3M Science. Applied to Life.™

R&D Club

Applying Science to Life

Chris Howitt, Ph.D

Chief Technology Officer, Central & East Europe

29th September 2015

Our Vision

3M Technology Advancing Every Company
3M Products Enhancing Every Home
3M Innovation Improving Every Life

All Rights Reserved.

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

1930
Scotch™ Cellulose tape introduced

1931
3M began producing Colorquartz™ roofing granules

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

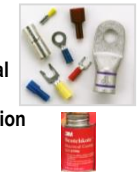
1945
Scotch TM vinyl electrical tape introduced

1947
Scotch™ magnetic audiotape introduced

1948
3M debuted its first surgical drape

3M's first non-woven product-decorative ribbon for gifts introduced

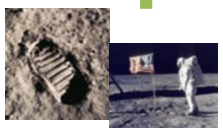
1952
Scotchlok™ electrical connectors and Scotchkote™ insulation introduced



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

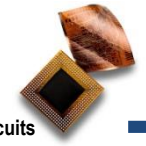
1960
Scotch™ Brand Magic transparent tape introduced

1967
3M developed the first disposable facemasks and respiratory protection products



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



1996
New products include flexible circuits for electronic products and HFEs (hydrofluoroethers), replacing ozone depleting chlorofluorocarbons

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

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

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

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

2000
3M introduced the Vikuiti™ brand for light management products that make electronic displays easier to read

2005
3M developed Aluminum Conductor Composite Reinforced (ACCR) as a solution to thermally constrained transmission bottlenecks

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

3M Confidential.
© 3M 2015. All Rights Reserved.

“Innovation is our biggest competitive advantage and the heart of 3M.”

– Inge Thulin 2012

Chairman, President & CEO

Connecting Customers to Technology

1925

Two-tone 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 …

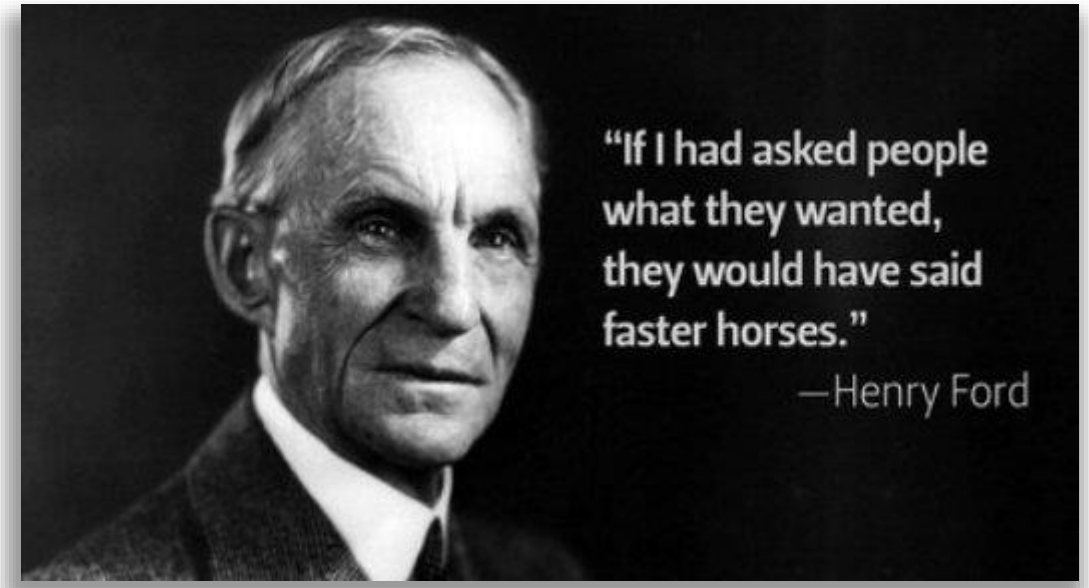
… and he remembered
some stuff he'd seen
in the laboratory…

… and went on to invent
3M Scotch Masking Tape

© 3M 2015. All Rights Reserved.

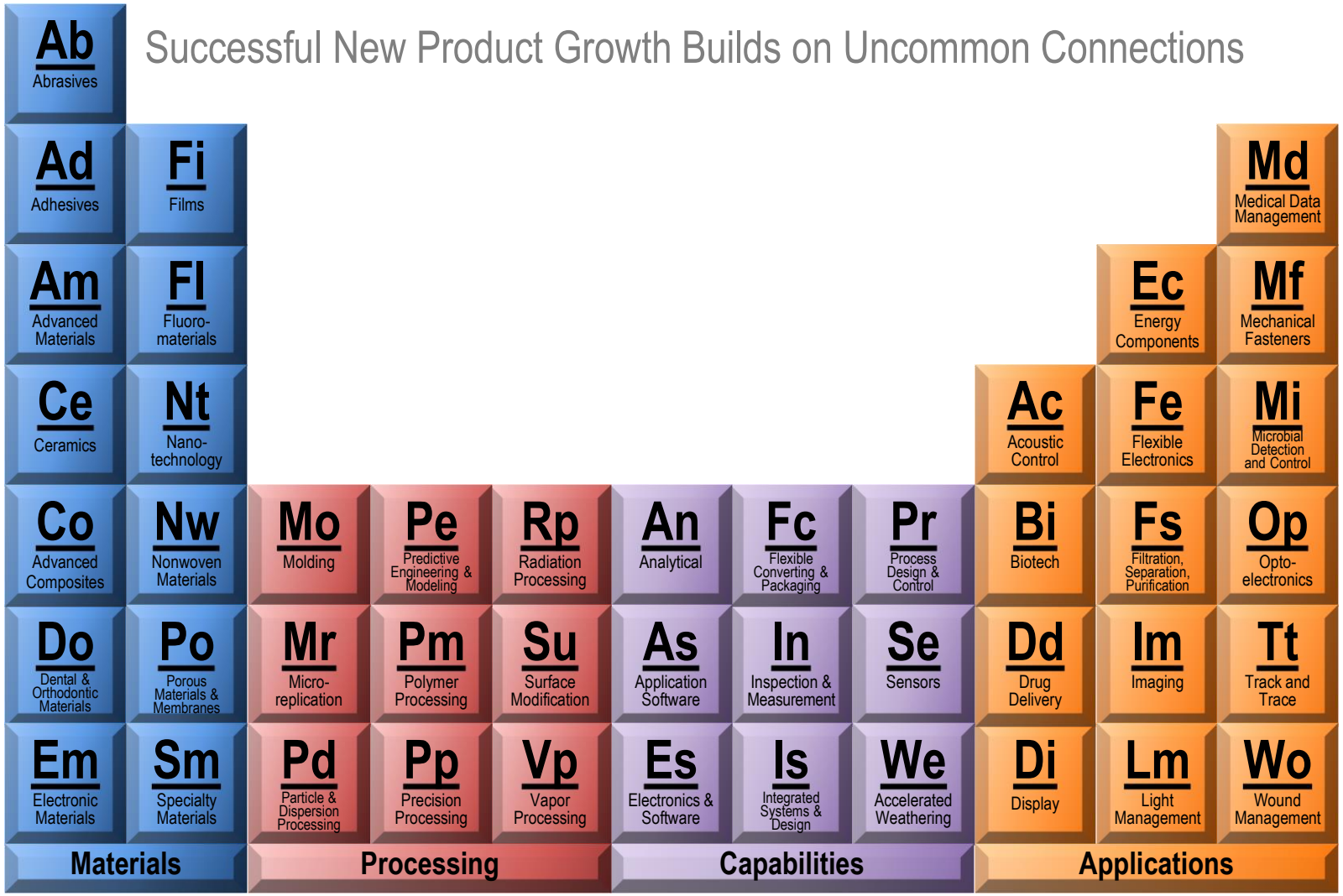
Customer Insights Drive Innovation

- Customers can be challenging to understand …
  - They think within the context of what they know today
  - Simply asking people what they want (VOC) rarely yields important insights



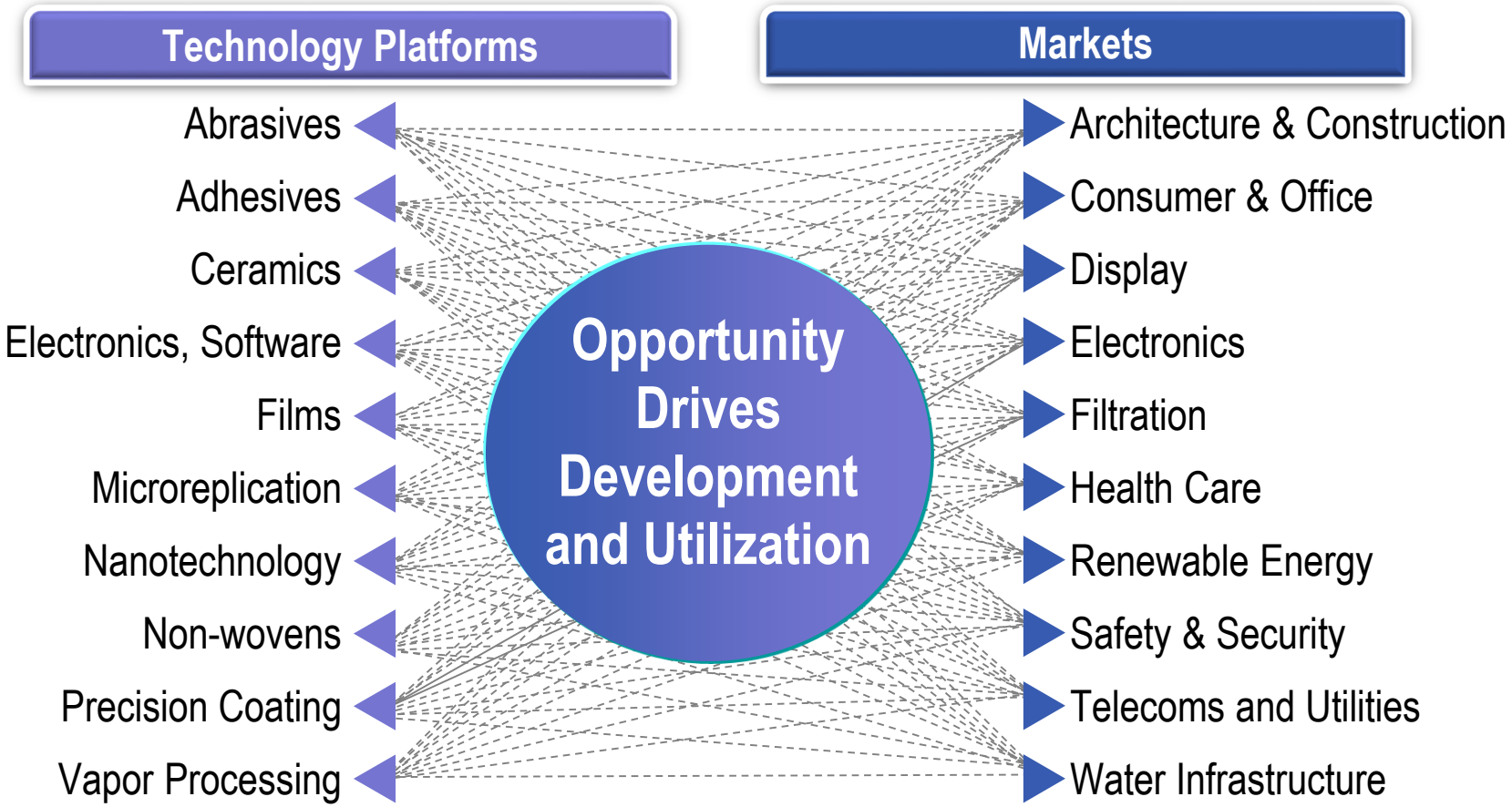
© 3M 2015. All Rights Reserved.

46 Core Technology Platforms



© 3M 2015. All Rights Reserved.

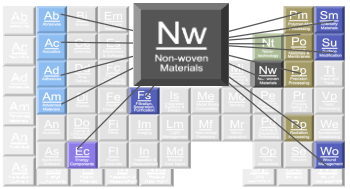
3M Innovation Model



© 3M 2015. All Rights Reserved.

Product and Technology Migration

Non-wovens Technology



Sasheen™ Decorative Ribbons

Scotch-Brite™ Pads

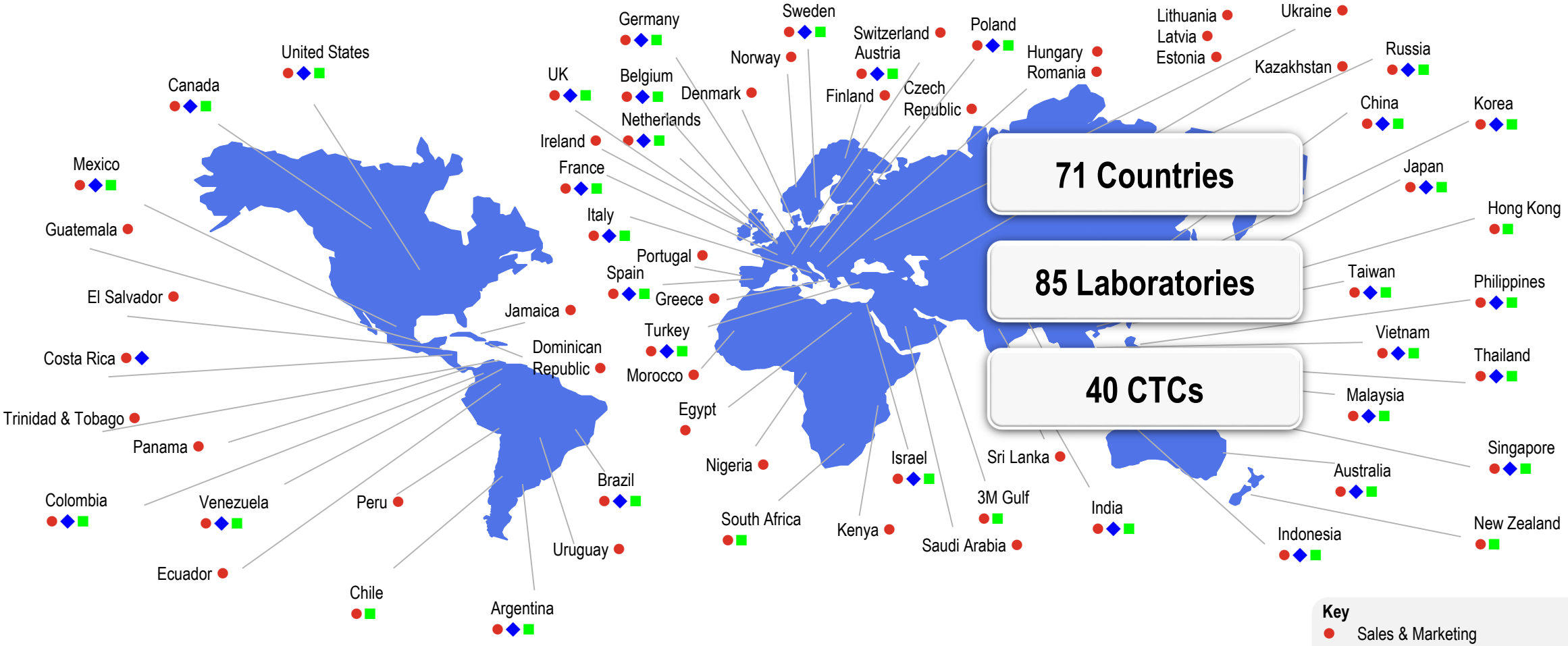
Filament Tape
Dampening Sleeves
Tapes and Ribbons
Insulation Tape
Removable Highway Marking Tapes
Conformable NVH Tape
Extrusion Bonded Loop
Diaper Fastening Tape
Diaper Stretch Tabs
Hookit™ Abrasive Disks
3M™ Enhanced Fiber Diffuser
3M™ LED Design Light License Plate
Scotch-Brite™ Greener Clean
Scotch-Brite™ Botanical
Scrubbing Pads
Buf-Puf™ Pads
Surface Conditioning Pads, Wheels, and Belts
Film-backed Belts
Floor Brushes
Easy Trap Duster
Dirt Trap
Super Cling Floor Cloths
Scotch-Brite™ SL Discs and Belts
Mill Rolls
Floor Pads
Food Service Cleaning Pads
Rescue™ Soap Pads
Never Rust™ Wool Pads
Non-Scratch Cleaning Pads
Bathroom Scrubbers
Scotch-Brite™ Stay Clean
Clean 'N Strip™ Pads
Entrap™ Mats
Anti-Fatigue Mats
Nomad™ Entry Mats
High Performance Roll Gauze
2-layer Compression Wrap
Micropore™
Steri-Strip™ Surgical Tapes
MediPore™ H
First Aid Dressings
Tegaderm™ I.V. Advanced
Coban™
Electrode Backings
Nexcare™ Comfort Strips
Ultra Conformable™
Wrist Rest
Drapes
Breathable Tapes
Attest™ Biological Indicators
APC Flash-Free Dental
Flat Fold Respirators
Surgical Masks
Steri-Drape Surgical Drapes
Spunbond Webs
Bair Hugger™ Patient Warming Gowns and Blankets
Face Masks and Respirators
Filtrete™ Commercial HVAC Filters
Filtrete™ HEPA Filters
Filtrete™ Odor Reduction Filters
Filtrete™ Electrets
Furnace Filters
Cabin Air Filters
Filtrete™ Room Air Purifiers
Vacuum Bags
PolyNet™ Filters
Emphaze™ AEX Hybrid Purifier
Micro-Klean™ Filters
Liquid Filter Bags
Meltblown Webs
Thinsulate™ Thermal Insulation
Flex Thinsulate™
Warming Mask
Thinsulate™ for Bedding
Thinsulate™ Acoustic Insulation
Flame Retardant Thinsulate™
Oil Sorbent
Doodleduster™
Thinsulate™ High Temperature
Chemical Spill Sorbents
Interam™ Mats
Fire Barrier
Nextel™ Flame Stopping Dot Paper
Air Duct Wrap
Grease Duct Wrap
Interam™ Thermal Insulation

TAPE BACKINGS and COMPOSITES
WIPES and ABRASIVES
MEDICAL PRODUCTS
FILTRATION PRODUCTS
INSULATION and SORBENTS

1940 1950 1960 1970 1980 1990 2000 2010 2020

3M Confidential.
© 3M 2015. All Rights Reserved.

3M's Global Reach



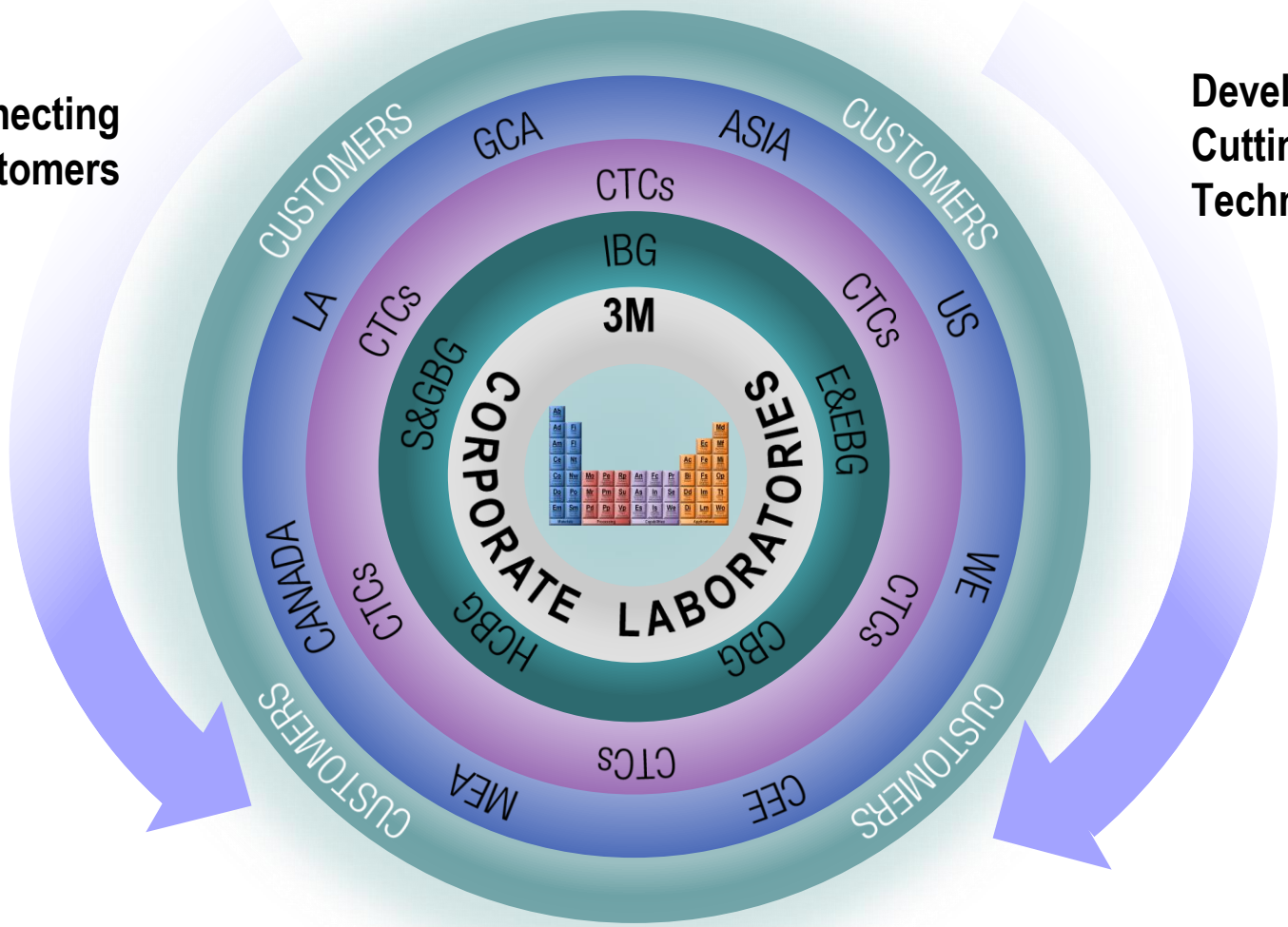
Just around the corner. All around the world.

© 3M 2015. All Rights Reserved.

Connecting Technology to Customers…

Anywhere and Everywhere

Connecting to Customers



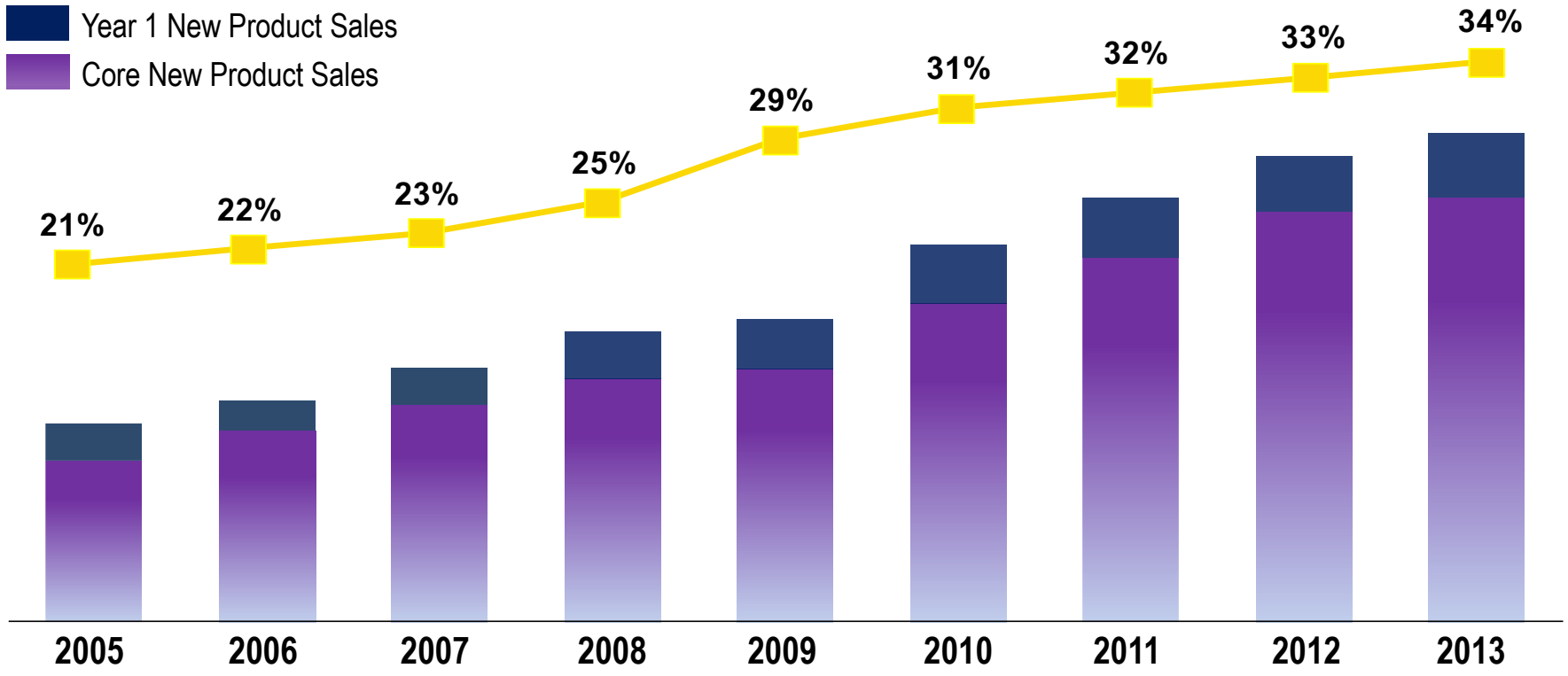
Developing Cutting-Edge Technology

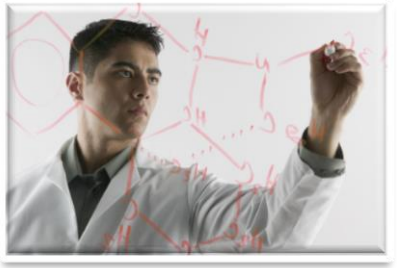
Driving Growth Through Innovation

© 3M 2015. All Rights Reserved.

New Product Sales as a Primary Business Metric

A new product is defined as being introduced within the past 5 years





International new products now ~70% of total

© 3M 2015. All Rights Reserved.

Creating an Innovation Culture

"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**.

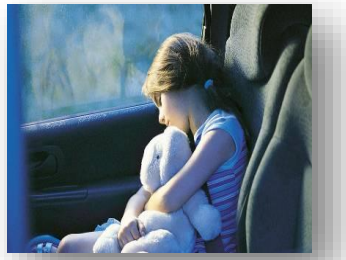
Management that is destructively critical when mistakes are made kills initiative. **And it is essential that we have many people with initiative if we are to continue to grow**."

William L. McKnight, 1948

© 3M 2015. All Rights Reserved.

Creating the space for Innovation

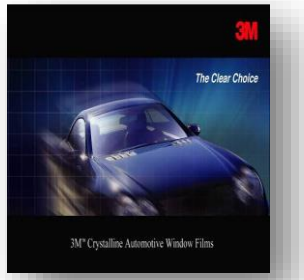
- It is a **culture/philosophy** not a time sheet measurement
- Enables employees to **explore** new technologies and/or new markets
  - Usually related to existing work
- Enables employees to **leverage** technical specialists
- Does not need management approval
- Teaches employees **leadership** and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



3M Scotchtint™
Auto Window Film

High Performance
RFID Reader

Structured
Abrasive Belts



Multilayer
Optical Film

Display Protection Films

APC™ PLUS Color Change Adhesive

Post-it® Notes

Transdermal Drug
Delivery Adhesives

Post-it® Flag
Highlighter

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

© 3M 2015. All Rights Reserved.

A Connected Global Collaboration Community

TECH FORUM

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

© 3M 2015. All Rights Reserved.

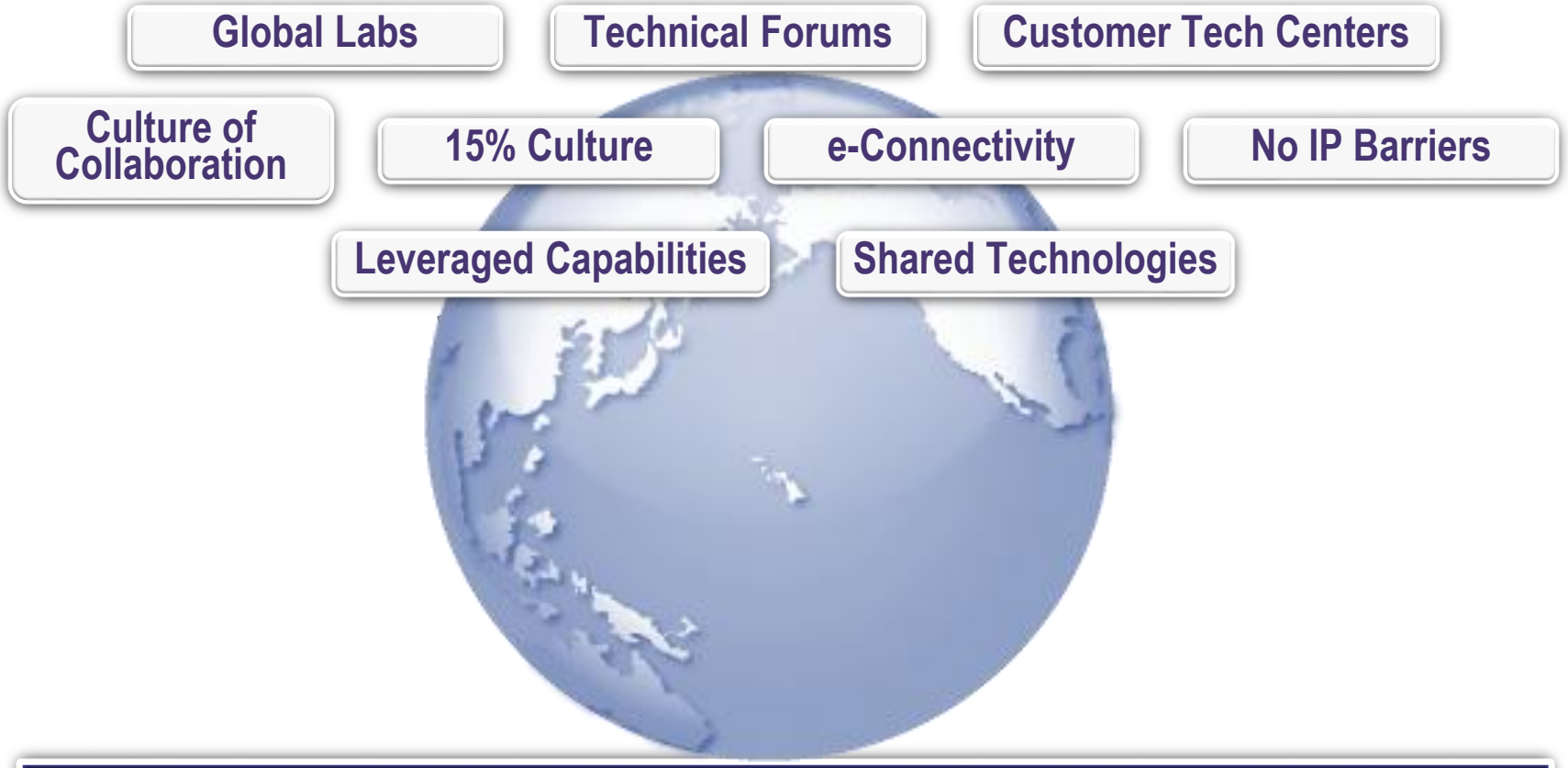
The Annual Event

- Largest event; Everyone participates
- “Internal 3M Trade Show”
- Latest and greatest 3M technologies
- Opportunities to help solve problems
- Delivered electronically to Worldwide Labs

1951

© 3M 2015. All Rights Reserved.

Innovation can be Planned, Purposeful and Global



Innovation is driven by a system of principles, practices and infrastructure that harness the chain reaction of new ideas.

© 3M 2015. All Rights Reserved.

© 3M 2015. All Rights Reserved.