

The Future of Learning & Development in the Workplace

Navigating the Human-Tech Era

Cengiz Hakan AYDIN



Human Resources Development
Learning & Development in Workplace
In-service training
Corporate training
Workplace training

Roadmap

01

**Systematic
Review of
Literature**

5 major trends

02

**Review of
the reports**

4 Paradigms

03

Synthesis

Mapping

04

Results

AI-powered
flow-of-work
soft skills

Systematic Review



Systematic Review

165

Studies

Peer-reviewed articles, reports & empirical papers

7

7 Years

Coverage period 2020–2026

86%

Cross-industry

Training innovations applicable across multiple sectors

5

Major Trends

Dominant evidence-based trends via thematic synthesis

Five Trends

**AI-Powered
Personalized
Learning**

**Microlearning &
Continuous
Culture**

**Upskilling &
Reskilling**

**Immersive
VR/AR
Technologies**

**Data-Driven
Learning
Analytics**

Trend 1: AI as Transformative Force

AI has moved from emerging technology to mainstream practice

95.8%

of included studies discuss AI's role in corporate training and workplace learning

61%

of organizations reportedly using AI for training purposes — mainstream adoption

3×

improvement in learning effectiveness reported in AI-personalized programs vs. traditional methods

Unprecedented Personalization

AI adapts learning experiences to individual needs, preferences, and performance levels, a fundamental paradigm shift from one-size-fits-all to individualized training philosophy.

Tangible Organizational Benefits

Evidence demonstrates enhanced learning effectiveness, improved engagement, reduced costs, and increased organizational agility with hybrid AI + human mentoring most effective.

Critical Implementation Challenges

High deployment costs, data privacy concerns, algorithmic bias, and the need for ongoing human oversight remain significant barriers requiring deliberate mitigation.

Hybrid Approach Dominates Best Practice

The literature consistently emphasizes AI capabilities combined with human mentoring and coaching as the most effective model, technology amplifies, not replaces, human expertise.

Trend 2: Microlearning & Continuous Learning

Bite-sized + mobile-accessible content = just-in-time learning (busy work schedules & immediate application support)

85%

microlearning **MORE**
engaging than traditional
methods

75%

BETTER retention
compared to conventional
long-form training

Why Microlearning Works

- Aligns with cognitive science on attention spans and the spacing effect
- Enables just-in-time delivery at the point of performance need
- Mobile accessibility removes time and location barriers
- Reduces cognitive overload vs. full-day training events

AI + Microlearning Synergies

- AI generates personalized microlearning pathways per learner
- Optimal timing algorithms surface content at peak receptivity
- Continuous optimization of content based on engagement data
- Adaptive sequencing ensures progression without gaps

Building Continuous Cultures

- Skill development becomes ongoing practice, not periodic events
- Learners develop agency and self-directed learning habits
- Organizations build institutional capacity for rapid reskilling
- Managers shift from training sponsors to continuous coaches

Trend 3: Upskilling & Reskilling

Upskilling and reskilling as strategic imperatives for organizational survival

Organizational Outcomes

- Greater adaptability and innovation capacity
- Sustained competitive advantage
- Faster response to technological disruption
- Higher internal mobility and talent retention

Employee-Level Outcomes

- Enhanced job satisfaction and engagement
- Reduced voluntary turnover
- Improved career resilience and marketability
- Greater psychological safety in change contexts

The Complementary Skill Portfolio

Technical Skills

- Digital literacy & data fluency
- AI collaboration & prompt engineering
- Data analytics & interpretation
- Automation tool proficiency

Uniquely Human Capabilities

- Critical & creative thinking
- Social-emotional intelligence
- Complex problem-solving
- Ethical judgment & leadership

Trend 4 — Immersive Technologies

Experiential learning environments with measurable advantages for technical, safety, and soft skills development

Technical Skills

Complex technical procedures in safe, repeatable virtual environments

Enabling mastery without real-world consequences of error

Safety Training

High-risk scenarios (industrial hazards, medical emergencies) simulated realistically

Demonstrate significantly higher retention and confidence under real conditions

Soft Skills & Leadership

Role-play scenarios for difficult conversations, leadership under pressure, and cross-cultural communication

Psychological safety for practicing interpersonal skills without social risk

Evidence Summary

- Enhanced engagement and motivation vs. passive instruction
- Higher retention rates, stronger memory encoding
- Accelerated skill acquisition through immediate experiential feedback
- Scalable delivery once content is developed, consistent

Implementation Challenges

- High upfront content development and hardware costs
- Motion sickness and accessibility barriers for some users
- Rapid technology obsolescence requiring content refresh
- Integration with existing LMS and analytics infrastructure

Trend 5: Data-Driven Learning Analytics

Learning analytics enable evidence-based decision-making, continuous program optimization, and ROI demonstration, shifting L&D from intuition-led to data-led practice.

Descriptive Analytics

What happened?

Completion rates, engagement metrics, assessment scores, time-on-task.
Provides the baseline picture of learning activity across the organization.

Predictive Analytics

What will happen?

Predict skill gaps before they emerge, identify at-risk learners, and forecast future capability needs aligned to business strategy.

Prescriptive Analytics

What should we do?

Recommends optimal learning pathways, intervention timing, and content adjustments.
Moves analytics from reporting to active decision support.

ROI Demonstration

What was the value?

Links learning activity to business outcomes (productivity, retention, quality, and revenue) enabling L&D to speak the language of the business management.

Cross-Industry Applicability & Trend Convergence

86.1%

**of studies examined cross-
industry training innovations**

universal nature of digital
transformation challenges and the
widespread applicability of AI-enabled
training solutions regardless of sector
or organizational size

How the Five Trends Converge

AI + Microlearning - Personalized bite-sized pathways delivered at anytime, anywhere

AI + Analytics - Predictive skill-gap identification driving proactive rather than reactive L&D

AI + VR + Analytics - Immersive experiences with real-time performance data for immediate feedback loops

AI + Upskilling/Reskilling - A continuous reskilling ecosystem built on data, personalized paths, and experiential practice



UNIVERSITY
OF TWENTE.



Fostering Opportunities, Resources and Capabilities in Artificial Intelligence for Effective Management of Higher Education Institutions //FORCE AI//

Artificial Intelligence Manager for Higher Education (AIM4HE) training



FORCE Ai

6 April - 30 Sep. 2026
University of Twente – LMS



<https://force-ai.eu/>
[linkedin.com/showcase/forceai](https://www.linkedin.com/showcase/forceai)
info@force-ai.eu



Co-funded by
the European Union

www.force-ai.eu
Project ID: 2024-1-DE01-KA220-HED-000250975

Analysis of Reports



GLOBAL RISK ANALYSIS (WEF)

COHEATION MONITORING (UNESCO)

TRADE & DEVELOPMENT (EASTAD)

WORLD BANK: GLOBAL ECONOMIC PROSPECTS - 2024

EU COMMISSION: ANNUAL REPORT ON HUMAN RIGHTS

OECD ECONOMIC OUTLOOK

WEF risk map
High Climate Concerns
Climate Resilience
High Income Risk
Manufacturing
The process of
economic growth
may be uneven
- digital divide
- inequality
- migration

UNESCO GLOBAL ALLIANCE FOR CULTURAL DIVERSITY



The Scale of Disruption

World Economic Forum · Future of Jobs Report 2025

39%

of core job skills will be disrupted or replaced by 2030

Down from 44% in 2023, but still represents a seismic transformation

78M

net new jobs projected globally this decade

170M created vs. 92M displaced, requiring entirely new skill architectures

85%

of employers plan to prioritize upskilling by 2030

Yet only 50% of the workforce completed any training in 2024 (up from 41% in 2023)

The Shrinking Half-Life of Professional Skills

1990s — 2000s

10–15

Years

Skills in formal education professionally relevant for a full career generation.

Periodic refreshment was sufficient.

2010s

< 5

Years

Digital acceleration compressed the relevance cycle.

Continuous professional development became a competitive necessity rather than an aspiration.

Today · AI Era

< 2.5

Years

70% of specialist knowledge becomes obsolete within 18 months.

AI development has compressed cycles further still.

Demographic Disruption: The Aging Workforce

OECD Employment Outlook 2025 · ILO Working Paper on Population Ageing

The Silver Workforce

17.7% of the workforce in developed countries will be aged 55–64 by 2030, the fastest-growing labor cohort (OECD 2025)

35% of workers aged 55–64 participate in job-related training, vs. 48% of the 35–54 cohort, a persistent engagement gap (OECD EU data)

40% slower GDP per capita growth projected in OECD economies without significant productivity gains from workforce reskilling

Higher Education's Evolving Mandate

From credentialing to lifelong learning

Universities designed for 18–24 year olds must transform to continuous learning providers, serving mid-career and older learners throughout their working lives

Micro-credentials & stackable qualifications

Short, modular, employer-aligned program that reskill workers in weeks, not years, meeting the pace of skills obsolescence

Corporate–academic partnerships

Co-designed curricula linking higher education directly to organizational skills needs, bridging the gap between academic theory and workforce application

With fewer young entrants to the labor market, the existing workforce IS the talent pipeline. Reskilling is no longer optional; it is the primary growth strategy.

Navigating the Unknown: The Future of Jobs is Unpredictable

65%

*of children entering primary school today
will work in jobs that do not yet exist*

WEF / Institute for the Future

92% of hiring managers now consider soft skills equally or MORE important than technical expertise (WEF 2025)

*When the future of jobs is uncertain, content expertise decays.
Adaptive capacities endure.*

Adaptability

Critical Thinking

Creative Thinking

Design Thinking

Resilience & Grit

Risk Management

Systems Thinking

**Emotional
Intelligence**

Three Macro Forces Redefining the Workplace

Technological Acceleration

- AI
- Automation now targets cognitive, not merely manual, tasks
- 57% of employees need AI skills to remain competitive (TalentLMS, 2024)
- Yet only 41% report their organization provides AI training

Evolving Workforce Expectations

- Employees demand personalised, self-directed, continuous development
- 68% agree learning helps them adapt to change (LinkedIn WLR, 2025)
- Only 15% get helped build a career plan in the past 6 months
- Growth opportunity and psychological safety are primary retention drivers

Organizational Competitive Pressure

- 87% of executives expect different workforce within 5 years (McKinsey)
- Organizations prioritizing upskilling are 1.5× more likely to be market leaders
- Speed-to-competency is now a direct competitive differentiator
- L&D ROI must be demonstrable at board and executive level

Why the Traditional L&D Model is Failing

Structural inadequacies in an era of accelerating change

The 'Train and Forget' Paradigm

Event-based training with no reinforcement exploits what Ebbinghaus (1885) demonstrated: without spaced repetition, humans lose ~80% of new information within 48 hours.

One-Size-Fits-All Curriculum Design

Generic programs ignore individual skill gap profiles. TalentLMS (2024) found 70% of workers report lacking mastery of skills needed for their current role, yet organizations routinely deploy uniform training solutions.

The Curriculum Development Lag

Traditional course development cycles of 6–12 months cannot keep pace with a skills half-life now measured in months, not years. Content is often partially obsolete before launch.

The Persistent Transfer Gap

Research by Brinkerhoff and others consistently demonstrates that only 10–20% of training investment produces meaningful behavioral change on the job, a chronic failure of learning design and organizational reinforcement.

AI as Systemic Transformation

TECHNOLOGY

92%

of companies plan to increase AI investments in the next 3 years

- AI tools, platforms, and systems integration
- 88% of organizations now use AI in at least one function, up from 78% last year
- The \$4.4 trillion productivity opportunity (McKinsey) begins here

PROCESS

55%

of AI high performers reworked their processes

- AI does not slot into existing workflows, it demands redesign
- Half of high performers intend to use AI to transform business models entirely
- Process redesign is where AI value is realized or lost

PEOPLE

40%

of organizations plan to upskill employees for AI-augmented roles

- Only 40% plan HR investment
- Investing in technology without investing in people captures only a fraction of AI value
- HR must be treated as strategic infrastructure, not a support function

Paradigm I: AI-Powered Personalized Learning

From Curriculum to Adaptive Learning Flows

Adaptive learning platforms (Degreed, Coursera for Business, Workday Learning) use AI to map individual skill profiles against organizational strategy and serve **personalized, sequenced pathways**

AI-driven coaching provides real-time, contextual performance feedback, **shifting from periodic assessment to continuous learning intelligence**

Natural language interfaces allow employees to query knowledge bases mid-task, **dissolving the boundary between working and learning**

Predictive analytics identify emerging skill gaps before they become performance deficits, enabling **proactive** rather than reactive **L&D**

The AI-L&D Implementation Gap

80%

of L&D professionals view AI as critical to their learning strategy

Yet only

25%

factor it into their practice routinely

Paradigm II: Learning in the Flow of Work

Embedding Learning and Development in the Daily Workflow



The 70-20-10 Model Reimagined: 70% experience-based · 20% social & collaborative · 10% formal instruction, all now enabled by AI platforms and embedded in the daily flow of work

Paradigm III: The Human & Adaptive Skills Imperative

WEF Top Skills for 2030

Cognitive

Analytical Thinking

Cognitive

Creative Thinking

Human

Resilience & Adaptability

Technical

AI & Big Data Literacy

Human

Leadership & Social Influence

Human

Curiosity & Lifelong Learning

Cognitive

Systems Thinking

Human

Motivation & Self-Awareness

Source: World Economic Forum, Future of Jobs Report 2025; WEF/Institute for the Future

Paradigm IV: The Rise of Skills-Based Organizations

*The shift from **job-title-based** to **skills-based** organizational architecture represents a fundamental redesign of how talent is identified, deployed, developed, and retained.*

Internal Talent Marketplaces

AI-powered platforms match employees to projects, gigs, and permanent roles based on verified skills profiles, not job titles.

IBM, Unilever, and Schneider Electric have deployed organization-wide talent marketplace systems, demonstrating 25% faster internal mobility (IBM, 2024).

Dynamic Skills Taxonomies

Organizations build AI-maintained maps of the skills present in their workforce, updated continuously.

These enable real-time visibility into capability gaps, succession risks, and emerging talent, capabilities impossible with static job descriptions and annual talent reviews.

Learning Tied to Career Mobility

Development is explicitly connected to internal career progression.

LinkedIn research finds 94% of employees would remain longer at an organization that invested demonstrably in their career development, making L&D a measurable retention lever.

94% retention lever →

Measuring What Matters: From Completion to Impact

The Kirkpatrick Evaluation Framework and AI

Level 1: Reaction

Did participants find the learning engaging and relevant?

Most

Level 2: Learning

Did participants acquire the intended knowledge and skills?

Many

Level 3: Behavior

Are participants applying learning effectively on the job?

Few

Level 4: Results

Is the learning producing measurable organizational outcomes?

Very few

Only 10–20% of training investment results in measurable behavioral change on the job

Evidence in Practice: Organizational Case Studies

Amazon

Upskilling

Committed USD \$1.2 billion to upskill 300,000 employees into higher-skilled technical and non-technical roles: AWS training, Machine Learning University, and Mechatronics & Robotics apprenticeships, built on a skills-based internal mobility framework.

Largest corporate learning investment in history, demonstrating L&D as strategic infrastructure, not an optional expense

IBM

SkillsBuild

IBM deployed an AI-powered skills taxonomy connecting 380,000 employees to internal project marketplaces and development pathways based on verified competency data. The platform continuously updates skills profiles and surfaces relevant learning at the moment of need.


25% faster placement into new roles vs. traditional job-posting, direct commercial ROI from skills-based talent architecture

AT&T

Future Ready

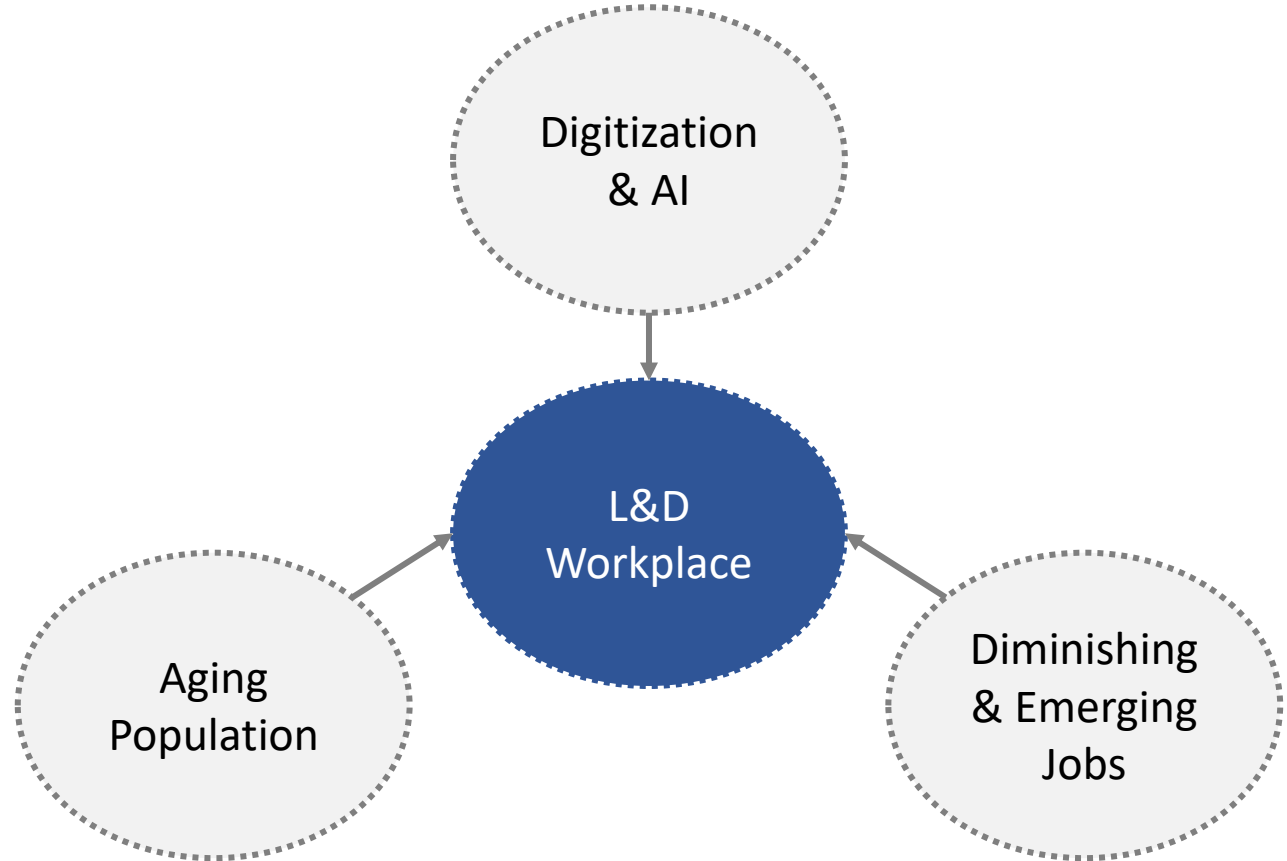
In 2013, AT&T identified that 100,000 of its 240,000 employees held skills that would be obsolete within a decade. The company invested \$1 billion in retraining, partnering with Georgia Tech, Udacity, and Coursera to deliver accredited technical education at scale.

Retrained employees now fill 50% of AT&T's open management positions, a directly auditable return on learning investment

A study desk with a laptop, books, a lamp, and an open notebook. The notebook has the text "Summary & Implications" written on it. The desk is cluttered with various items including a stack of books, a mug, glasses, and a tablet. A bookshelf filled with books is visible in the background.

Summary & Implications

Major forces



Trends

1 Adopt AI as Infrastructure
Embed AI into the entire learning architecture (design, delivery, support, monitoring, evaluation)

2 Design for continuous learning and development
Move from periodic training to anytime learning ecosystems. AI-powered, personalized or other flexible modalities. L&D embedded in the daily workflow.

3 Prioritise the Human-AI Balance
Hybrid is better and safer

4 Measure What Matters (Business Outcomes)
Build AI-powered evaluation system to track predictive gap modelling, ROI measurement, and behavior-change

What Organizations Must Do Now

1

Conduct a Skills-Forward Audit

Map current workforce competencies against a 3–5 year strategic horizon.

Use AI-supported skills taxonomy tools.

Identify critical gap clusters before they become performance crises.

2

Invest in HR as Strategic Infrastructure

HR is not a cost center; it is the human system that makes all other systems work.

3

Develop Adaptive Capacity, Not Just Skills

Prioritize critical soft skills alongside technical competencies.

Hire and develop for the capacity to learn, not only for current content expertise.

4

Redesign Learning Infrastructure

Implement LXP platforms, AI coaching tools, and manager enablement systems.

Partner with higher education for modular, micro-credential pathways.

Build learning architecture for a multigenerational, continuously reskilling workforce.

5

Measure Impact in Commercial Language

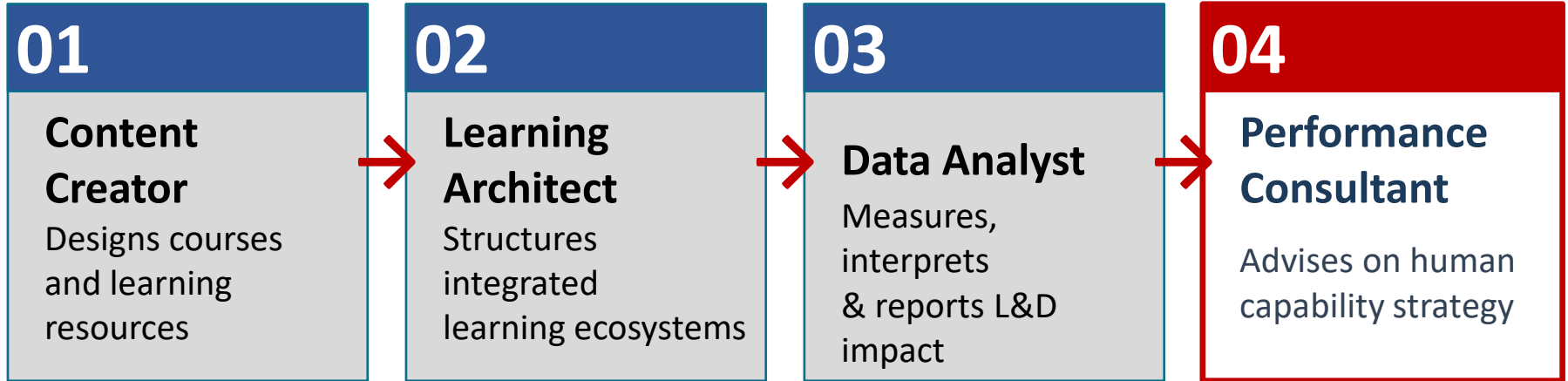
Target Kirkpatrick Levels 3 and 4.

Report L&D ROI in business terms (productivity gains, retention cost avoidance, speed-to-competency, and revenue contribution).

Measurement is not optional; it is the foundation of strategic credibility.

The L&D Professional

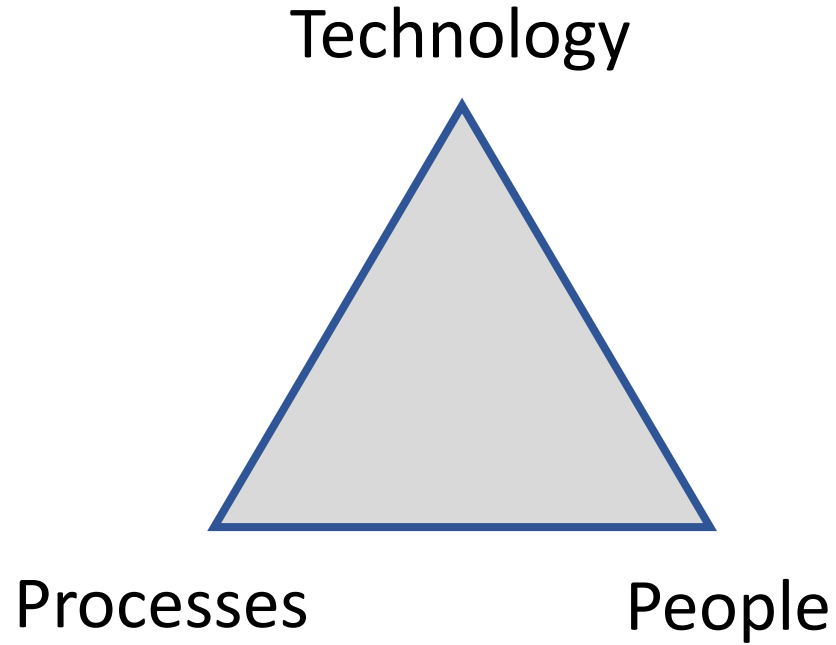
From content curator to strategic performance architect



New Core Competencies Required for the Human-Tech Era:



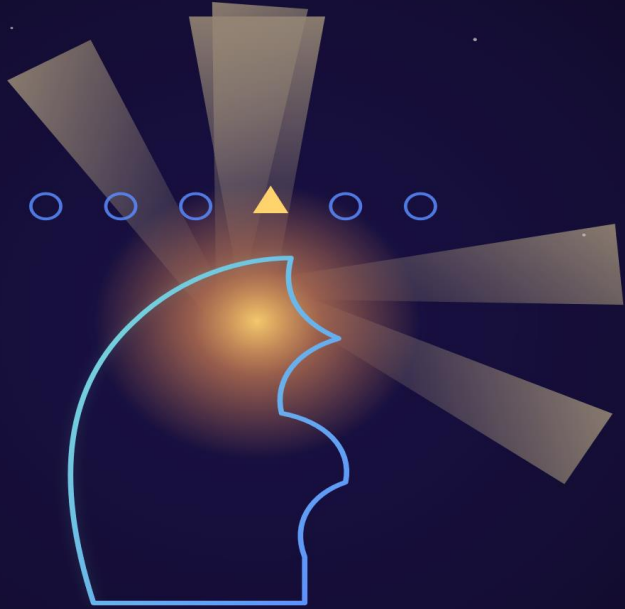
TPP – Golden Triangle



Disclosure of AI Use

This presentation was developed with support from AI tools.

- I used **SciSpace and BiblioShinny** during the systematic review
- I used **NotebookLM** to review the reports of international organizations, such as WEF, WorldBank, etc.
- I used **Claude** to create the first draft of the presentation and also some images
- I used **Gemini** to generate the images of the subsections
- Some text was generated using AI, but **all content has been critically reviewed, edited, and approved by me.**
- No personal or sensitive data was entered into any AI tool.
- I take full responsibility for the academic integrity and accuracy of this presentation.



Think differently.
Be open.

Cengiz Hakan AYDIN

Özyeğin University
hakan.aydin@ozyegin.edu.tr