

Defining AI



AI



ML

Sort

Cluster

Predict

Defining Gen AI



Defining Agentic AI



CREATE

Generative AI

Generative AI models produce text, images, and media based on trained data and statistical methods. Data first strategies are being established.

Agentic AI

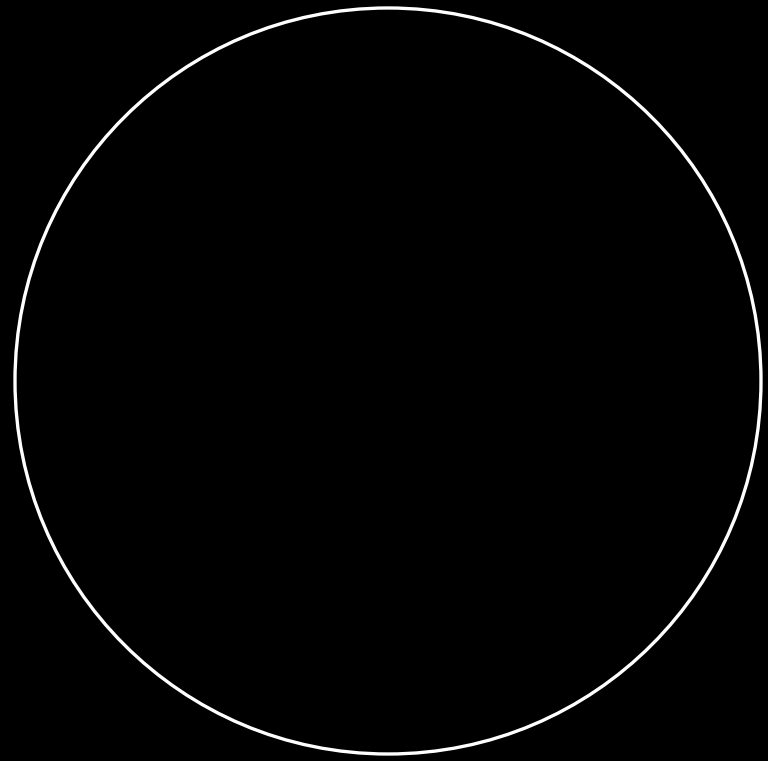
Agentic AI systems act autonomously with goal-directed behavior without constant human control.

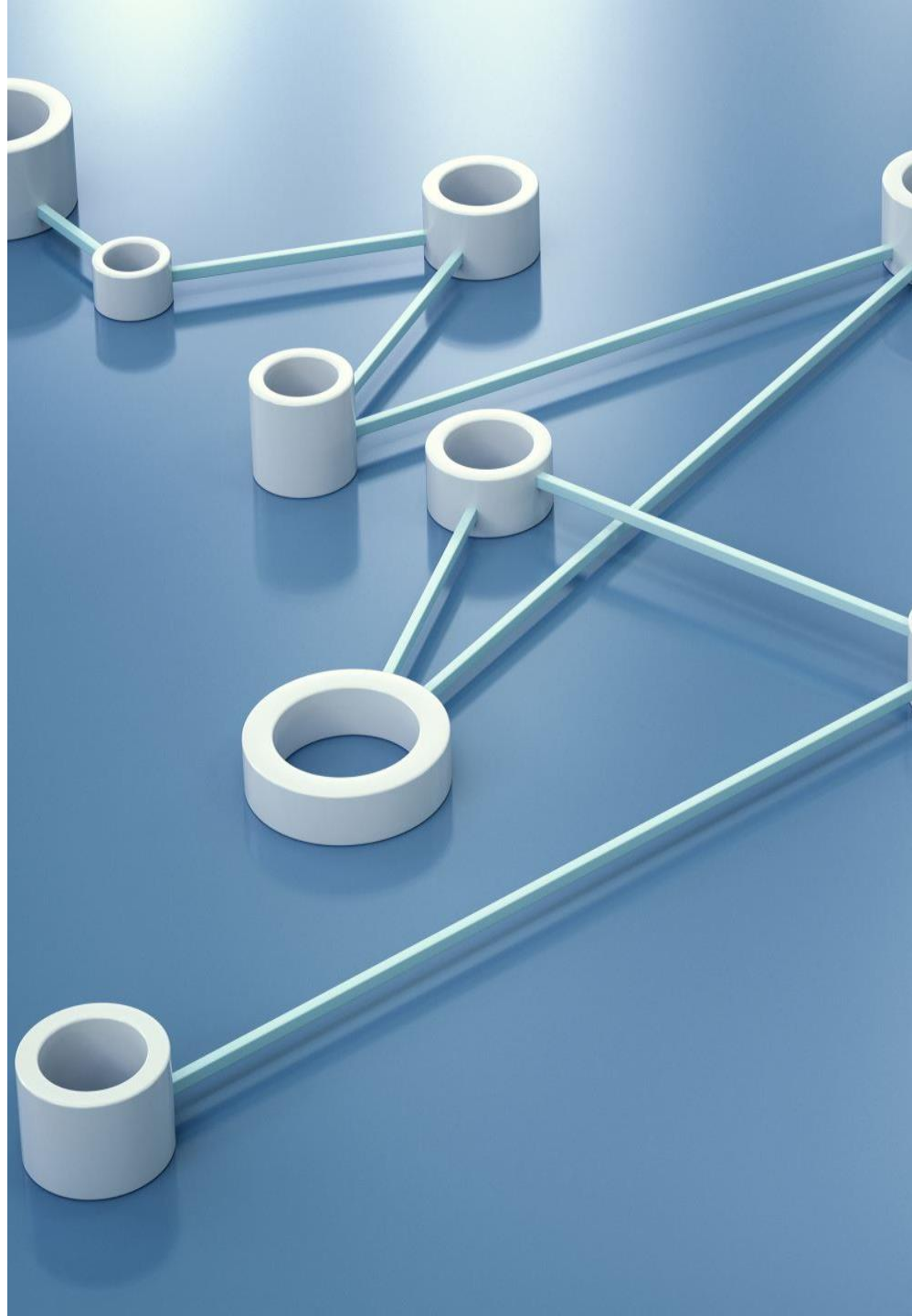
Relevance in R&D

Gen AI technologies are accelerating the packaging and transfer of R&D ideas into commercial products, process automation and new business models creation and testing.



Research Design





Research Hypotheses

Hypothesis #1 Gen AI is a technology that will help level the playing field between SMM supply chain partners and larger organizations in terms of R&D and commercialization activities and outputs.

Hypothesis #2 Manufacturers that leverage Gen AI will increase inside-out innovation outputs in new products, new technical services, and new market development.

Initial Observations & Findings

Phase One Fall 2025 – Spring 2026

The analytical framework used in this research and the foundational model for managing transformational innovation in corporations was discovered and designed and by the Corporate Startup Lab at Carnegie Mellon University by Ammirati, Crespi, Musante, et al

**Carnegie
Mellon
University**

CSL corporate startup lab
A CMU Swartz Center Initiative

Research Sample To Date

Large Manufacturers

- PPG
- Carlisle Construction Materials
- Bosch
- Colgate
- Coherent (II-VI)
- Dupont
- Church & Dwight
- 3M
- Philips
- Covestro
- Exxon Mobile
- Lockheed Martin
- Moderna

Small & Medium Manufacturers

- DMI Companies
- Benshaw Controls
- EBARA Elliott Energy
- Many Others

Non-Manufacturing

- BNY Mellon
- PNC
- Optum/ UHC
- Deloitte
- A.T. Kearney
- EY
- McKinsey
- Bain

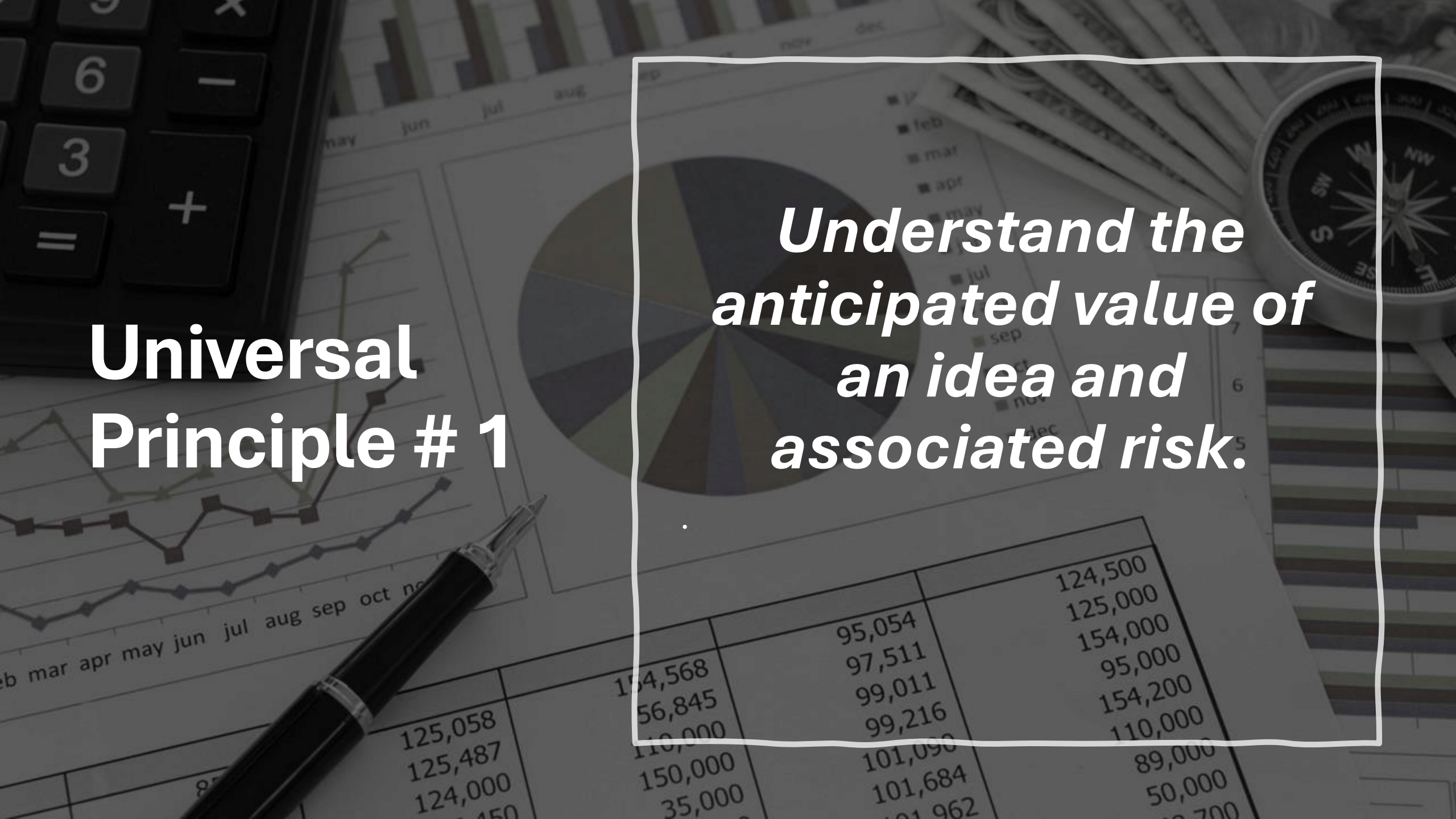
Three Universal Principles

Those successful at implementing transformational technologies have followed three universal principles in experimentation, testing and scaling.

How do these compare to your organization's practices in rolling out Gen AI in R&D?

Universal Principle # 1

Understand the anticipated value of an idea and associated risk.

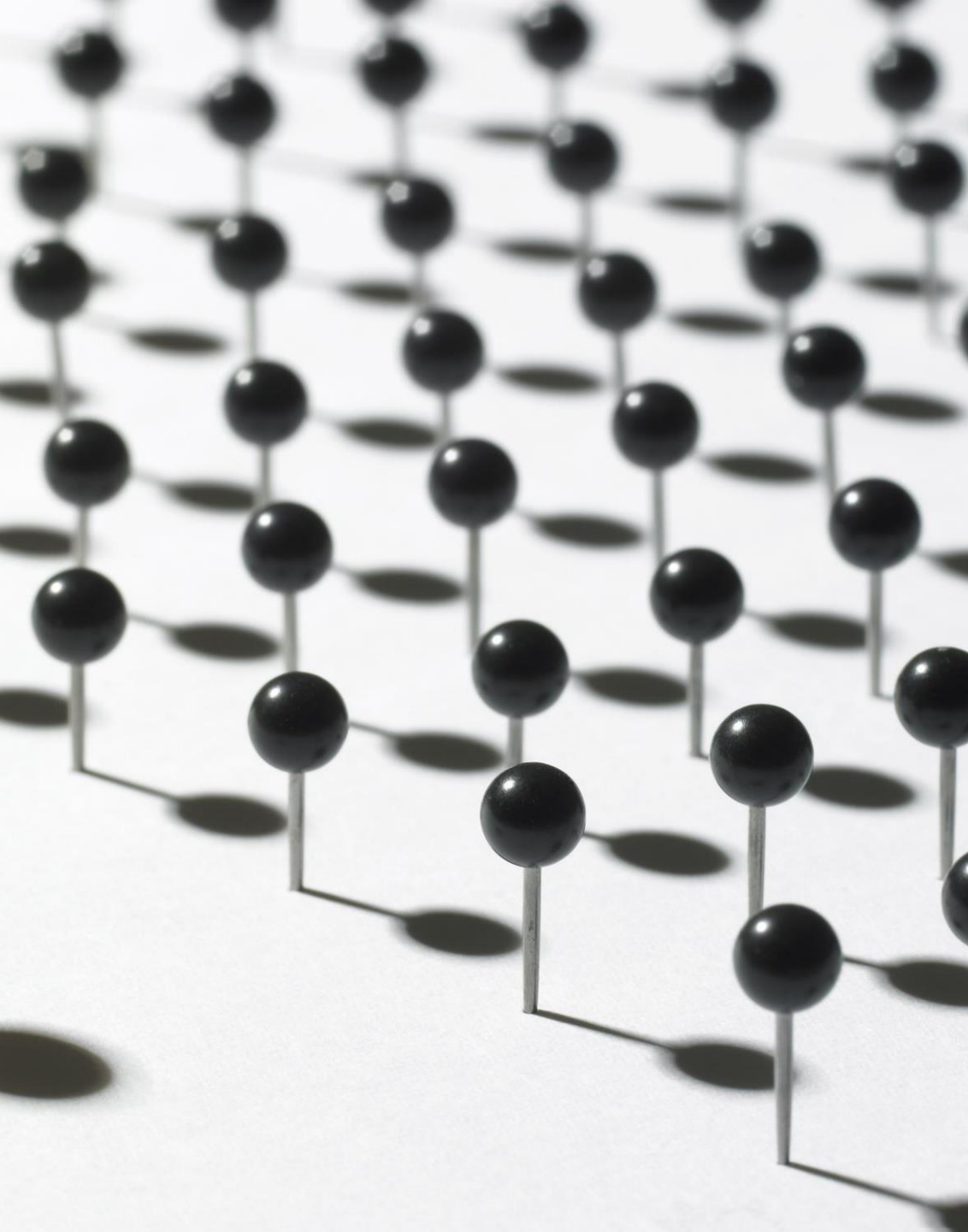


**Universal
Principle # 2**

***Validate the riskiest
elements first.***

**Universal
Principle # 3**

***Distinguish between
failures in process vs
concept.***



Five Dimensions of Differentiation

This transformational innovation framework was tested through five orthogonal differentiation choices. Each dimension represents a strategic decision that shapes how GenAI creates advantage:

The Five Dimensions

1) **Federated vs. Siloed** governance models (enterprise-wide coordination versus isolated business unit ownership).

2) **Cloud vs. Edge** deployment (where intelligence and learning primarily reside).

3) **Plant-first vs. Office-first orientation** (where operational value is first realized).

4) **Build vs. Buy vs. Partner** strategies (ownership: who owns, controls, and evolves intelligence).

5) **Vertical vs. Horizontal** applications (domain-specific differentiation versus cross-functional leverage).

Dimension # 1 – Federated vs. Siloed

Everyone is
Responsible

or

Subset is
Responsible

Dimension # 2 – Cloud vs. Edge



Constrained

VS



- Unconstrained

Dimension # 3 – Plant First vs Office First



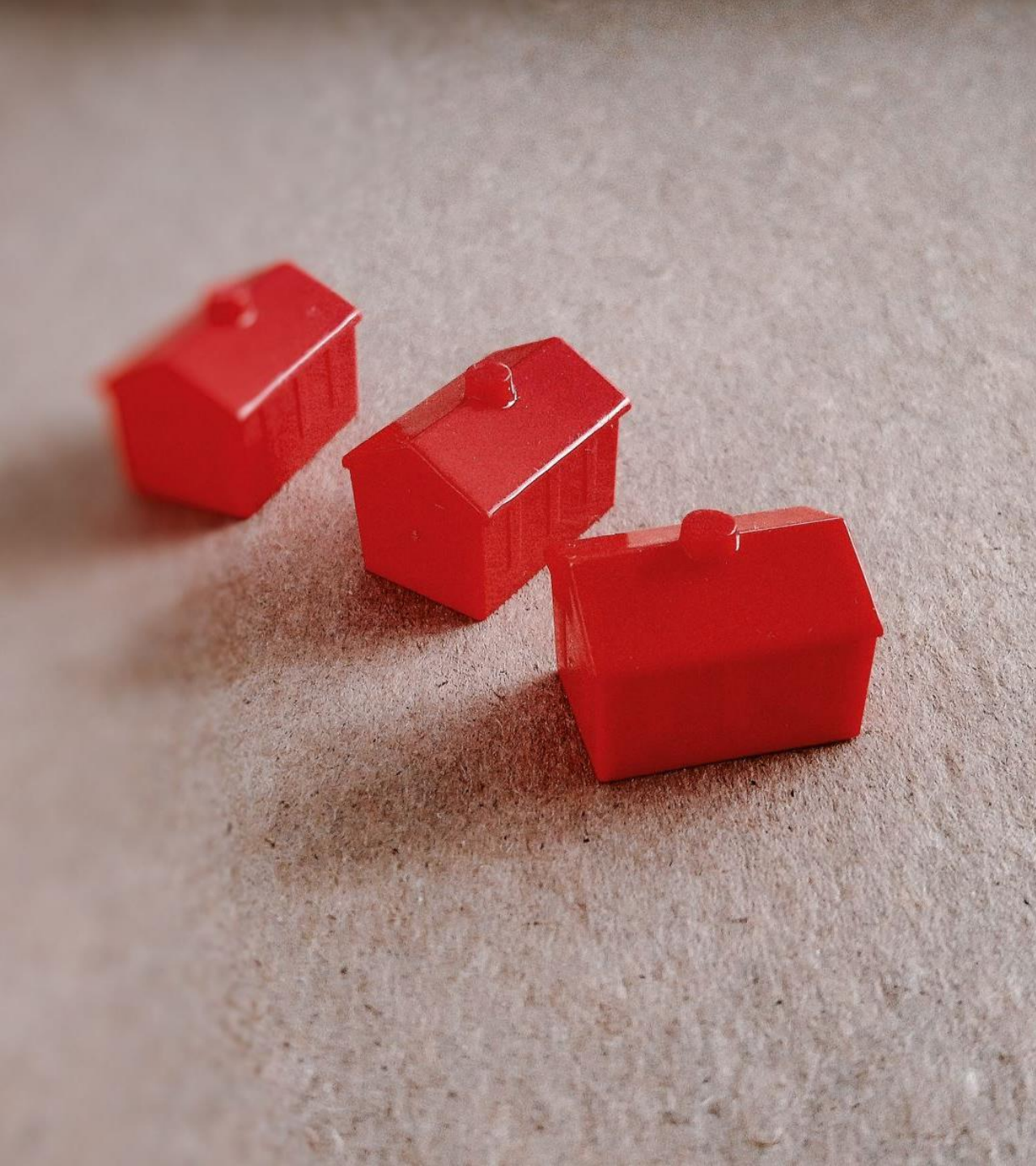
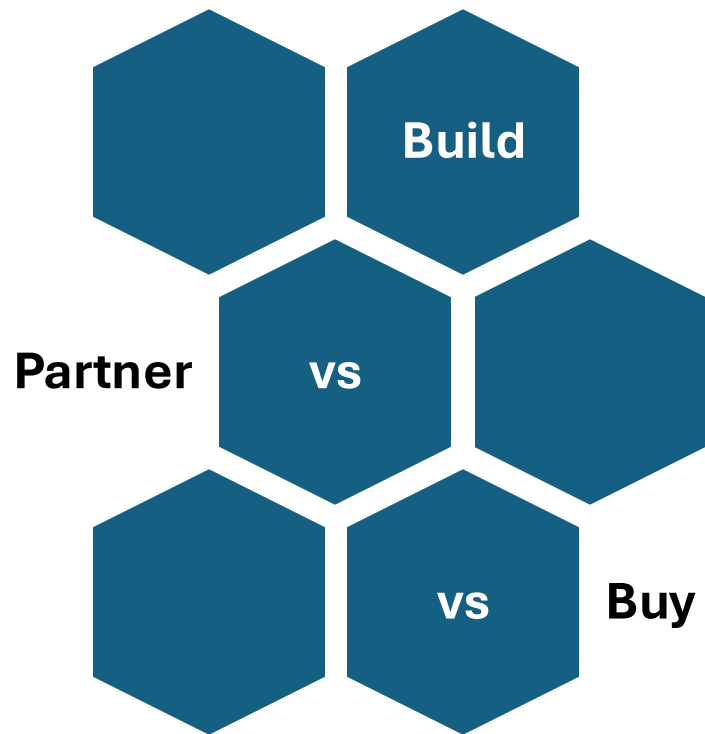
**Incremental
Initiatives**



**vs
Truly
Transformational**

Dimension # 4

Core Competency & Capacity



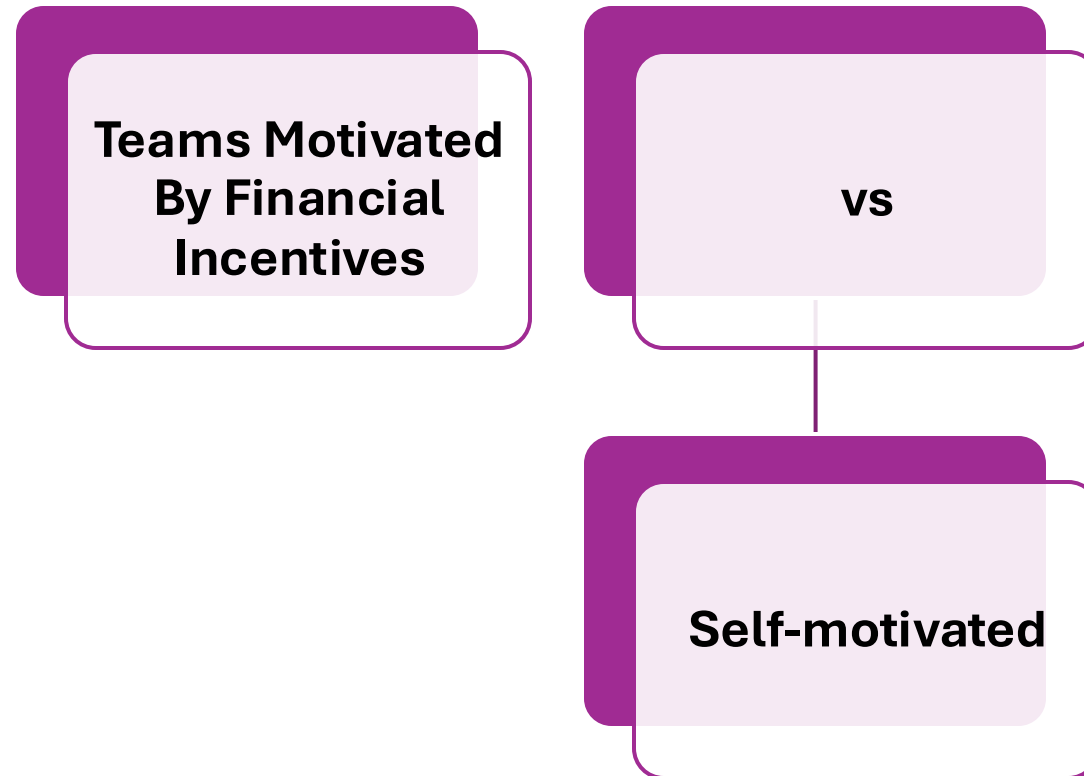
Dimension # 5 - Cross Functional vs Point Solution

Vertical

vs

**Horizontal
Application**

Dimension 5 ½



Deployment of Gen AI is siloed, in the cloud, in the office, sourced and horizontal

Estimated % IRI Members

D1	Governance: Federated vs. Siloed	45% Siloed	28% Federated	20% Both	7% Unknown
D2	Deployment: Cloud vs. Edge	72% Cloud	3% Edge	18% Both	7% Unknown
D3	Orientation: Plant vs. Office/R&D	62% Office/R&D	8% Plant	22%	8% Unknown
D4	Ownership: Build vs. Buy vs. Partner	40% Buy	28% Partner	28% Both	14% Build
D5	Application Scope: Vertical vs Horizontal	38% Horizontal	32% Vertical	22% Both	8% Unknown

McKinsey 2025 Global AI Tracking Study

	All	Manufacturing	Energy & Materials	Advanced Manufacturing	Pharma & Medical Products
Sample Sizes (Global)	420	191	152	77	
Marketing & Sales	36	33	29	46	
IT	36	39	40	29	
Product and/or Service Development	33	28	30	41	
Knowledge Management	32	33	29	35	
Software Engineering	27	30	35	19	
Service Operations	25	32	22	21	
Supply Chain/ Inventory Management	26	19	25	34	
Human Resources	23	22	18	29	
Strategy & Corporate Finance	18	20	16	19	
Manufacturing	15	21	26	17	
Risk, Legal & Compliance	11	17	7	9	
Use GenAI in at least one business function (%)	86	89	86	83	

Catalyst Connection CMU CSL Gen AI Demo Lab

Add logos of new star up from Y-coom Under
Evaluation

Catalyst Connection CMU CSL

Gen AI Demo Lab

GrowthSignals.io

Market Research and Commercialization



Supply Chain & Tariffs

lunon.ai

Consulting Service Automation

lmusante@catalystconnection.org



PHIN
MATERIALS

Computational Material Science

tezoX

Sales Team Alignment

 **SkillBuilder.io**

B2B Sales & Customer Service Chatbots

AdSkate

Web Site & Marketing Material Optimization



CATALYST CONNECTION®
WE GROW MANUFACTURING



CASE STUDIES

Lockheed Martin

3M

Other

Initial Observations & Findings 1

GOVERNANCE

- Relative to Gen AI ... Island of Excellence in parallel with emerging Centers of Excellence (COE) at corporate and SBU.
- ... Overall governance – who's in charge, no one voice
- In Gen AI Healthcare and Banking More Centralized versus Manufacturing except Pharmaceutical maybe AI vs Gen AI

Initial Observations & Findings 2

DATA ASSETS

- Plant AI (automation) mature versus Gen AI in R&D via process stream mapping and data quality management.
- Can't have an AI strategy without a data strategy ... lack of data quality and hallucinations.
- Data as an asset and value of customer information e.g. Sleep database largest in world but ...
- Early on digital transformation advocates elevated data quality processes now ahead of pack in Gen AI e.g. lab notebooks

Lockheed Martin – Secure GenAI for Advanced R&D



Artis.ai is a spinout (2025) to generate and retain IP creating new commercial businesses and learning from the private sector

**LM AI Factory ML Operations
+ LM Text GenAI Platform
built on Gemini**



**You can have an AI strategy
without a data strategy**

- Accelerated multi-modal data analysis
- Advanced research and development
- Optimized logistics

ROAI (Return on AI Investment)

Accelerate R&D and software delivery

Compounding productivity gains across programs

Strategic differentiation in defense R&D

Spin outs creating new IP assets, new businesses and new commercial revenue streams

3M *Ask 3M & 3M Digital Materials Hub*

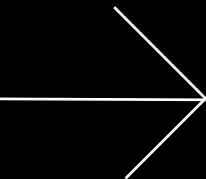


**Domain Focus: adhesives, tapes, and optical materials,
Estimated 12,000 SKU's**

- Faster R&D and lower prototyping costs through early virtual validation.
- Deeper customer lock-in by embedding 3M into daily engineering workflows.
- New, higher-margin digital revenue from software-enabled materials services.

NOTE: Not trained on raw PDFs or lab notebooks at scale, but instead grounded in structured, pre-validated material representations.

Next Steps and Engagement



Call to Action for IRI Members

Shadowing or Active Participation

Members can engage actively in facilitated bi-monthly webinars and events or shadow asynchronously to peer discussions and garner insights and ideas on adoption and scaling..

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