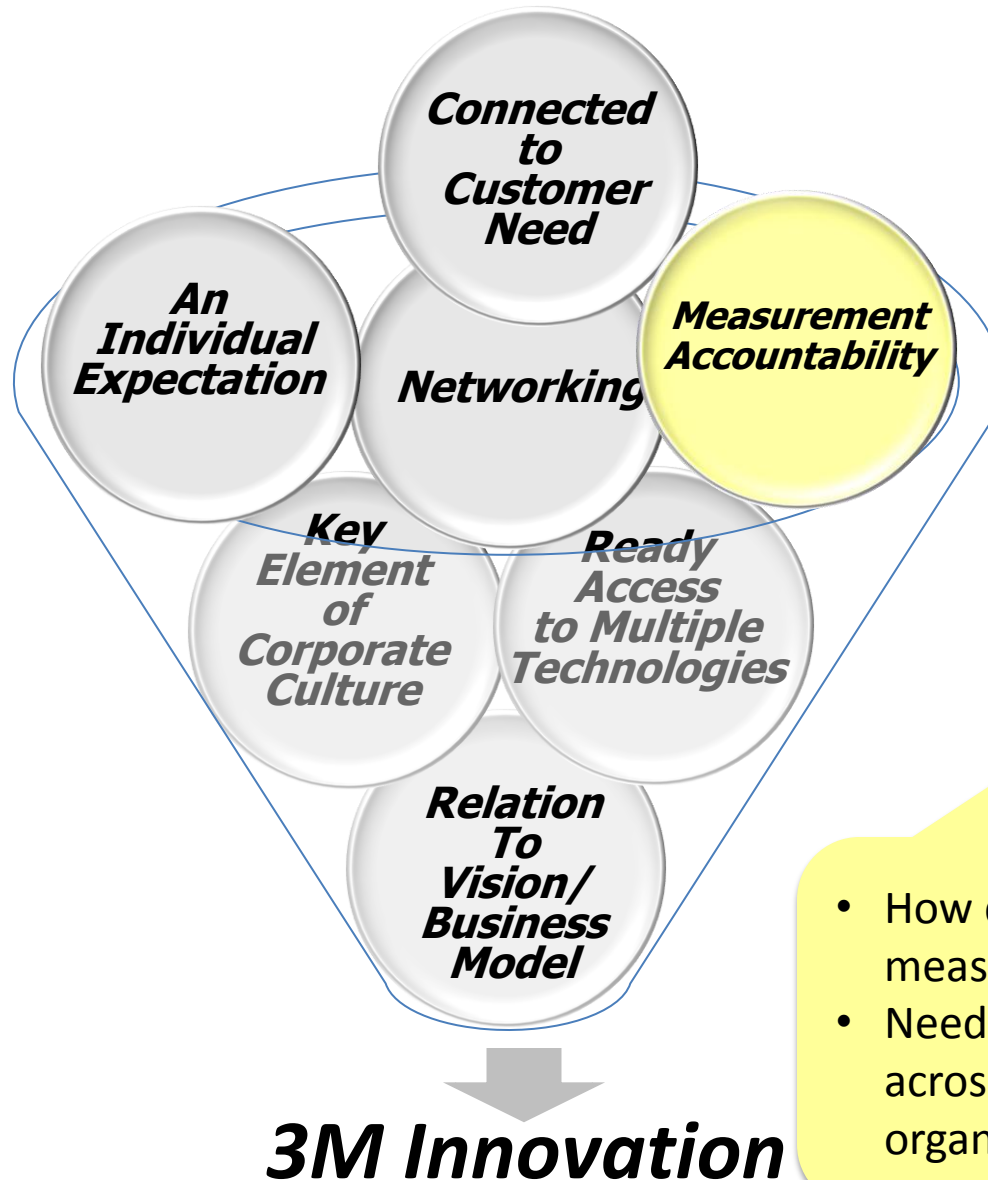
- In spite of e-tools...open, free-flowing collaboration across organizations is a challenge.
- Is conventional IP management a barrier to open networking?

7 Elements of *Innovation*



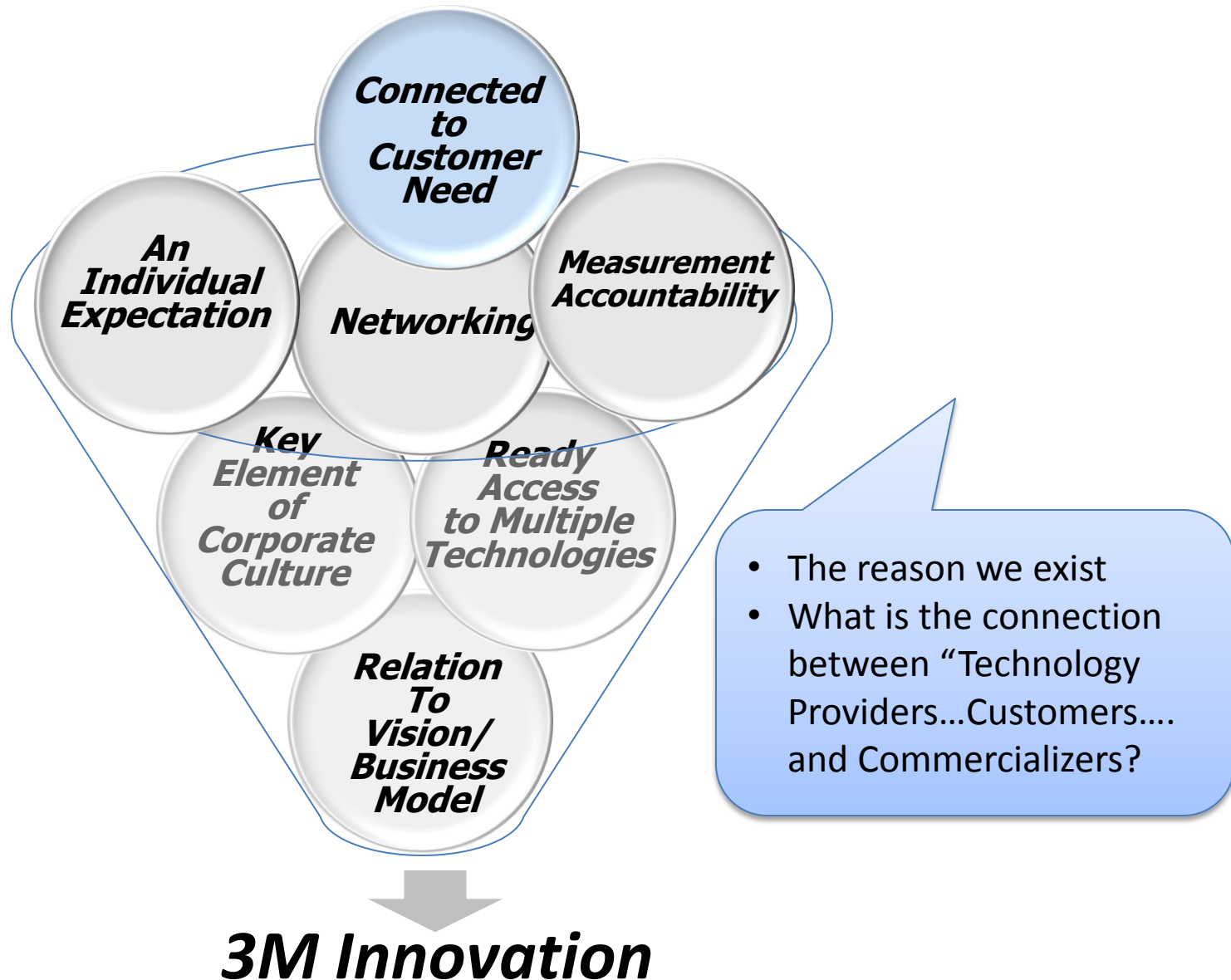
- Is career development aligned with *Innovation* within your organization?
- New university graduates seem more attuned to *Innovation* than ever before

7 Elements of *Innovation*



- How does your organization measure *Innovation*?
- Need common metrics across collaborating organizations

7 Elements of *Innovation*



Innovation is not an accident

It is driven by a system of principles and practices which support and encourage the coupling of technology and creativity to satisfy customer needs.

