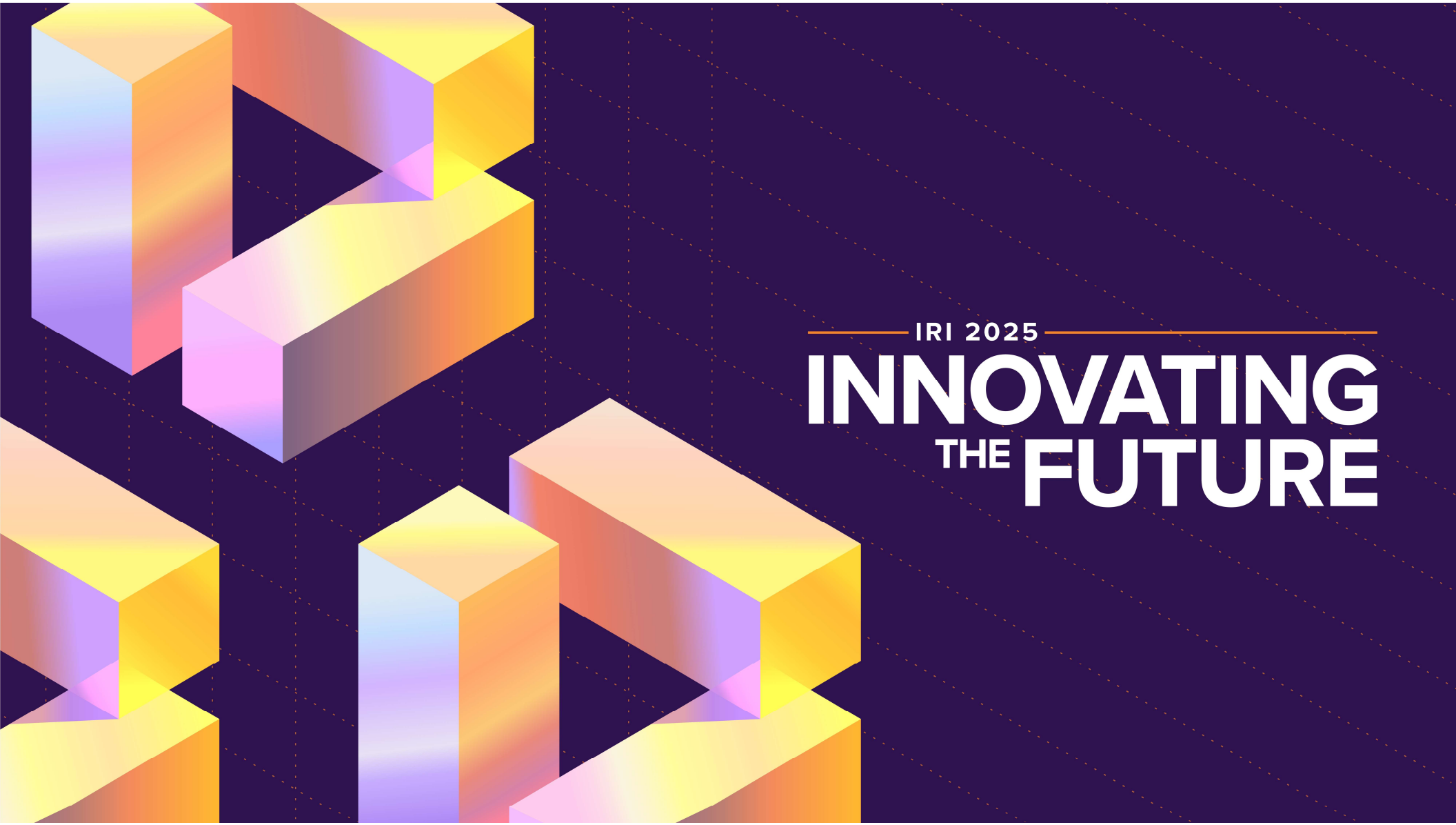
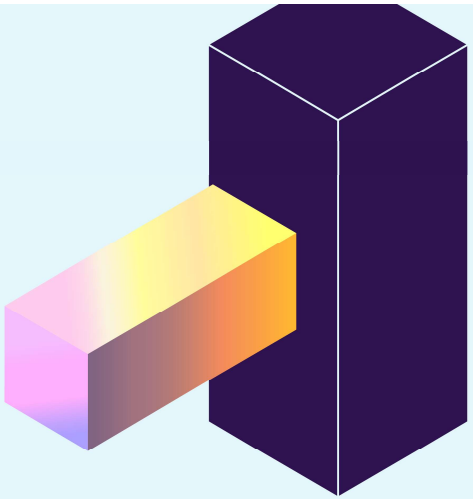
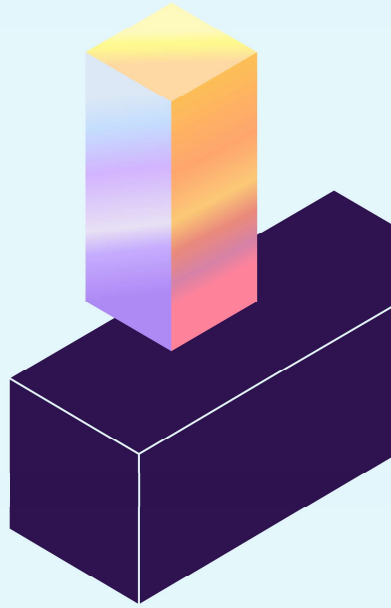
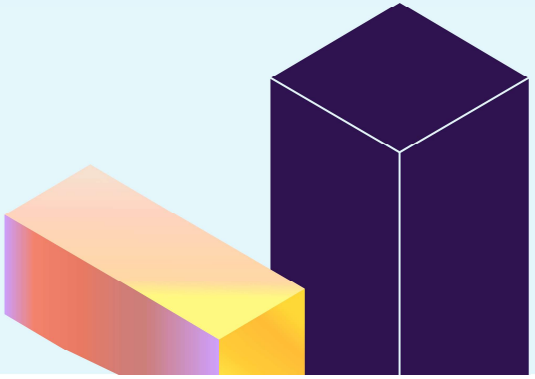

IRI 2025
INNOVATING
THE FUTURE

CTO Forum

Todd Boppell
Chief Operating Officer
National Association of Manufacturers



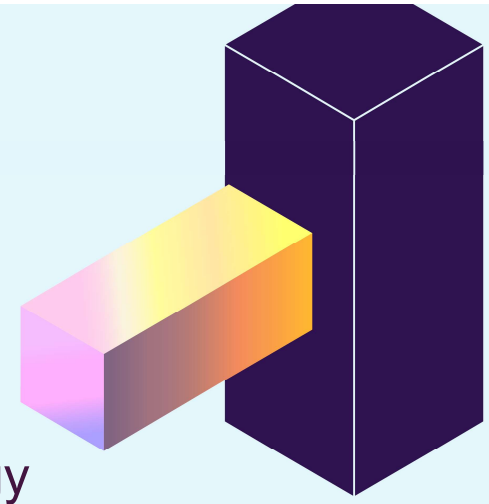


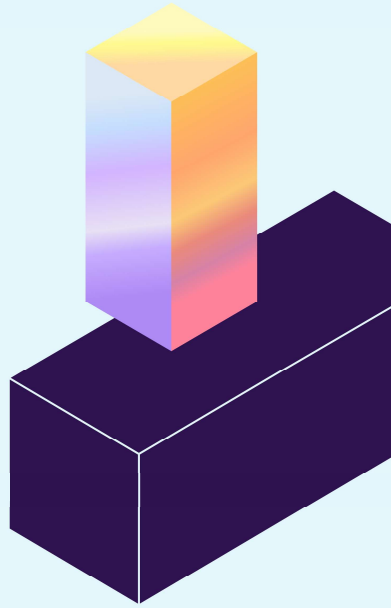


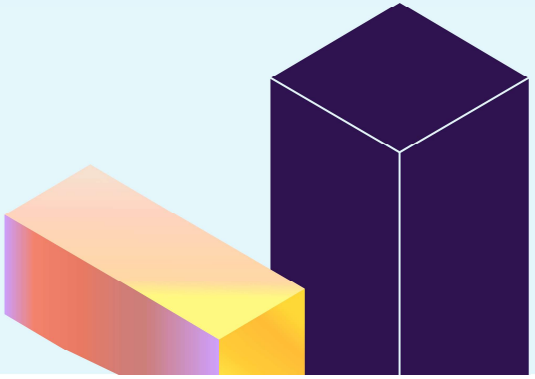
Co-chairs

Julie Edgar
Senior Vice President, Chief Technology Officer
The Lubrizol Corporation

Arthur Martin
Vice President of Research & Development in North America
Arkema, Inc.







Lubrizol: Strategic Technology Priorities

1. **Accelerating Growth**
   - Leverage strong market positions and prioritize high-ROIC investments
   - Realign globally to build HGR capabilities
2. **Improving Profitability**
   - Focus on differentiated margin products and productivity enablement
   - Streamline processes to align with HGR ambitions and optimize offerings
3. **Exploring Adjacent Markets and leveraging external technology**
   - Pursue innovative opportunities to expand reach; including partnerships
   - Strengthen strategic pillars and capabilities
4. **R&D Transformation**
   - Reimagine where and how R&D work is done
   - Rebalance portfolio to maximize human and financial capital towards growth

Lubrizol

Lubrizol: Strategic Pillars

Core Product Development

Develop and deliver market leading technology to support existing markets

Improving Competitiveness

Support complexity optimization, diversification of RM sourcing and productivity

Innovation Beyond the Core

Discover, Incubate, commercialize opportunities

Best in Class Processes

Streamlined processes designed for agility, efficiency, and consistent global delivery

Digital Transformation

Embed use of data and decision science and modeling, enhancing speed to market & continuous improvement

Physical Transformation

Globally connected network enabling collaboration and agility for adaptive solutions

+

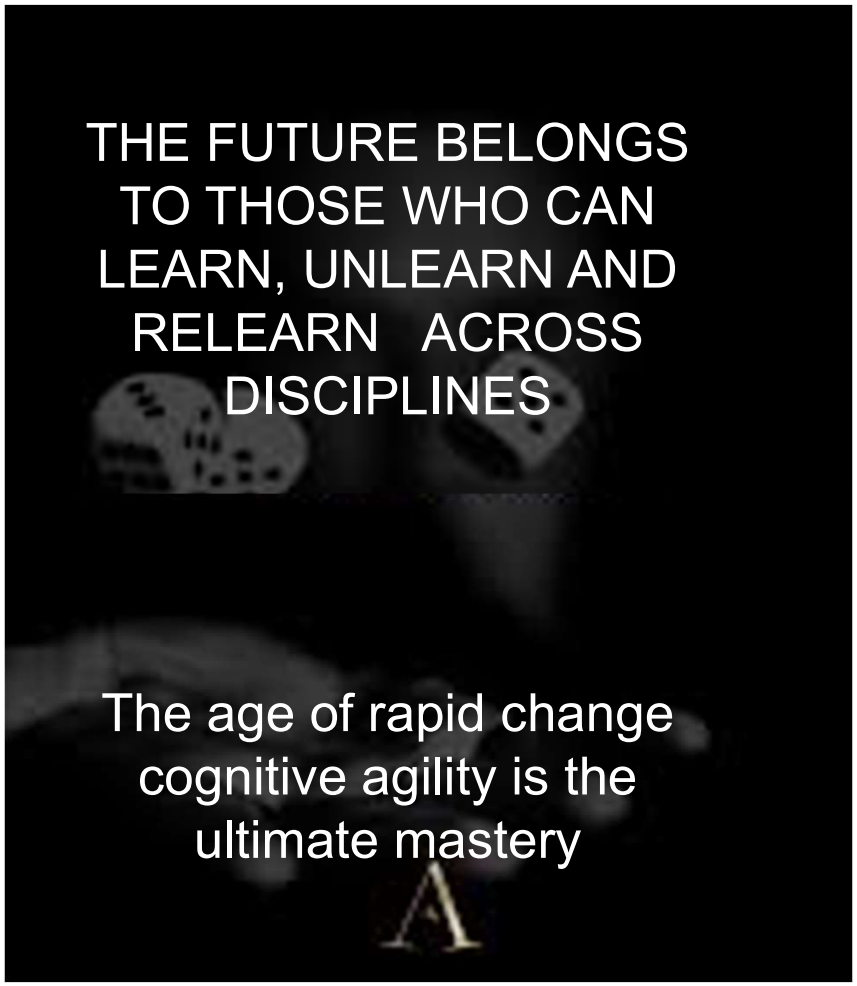
Winning Talent

Having the right people in the right place with the right capabilities, living our values, to deliver on our strategy

Lubrizol

Future of Work: Jack of all Trades and Master of all Trades

Emerging expertise shaping innovation across multiple sectors



Summary

The future of work in the chemical and technology sectors belongs to "masters of many"—deep specialists who can also operate across disciplines.

Instead of choosing between *jack of all trades* or *master of one*, companies will demand **flexible, hybrid, tech-empowered experts** who can integrate chemistry, digital tools, sustainability, and real-world applications.

Why This Hybrid Model Is Emerging

Convergence of Chemical, Digital, and Technologies

→ **Specialty chemical companies are no longer purely chemistry-driven. They now require:**

- Computational modeling & AI-assisted formulation
- Digital twins for process simulation
- Biotechnology for novel materials
- Automation & robotics for production
- Sustainability-driven LCA and regulatory expertise

This pushes companies to seek talent who can fluidly operate at the intersection of **chemistry + digital + engineering**.

Integrated Value Chains

Chemistry + software + data + automation must now be developed in tandem. So, companies need:

→ Chemists who understand ML

→ Data scientists who understand materials science

→ Process engineers who understand automation & IoT

→ Product managers who know both applications and regulatory landscapes

Capability Categories (Resulting Talent Archetypes)

1. Deep Specialists (Low fungibility)
Criteria:
D = 3, B ≤ 1, F = 0–1
Typical share: **40–70%**

Mechanistic Chemists, Process Engineers, Analytical Services, ML researchers in narrow subdomains.

2. T-Shaped Talent (Breadth + Depth, Medium Fungibility)
Criteria:
D = 2–3, B = 1–2, F = 1–2
Typical share: **20–40%**
These are the ones that truly have **breadth + depth** and are **moderately fungible**.

3. Versatile Generalists (High Fungibility)
Criteria:
D = 1–2, B = 2–3, F = 2–3
Typical share: **10–25%**
Examples: Chemical engineers, cross-functional data scientists, platform software engineers.

4. Emerging Talent / Junior Generalists
Criteria:
D = 0–1, B = 1–2
Share: **5–15%**
Often become the fungible workforce with training.

5. Critical Experts (Non-fungible, high-depth)
Criteria:
D = 3, B = 0–1, F = 0
Share: **5–15%**
They anchor the org but cannot be redeployed.

6. Functional Glue / Integrators
Criteria:
D = 1–2, B = 3, F = 2–3
Share: **5–10%**
Program managers, Portfolio Managers, platform integrators.

Model Output: Expected Distribution

Category	% of R&D Workforce	Fungible?	Breadth + Depth?
Deep Specialists	40–70%	❌ Low	❌ Mostly no
T-Shaped Talent	**20–40%**	**Moderate**	**Yes**
Versatile Generalists	10–25%	✔ High	↘ Some
Integrators	5–10%	✔ High	✔ Yes
Critical Experts	5–15%	❌ None	✔ Depth only

Depth and Breadth Model to the Future of Work

The “Master of Many” Talent Profile. Deep Expertise (the vertical)
A strong anchor skill such as:

→ Polymer chemistry

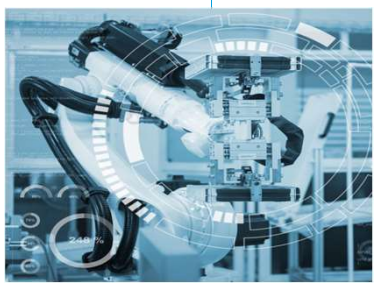
→ Catalysis

→ Process engineering

→ AI/ML modeling

→ Control systems

→ Materials informatics



Breadth Across Adjacent Domains (the horizontal) competence in:

→ Data literacy

→ Systems engineering

→ Sustainability frameworks

→ Automation & digital tools

→ Cross-functional collaboration

Meta Skills and Workforce Structure

Meta Skills & Future-proof capabilities like:

- Rapid learning
- Translating between technical domains
- Creativity in constraints
- Cross-domain problem-solving
- Communication & commercial awareness

How Companies Will Change Their Workforce Structure.

- Fewer purely “lab-only” roles
- More *“**chemistry + data + automation**”* hybrid roles
- **AI-assisted R&D** replacing repetitive experimental design
- Greater importance on ***application engineers*** who bridge customers, product teams, and R&D
- Upskilling existing chemists into **digital and sustainability competencies**

Invest in hybrid skill programs and cross-functional culture

Hybrid Skill Development

Investing in hybrid programs combines chemical expertise with digital and sustainability skills for a future-ready workforce.

Cross-functional Teams

Creating cross-functional teams fosters interdisciplinary cooperation and drives innovation within organizations.

Continuous Learning Culture

Building a culture that values ongoing learning ensures competitiveness and alignment with sustainability goals.

Leveraging Technology Platforms

Utilizing technology platforms enhances collaboration and supports advanced training and knowledge sharing.