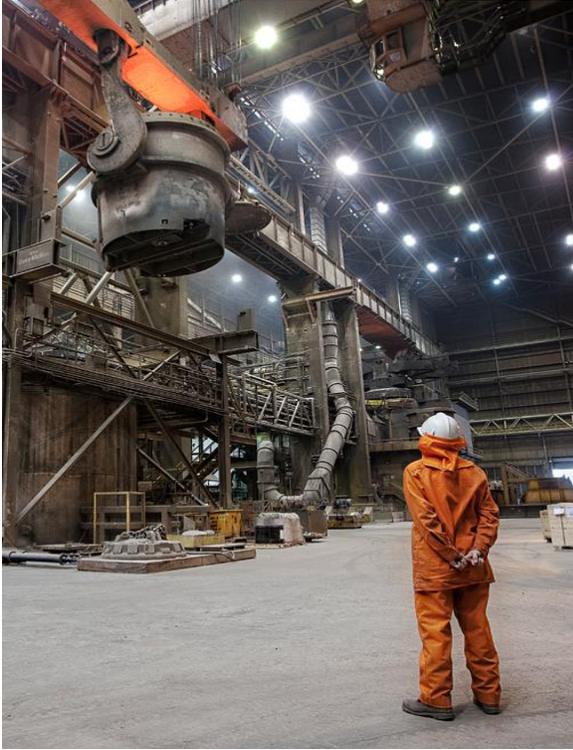




Retraining for I4.0 Operations and Safety Management

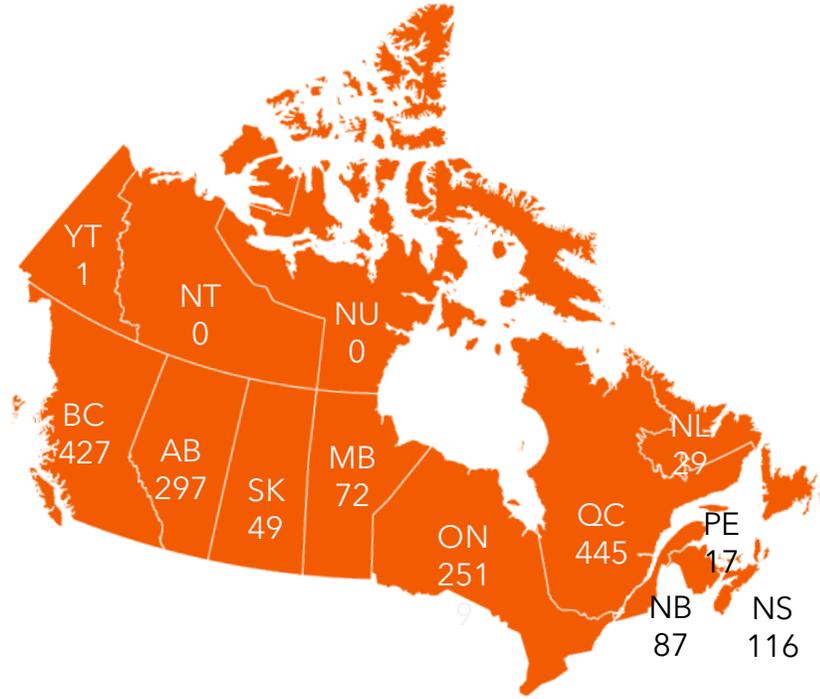
Christy Michalak
Director, Advanced
Manufacturing Development
Programs

28 October 2022



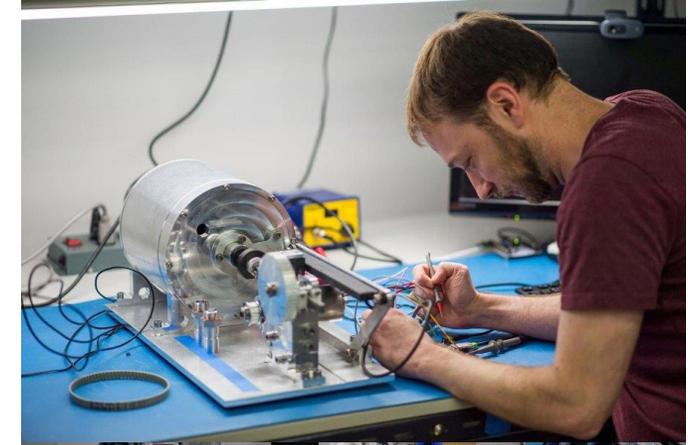
Building Canada's Advanced Manufacturing Ecosystem

NGen Members across Canada



Over 5,200 members from coast to coast.

- Manufacturers
- Tech Providers
- Colleges & Universities
- Industry Networks
- Business Services
- Investors & Funding Agencies
- Researchers & Experts





Next Generation Manufacturing Canada

- ⚙️ NGen is the industry-led, not-for-profit corporation that leads Canada's Advanced Manufacturing Supercluster.
- ⚙️ NGen has a mandate to build world-leading advanced manufacturing capabilities in Canada by enabling the successful development, scale-up, and deployment of advanced technologies in Canadian manufacturing.
- ⚙️ Raising awareness about Canadian capabilities, connecting and building collaboration across the ecosystem, and strengthening workforce skills and advanced manufacturing management capabilities have been core elements of our operating mandate since our foundation in 2017.



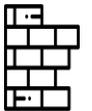
Promoting
Canadian
Capabilities



Making
Connections



Funding
Collaborative
Innovation



Building
Workplace &
Management
Capacity

Outline

Top Issues in Manufacturing

Impact of Industry 4.0 on employees

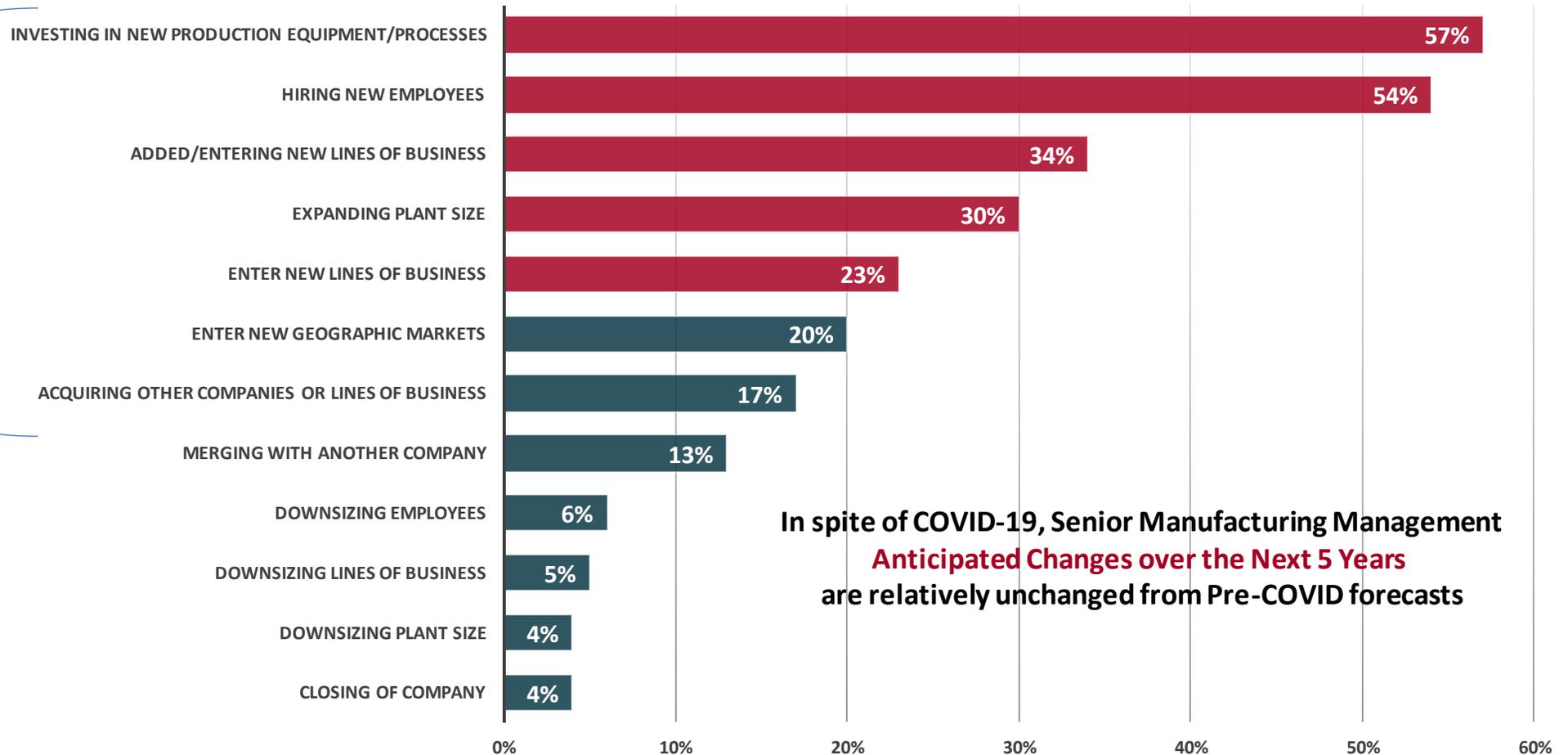
Critical Skillsets Identified by Manufacturers

Ngen's Approach to Upskilling

Changes Anticipated by Plant Management 2022-2026

(n=358 firms surveyed)

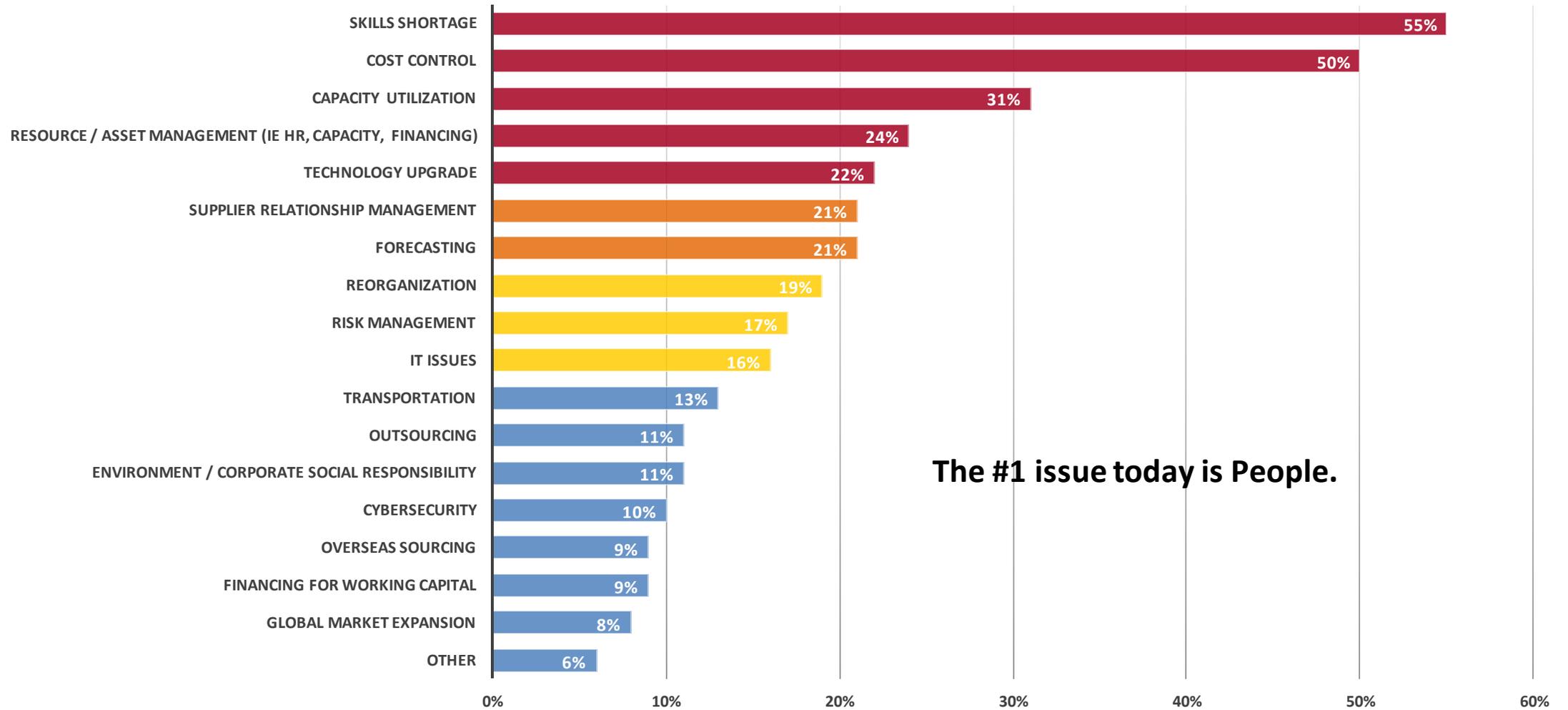
Approx. 90% of respondents indicating growth activities



In spite of COVID-19, Senior Manufacturing Management Anticipated Changes over the Next 5 Years are relatively unchanged from Pre-COVID forecasts

Issues Affecting Manufacturing

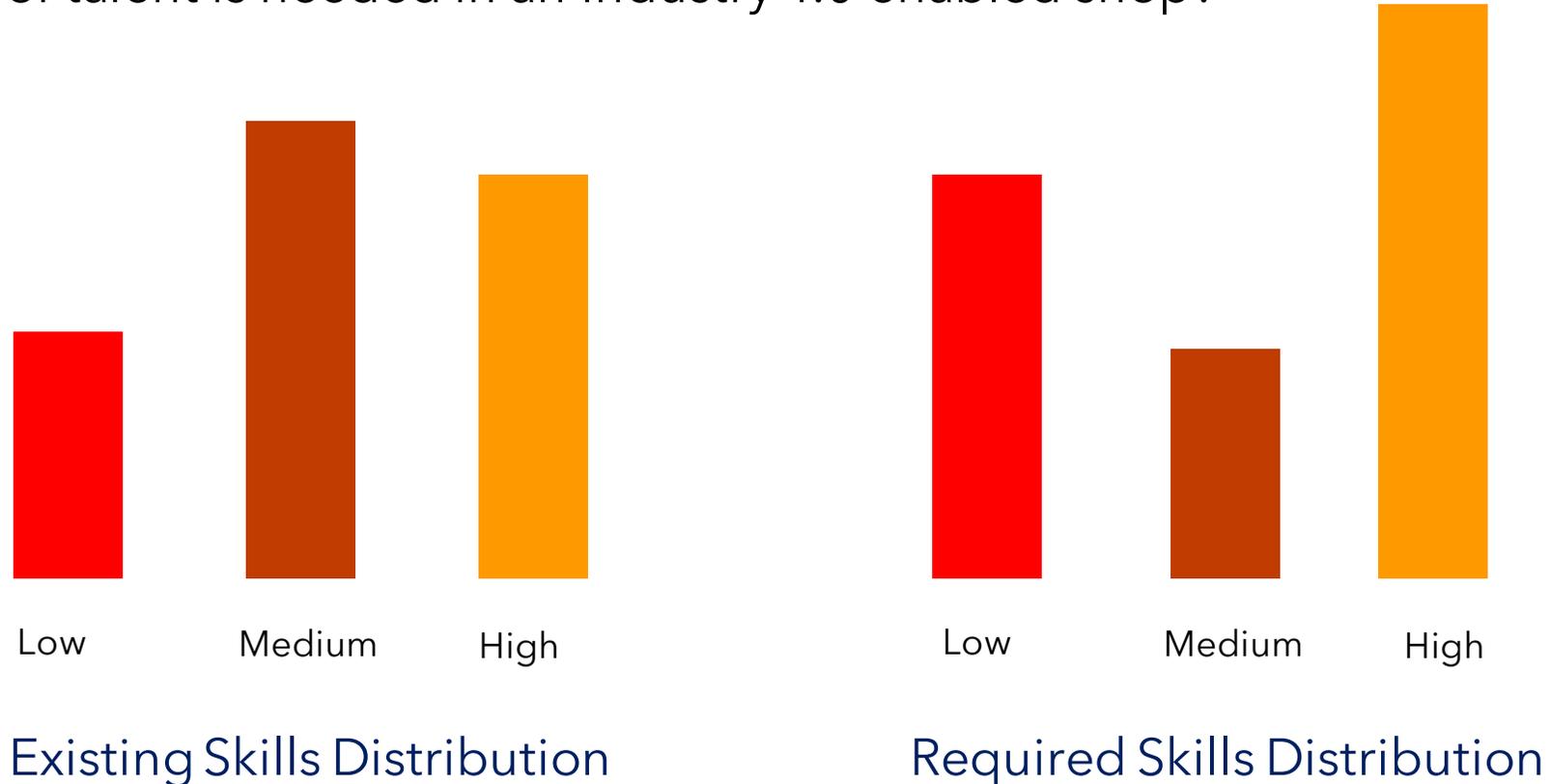
Most Significant Plant Management Issues for 2022 (n=358 firms surveyed)



The #1 issue today is People.

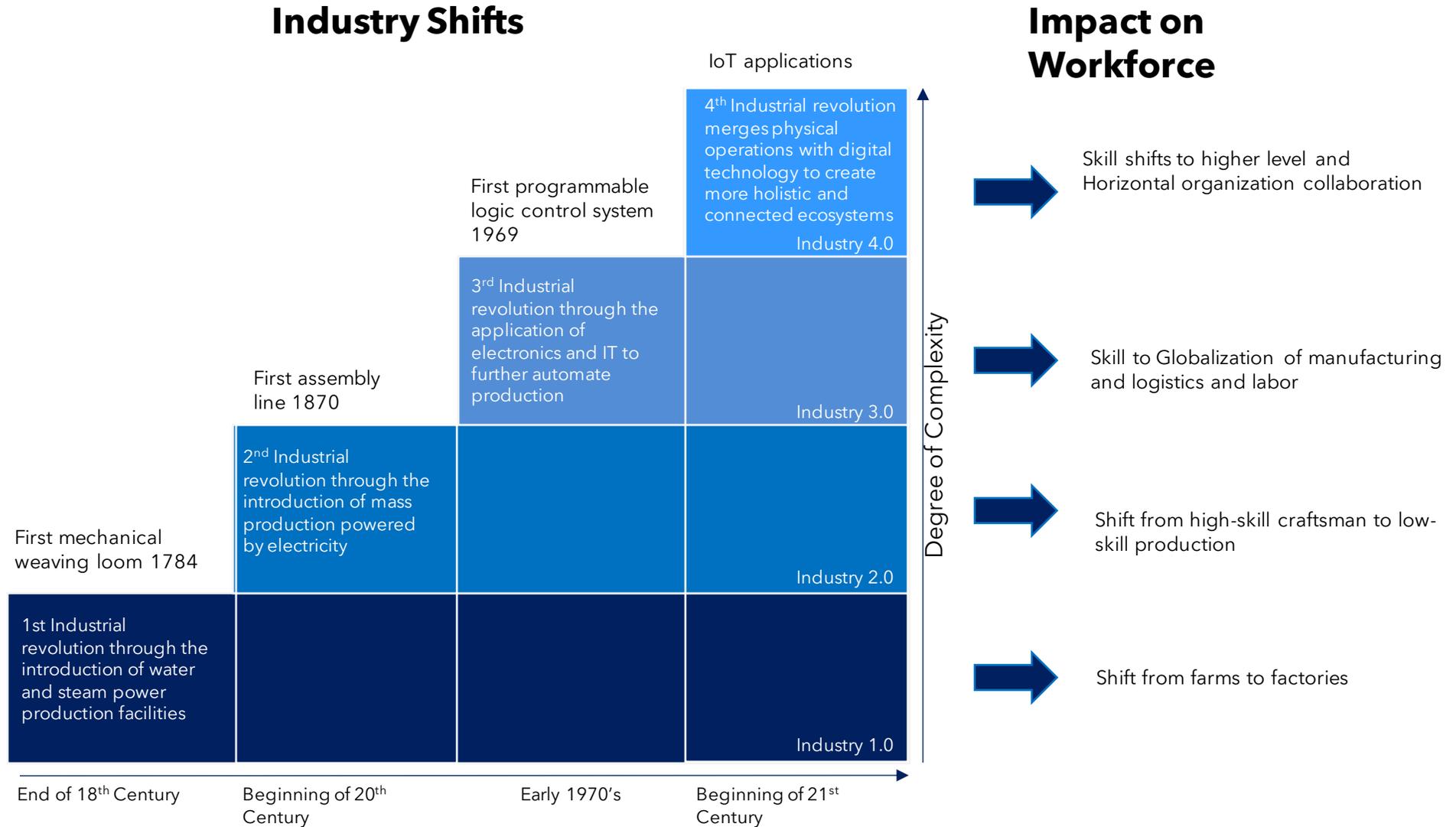
Skill Levels Will Shift Due to Industry 4.0

- What level of talent is needed in an Industry 4.0 enabled shop?



Source: "Industry 4.0 and the Demand for New Answers", Industrial Global Union, Working Paper, September 2017

Industry Shifts Have Always Impacted the Workforce



Industry 4.0 in the Workplace

Potential Benefits

Improved remote connectivity

Less monotonous work

Safer work conditions

Employee Health Monitoring

Smart personal protective equipment

Enhanced Human-Machine Interface for hazardous tasks

Potential Risks

Increased psycho-social stress

Reduced inter-personal contact

Skills gaps in current workforce

Potential for invasion of privacy

Underemployment or unemployment

Impact on work-life balance



Future skills requirements according to the government of Canada

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success.html>

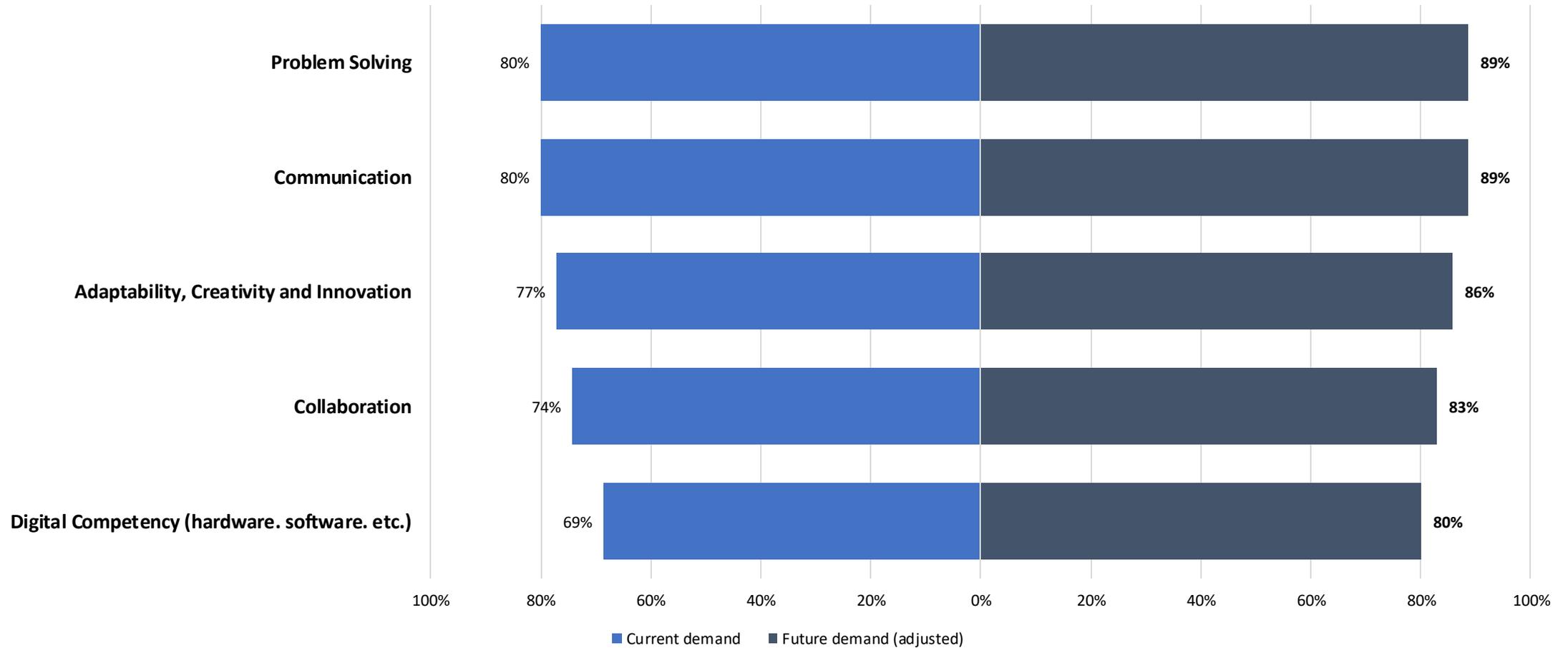


Future skills requirements according to the government of Canada

<https://www.canada.ca/en/services/jobs/training/initiatives/skills-success.html>

Foundational Capabilities are Largely in Demand and Will Increase in the Coming Years

Demand of Foundational Capabilities



Source: Excellence in Manufacturing Consortium

Creativity, Innovation, and Problem Solving

Creativity and Innovation is an important skill to help companies stay ahead of the game in the competitive market of manufacturing:

- **Productivity:** use equipment in an innovative way to speed up production
- **Market shares:** create new and innovative products; find creative ways to reduce product price
- **Customer service:** turn customer suggestions into creative, implementable ideas
- **Human resources:** ensure team members see their creative ideas valued and taken seriously; incentivize innovative ideas
- **Environmental impacts:** find creative and innovative ways to lower carbon emission during production





Communication and Collaboration

These are core skills, especially as companies continue to emphasize diversity and inclusivity:

- **Safety:** conduct cross-checks to ensure colleagues are safe
- **Productivity:** work across multiple teams – from supply management, R&D, to sales – to ensure production is on schedule
- **Quality:** share quality control best practices with newly hired colleagues
- **Customer service:** work with the engineering and sales team to address customization requests from clients
- **Human resources:** ensure all team members feel included as the company grows



Adaptability

Adaptability is a vital skill, as the need to pivot and shift on a daily basis is the reality of manufacturing:

- **Productivity:** adapt plans and priorities to meet deadlines when unexpected changes occur, e.g., machine breakdown, supply defects
- **Quality:** maintain consistency in quality despite changing production circumstances, e.g., seasonal fluctuations in production conditions, natural quality fluctuations of raw input materials
- **Human resources:** manage mental health of team members while responding to stressful and unexpected changes on the production floor
- **Customer service:** adapt product design to meet customers' unique needs

Digital Competency

Digital adoption is becoming increasingly popular in manufacturing. Tasks that used to be done manually or on paper are now digitized:

- **Safety:** conduct safety checks remotely
- **Productivity:** monitor machine runtime to optimize preventive maintenance
- **Quality:** conduct quality assurance/quality control in real-time to prevent defects
- **Customer service:** monitor customer order progress online
- **Marketing:** conduct marketing campaigns through social media
- **Human resources:** manage shift schedules, pay stubs, vacation requests online
- **Environmental impacts:** monitor wastewater levels in real-time



Can We Really Teach Foundational Skills?

- Participants typically thought that these skills are trainable/learnable, although some shared previous challenges. **The majority expressed the need for supervisory training to foster these skills among their employees.**

“ Definitely trainable, especially with on-the-job coaching and mentoring. ”

“ Some learn over time and become more adaptable and think outside of the box. Others throw their hands in the air and say they can't do it. It depends on the person. ”

“ As a supervisor, I would appreciate having the tools to encourage collaboration or creativity in my team. ”

Tools to Build
Creativity, Problem
Solving,
Communication
and Collaboration

8D, 7-Step

5 Why

Lean Kaizen

Value Stream Mapping

Stand-Up Meetings

Gemba Walks

Continuous Improvement

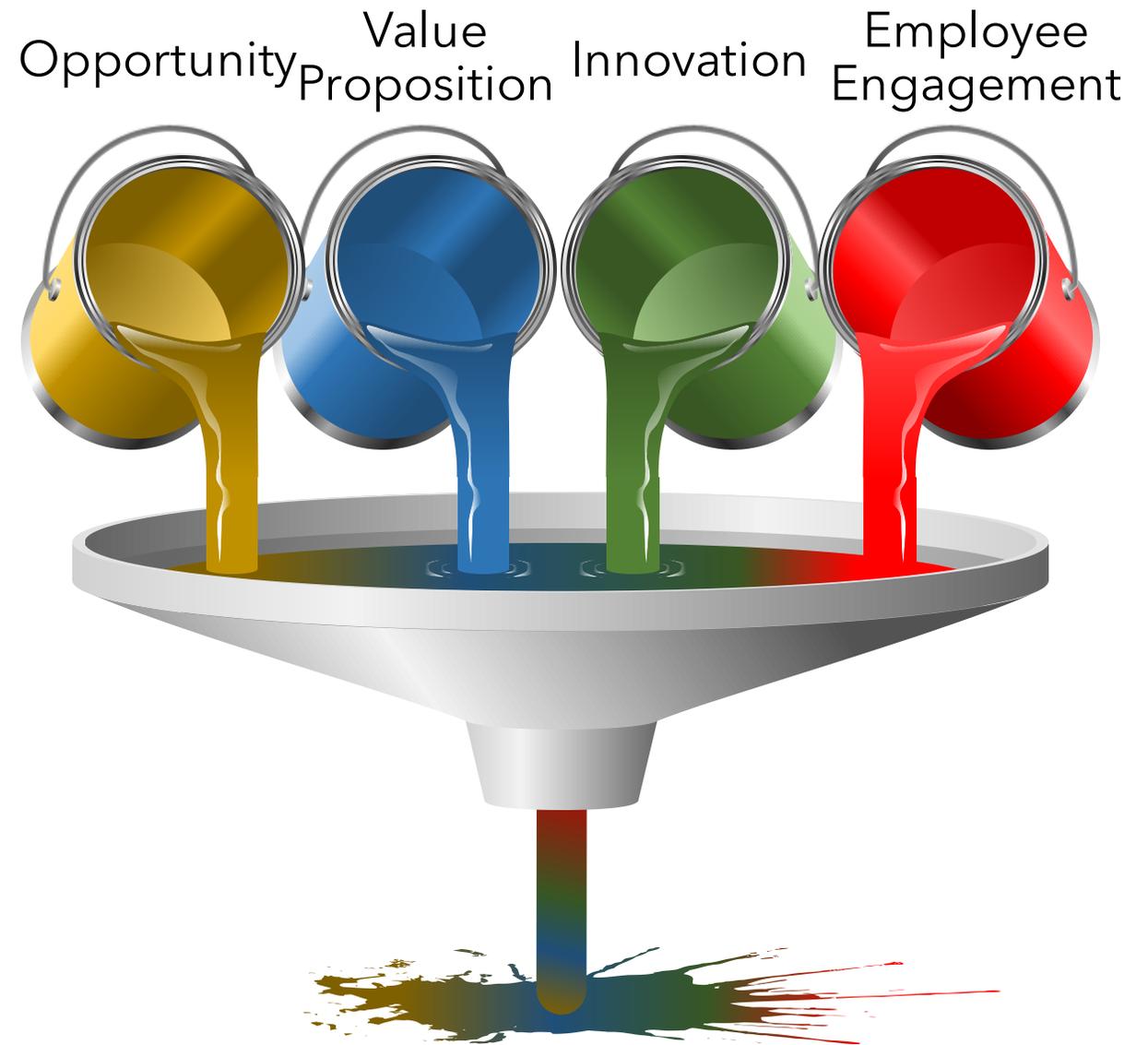
Kanban Boards

Etc.

Opportunities for Hands-on Training

- Consider the following:
 - **Involve** the factory floor / office staff when doing Lean Value Stream Mapping
 - **Involve** the factory floor / office staff when studying Industry 4.0 principles
 - **Involve** the factory floor / office staff when doing internal assessments of technology
 - **Involve** the factory floor / office staff in discussions of changing roles and safety
- Bottom line:
Training and engagement go hand-in-hand

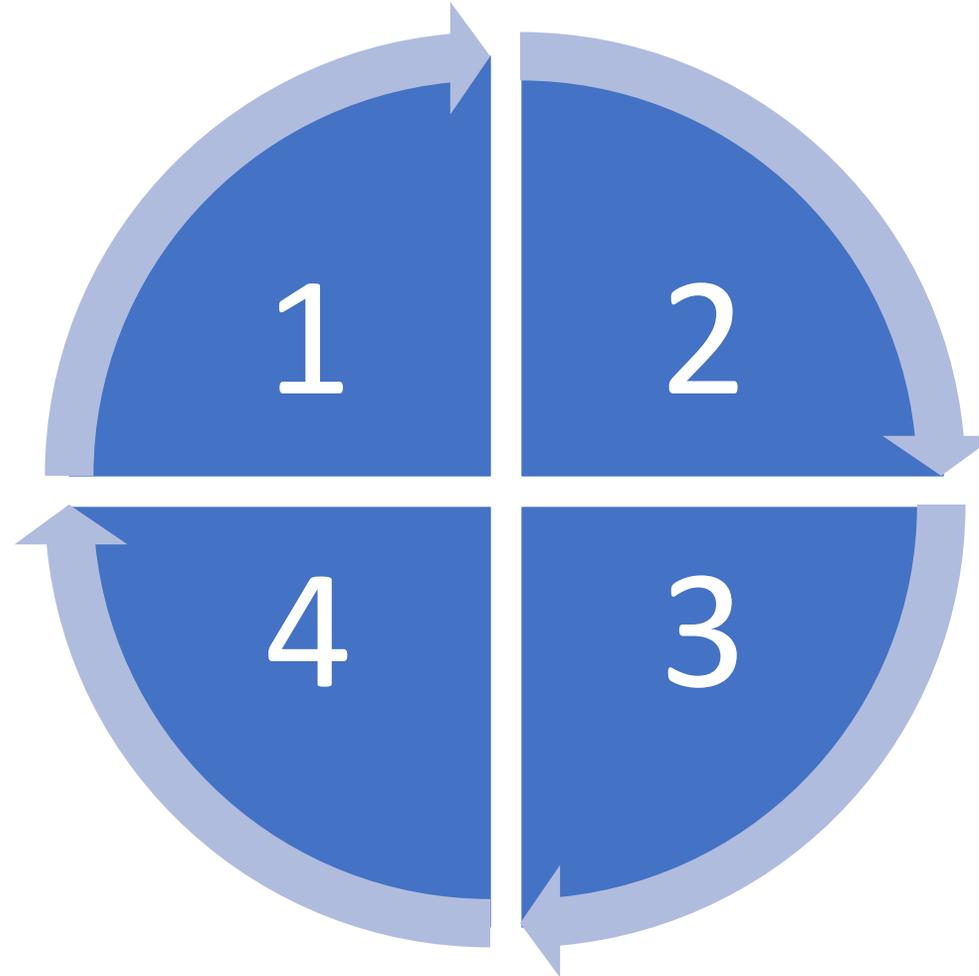
Financial
results are a
dependent
variable



Upskilling Cycle

1. Identify I4.0 projects
 - Bottlenecks
 - New smart equipment
 - Improved information flows
 - Immediate data acquisition
 - Etc.

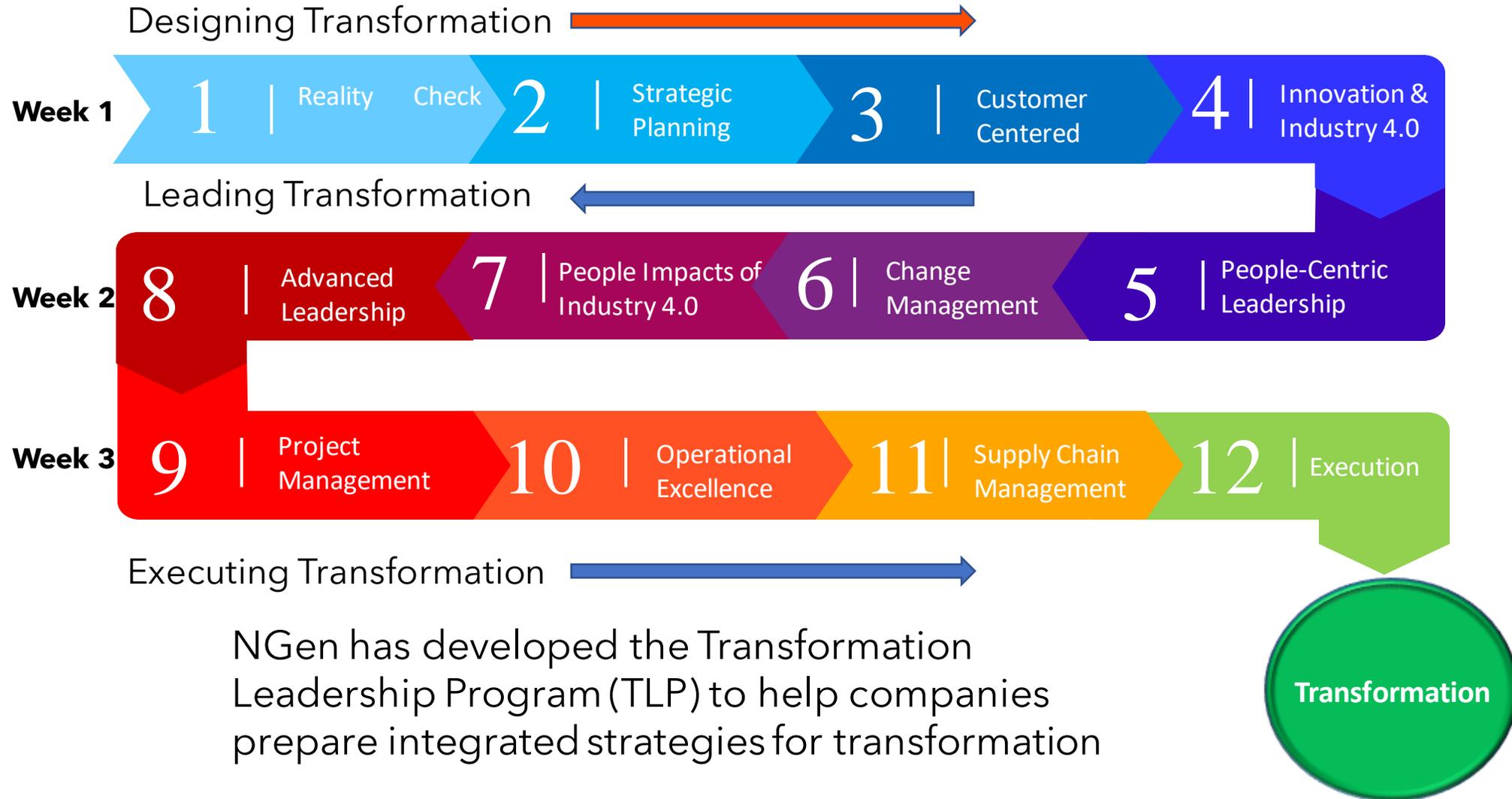
4. Re-evaluate skills and repeat cycle



2. Measure existing skills and competencies and perform gap analysis

3. Choose Relevant training/certifications
 - Micro/Nano Credentials
 - Technical training
 - Hands-on training
 - Lean activities

Transformation Leadership Program



Some Key Takeaways

- You must **engage** the affected workforce
- Present the **opportunity** so that the workforce “owns” the **solution**
- Change always brings fear. Successfully **identifying** and **addressing** the fears and concerns of the workforce is **essential** to successful transformation
- Look at your **workforce** in terms of required skills and **skills gaps**. Develop formal programming to support **upskilling/ reskilling**
- **Manufacturing needs to become the career of choice for young people.**



Building World Leading Advanced Manufacturing Capabilities for the Benefit of Canadians

www.ngen.ca/join
Christy.Michalak@ngen.ca

