

Knowledge Ecosystems in Digital Age: **Inclusive · Innovative · Equitable · Sustainable** **and the Future of the LIS Profession**

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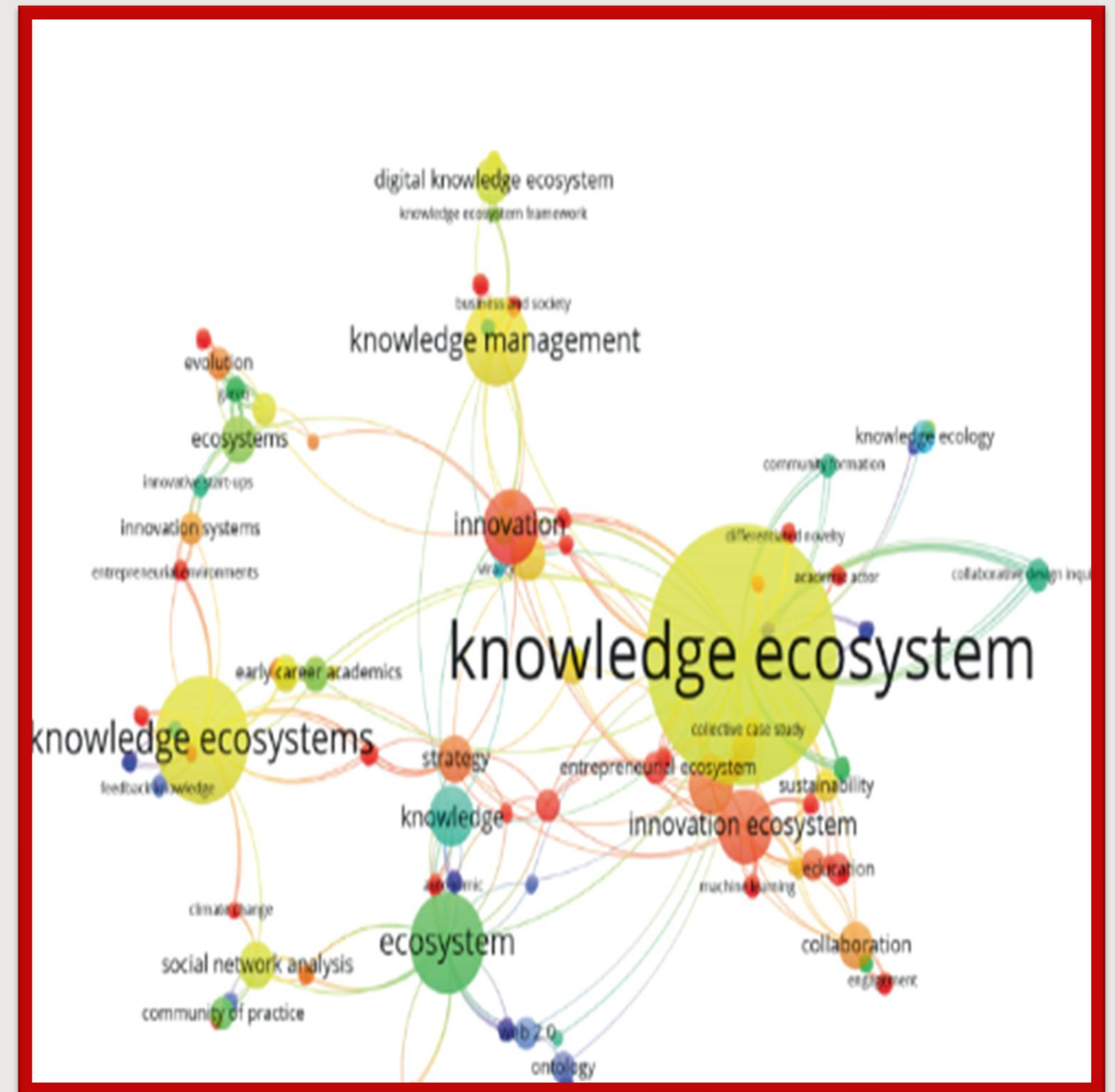
AGENDA

- 1 INTRODUCTION & LITERATURE REVIEW
- 2 KM MODELS & FRAMEWORK
- 3 DIMENSIONS OF KE
- 4 COMPETENCIES FOR LIS PROFESSIONALS
- 5 CONCLUSION

INTRODUCTION

Knowledge ecosystem refers to an institution, or society where data, information, knowledge, and learning tools can be accessed, contributed to, and shared by all segments of society regardless of background, economic status, gender, physical ability, or geographic location. (Wilson, 2021)

Thomson (2007) defines a knowledge ecosystem as “the complex and many-faceted system of people, institutions, organizations, technologies and processes by which knowledge is created, interpreted, distributed, absorbed and utilized

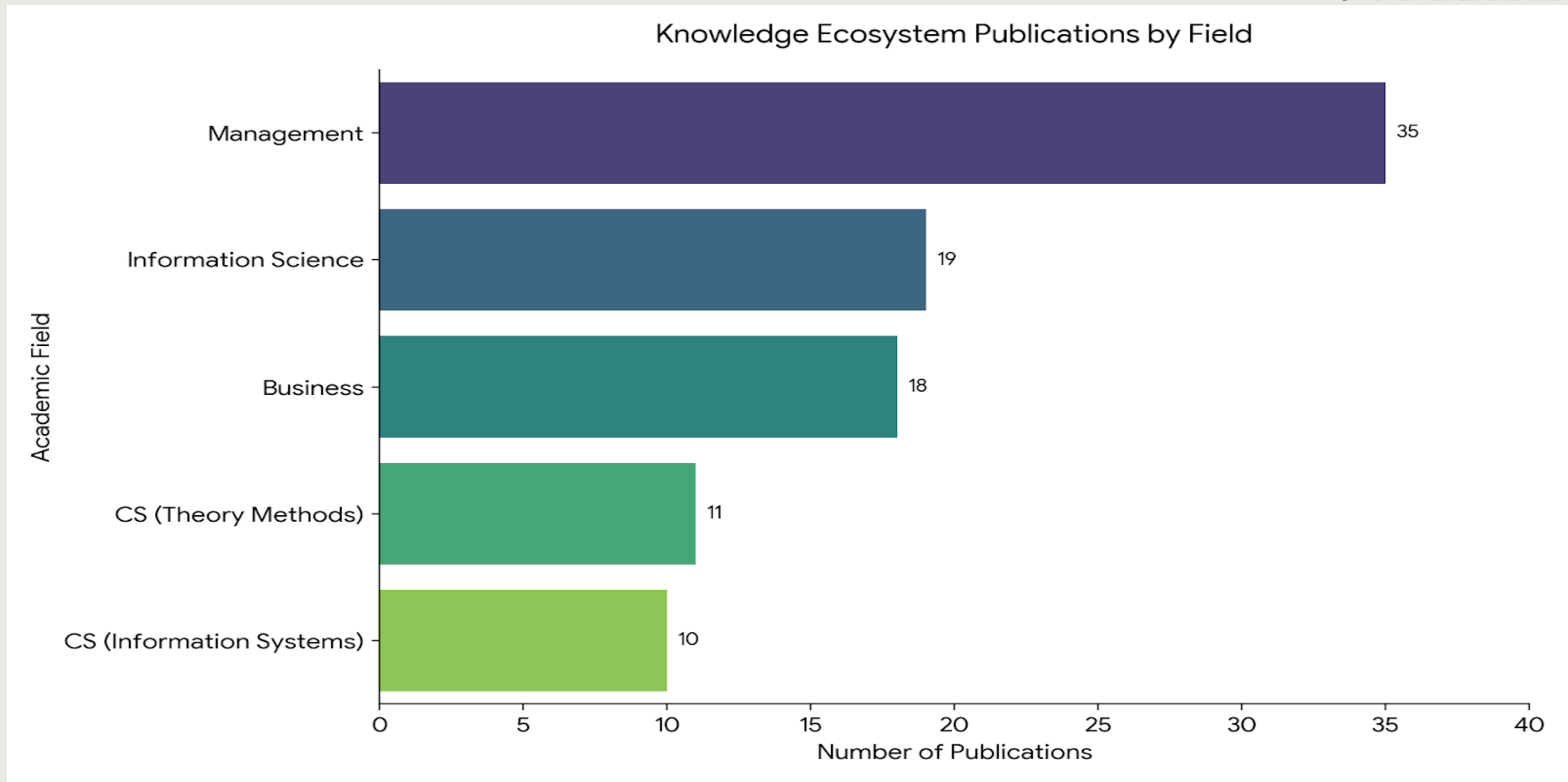


Voda, A.I., Șoitu, D.T., Cojocaru, D.C. (2025)

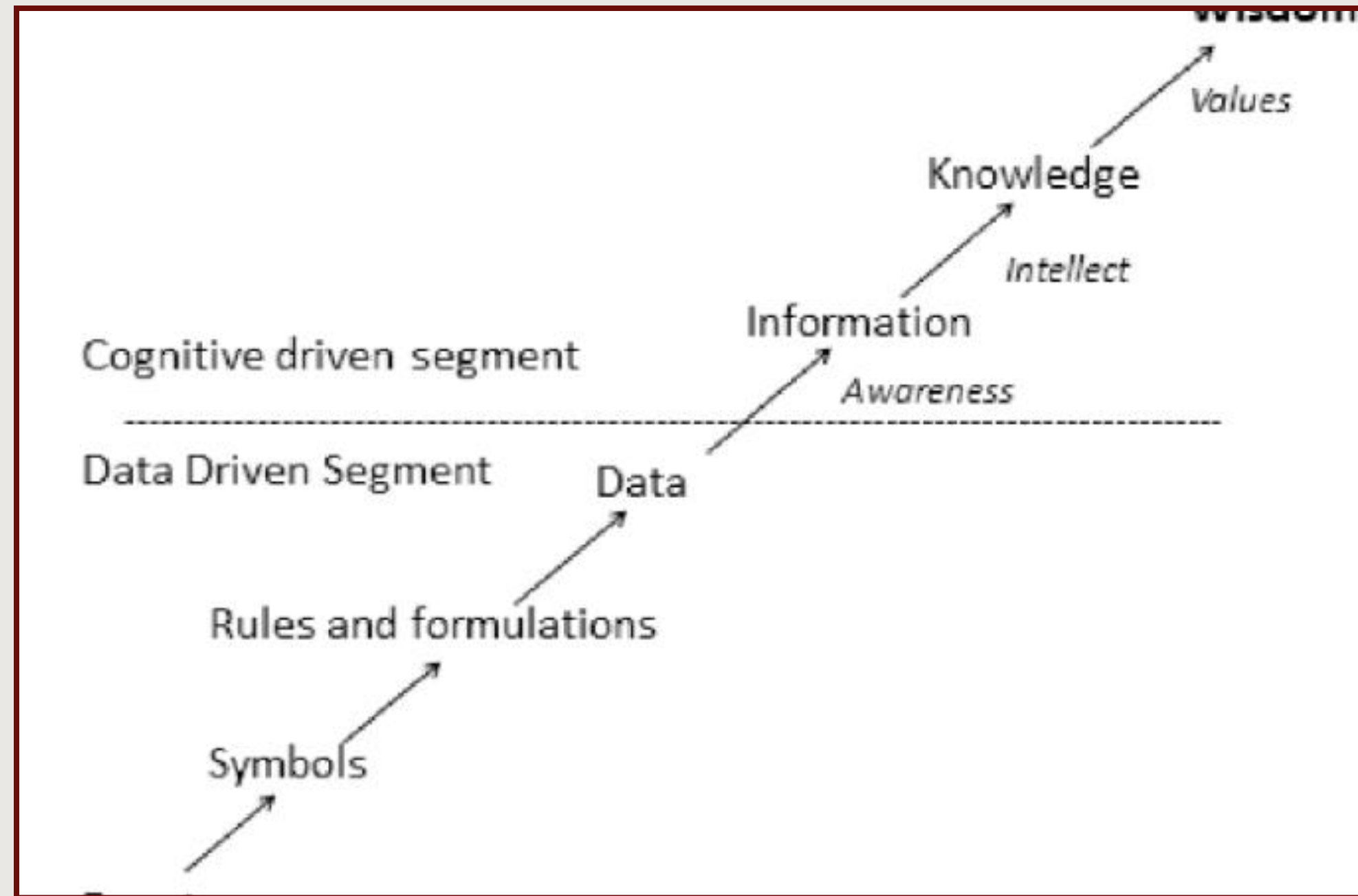
LITERATURE REVIEW

- Knowledge ecosystems are dynamic systems characterized by continuous knowledge exchange and flow, where actors are **exchanging knowledge, transmitting and organizing** it internally or as a reaction to the external environment.
- Knowledge ecosystem provides the framework for understanding how the **structure and dynamics of an environment influence the knowledge creation process**, considered to be an equitable collaborative effort of all stakeholders.
- Knowledge dispersion is seen as a crucial element within the ecosystem, as it is considered a **key pillar in increasing the accessibility of information**.

Voda, A.I., Şoitu, D.T., Cojocaru, D.C. (2025). Exploring the Dynamics of Knowledge Ecosystem: A Systematic Literature Review.

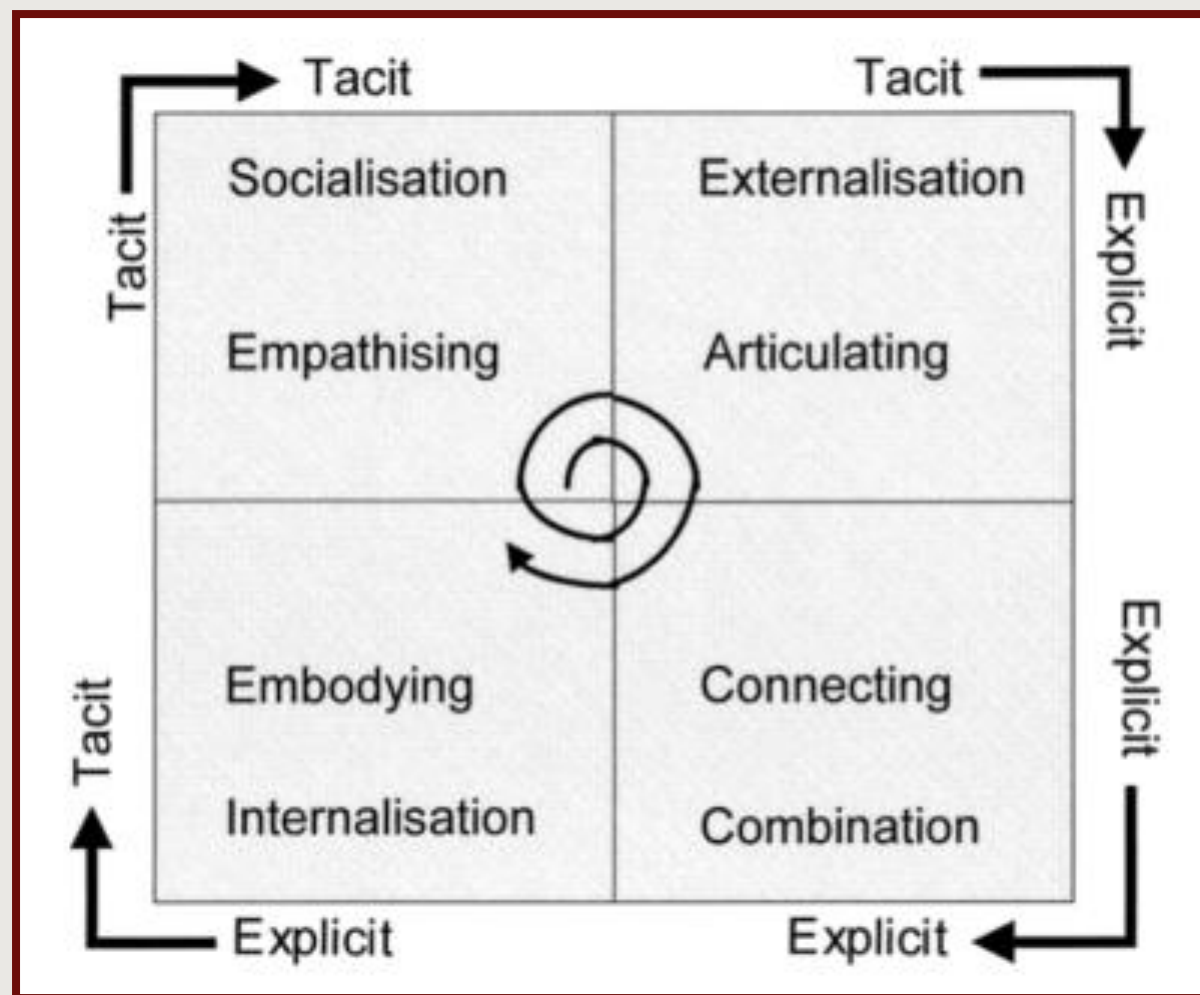


KNOWLEDGE SPECTRUM (DIKW Pyramid)

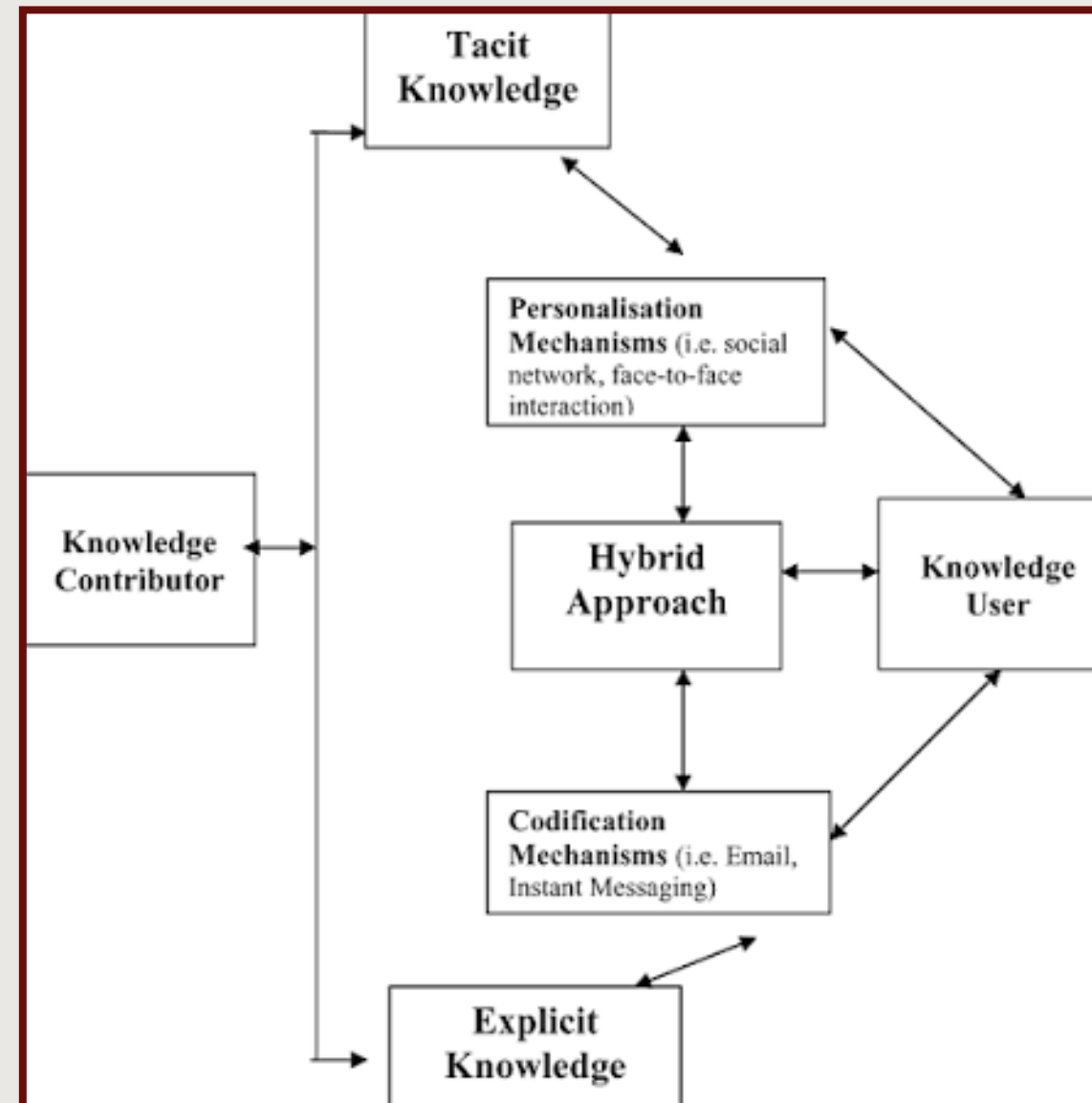


Russell Ackoff (1988)

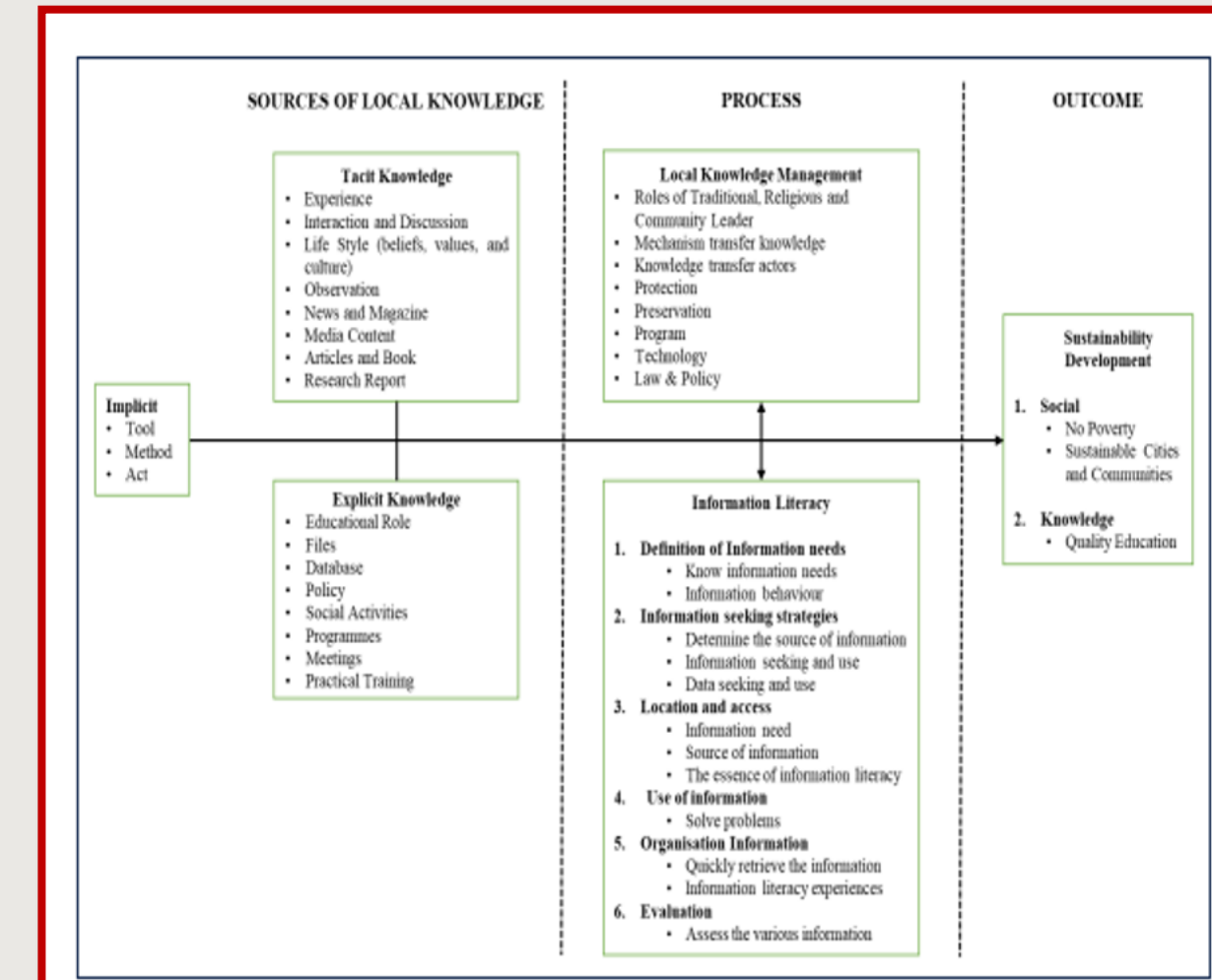
Models & Framework of KM



Nonaka and Takeuchi, (1995)

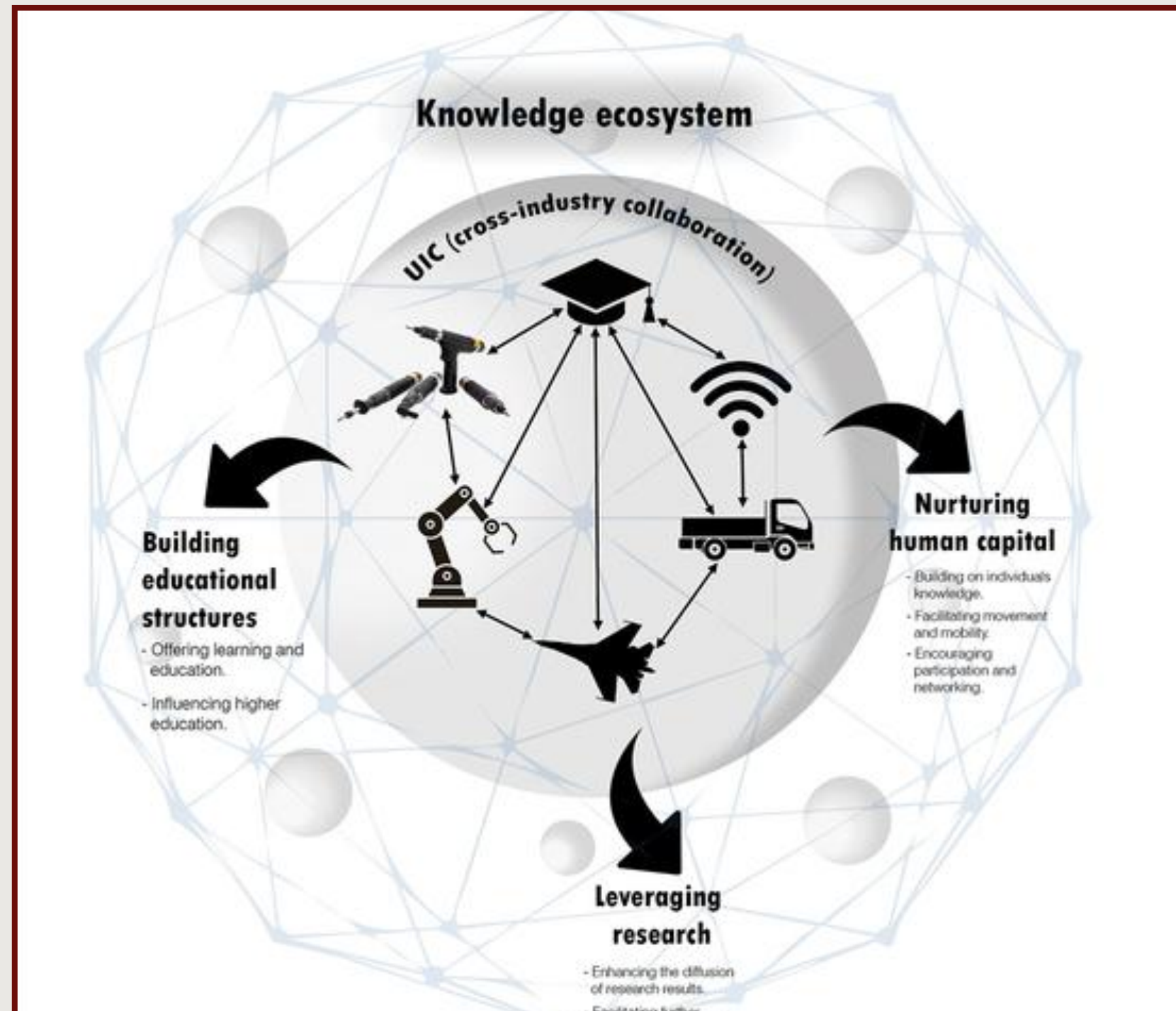


Jasimuddin, Sajjad M., Nigel Connell,
and Jonathan H. Klein (2012)



Elva, Shamila and Wan Aida, (2024)

Knowledge Ecosystems: University-industry collaboration Abu Sa'a, E., & Yström, A. (2025).



Knowledge Ecosystems: Shi and Chen, 2022

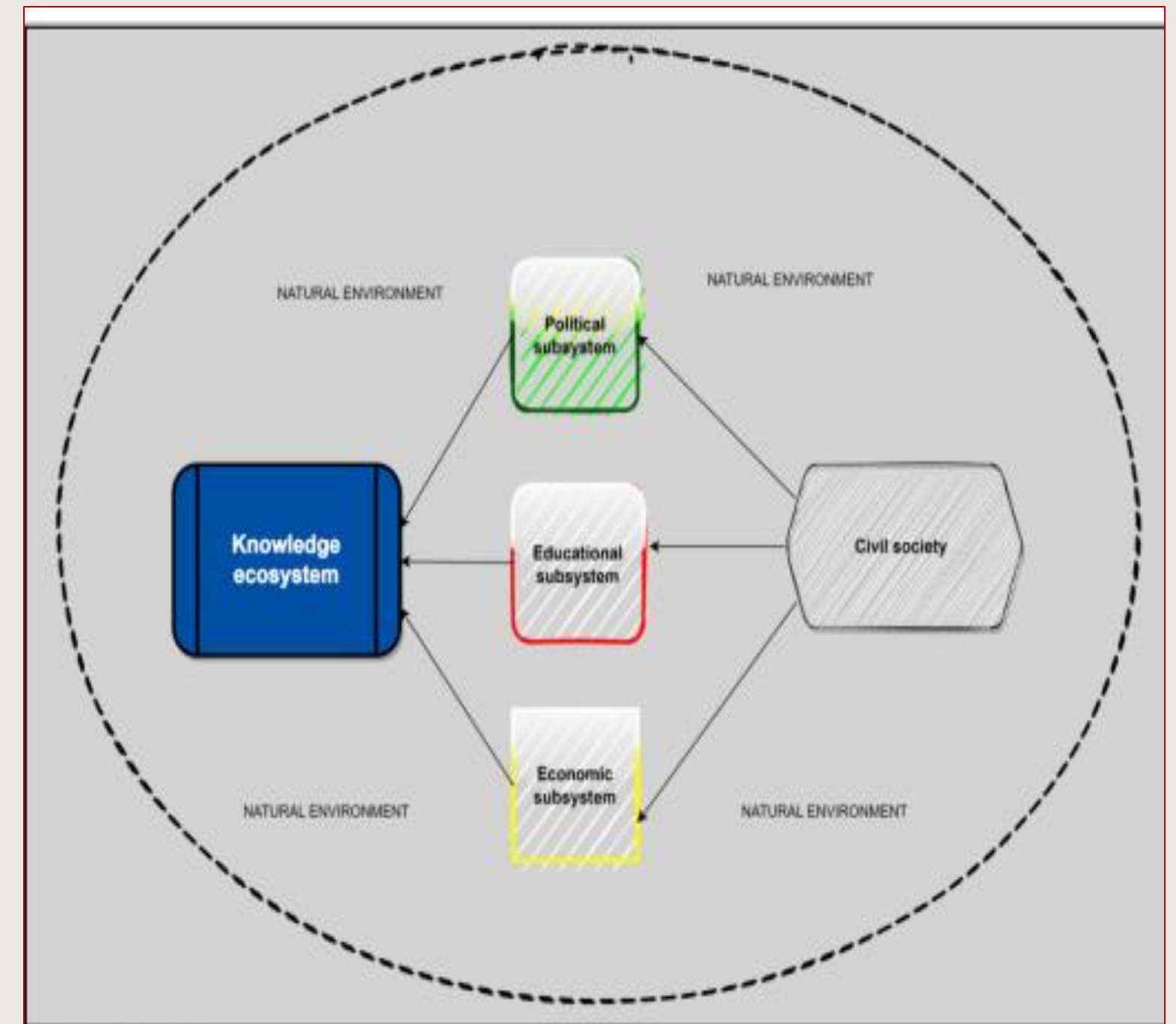


Figure 4. KE subsystems

Source: Shi & Chen (2022), p. 6

OVERVIEW OF KM ECOSYSTEMS & SDGs

- Scholars, researchers and academicians other related institutions have focused this knowledge ecosystems primarily on curiosity-driven research and teaching, and also to address the pressing social and economic challenges (Wilson, 2021)
- Cultural and linguistic diversity is a powerful but underutilized resource for enriching research, science, education and learning for present and future generations. (UNESCO, 2021)



Traditional Oral Knowledge is at Risk of Generational and Digital Extinction



- Indigenous knowledge is holistic, experiential, and closely connected to moral and social principles. It is historically transmitted through oral histories, myths, and legends from generation to generation.
- Currently, this invaluable wisdom faces a severe risk of loss due to rapid **digital transformation** and **generational shifts**.
- Without **proper documentation and management**, the **knowledge ecological and cultural wisdom** that provides communities with natural and cultural ways of managing their environment may disappear entirely.

(Selaledi, L. et al., 2021; Syahputra, 2019; Zulfadrim et al., 2019,)

KNOWLEDGE ECOSYSTEMS: LESSONS FROM THE COVID-19 PANDEMIC

1. SCHOLARLY COMMUNICATIONS STRESS TEST



COVID-19 was a recent stress test, exposing systemic issues with exposit academic issues volume, speed, reliability, and ethical access to research (Tavernier, 2020).

2. BUSINESS & ADAPTATION



The concept of knowledge ecosystems gained attention as businesses had to adapt, increasing the importance of knowledge sharing, development, and adaptation (Grumadaité et al., 2022).

3. CALLS TO RE-ENGINEER



Controversy underscores calls to reexamine, revamp, or entirely re-engineer systems of scholarly knowledge creation, dissemination, and discovery. Interacting systems must facilitate better production, transfer, and exploitation.

4. THE GRAND CHALLENGE & SOCIETAL IMPACT



Understanding large knowledge ecosystems, especially scientific ones, presents profound research challenges with huge potential societal and intellectual impacts.

WHY KNOWLEDGE ECOSYSTEMS MATTER

KEY BENEFITS OF AN INTERCONNECTED FRAMEWORK

1

BOOSTS INNOVATION



BOOSTS INNOVATION

Bringing together industry, academia, and government allowing groups to cross-fertilize ideas and create cutting-edge solutions.

[1, 2]

2

IMPROVES DECISION-MAKING



IMPROVES DECISION-MAKING

Decision-makers get access to high-quality, relevant, and timely evidence instead of relying on isolated islands of information.

[1, 2]

3

ENHANCES LEARNING AND GROWTH



ENHANCES LEARNING AND GROWTH

Organizations and communities retain expertise better and build collective intelligence when people converse and share tools continuously.

[1]

4

SOLVES COMPLEX PROBLEMS



SOLVES COMPLEX PROBLEMS

Global or national challenges—like healthcare crises or technological hurdles—require diverse talents working in an equitable, collaborative framework.

[1, 2]

5

INCREASES EFFICIENCY



INCREASES EFFICIENCY

Seamless digital platforms and open knowledge repositories let workers learn and perform tasks at the same time without geographic or schedule limits.

[1, 2]

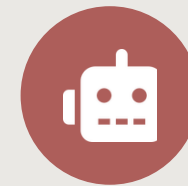
Digital-Era Drivers Reshaping Knowledge

Four forces are redefining how knowledge is created, found, and put to use — and raising the bar for what a healthy knowledge ecosystem must deliver.



Connectivity & Network

Local and global knowledge networks.



AI & Automation

Digital technologies reshapes how knowledge is discovered, summarized, and personalized.



Open & Big Data

Growing volumes of open data and content demand new curation and quality standards.



Cross-Sector Collaboration

Platforms increasingly connect academia, industry, government, and civil society.

Knowledge Ecosystem in Digital Age

In the digital era, these elements are more interconnected and interdependent than ever — and how well they work together determines whether knowledge truly reaches, benefits, and endures for everyone and organizational learning: (I + LO = OL)



Four Dimensions of Knowledge Ecosystem in Digital Age



Inclusive

01

Within knowledge-ecosystem scholarship there's explicit attention to bringing in non-traditional knowledge sources — for example, research on the inclusive engagement of Indigenous communities, multilingual, and accessible to every learner and community.



Innovative

02

The increasing connectedness and interdependence of the digital era has fundamentally reshaped knowledge production: creation and dissemination powered by AI, open data, and continuous innovation.



Equitable

03

Closing gaps in access, skills, and representation. Equity is about redistributing structural power, not just adding diverse voices, requires functioning relationships between producers, communicators, and users of knowledge.



Sustainable

04

Resource-efficient, resilient, and built to last. sustainable knowledge systems are described as more resilient to disruptions such as staff turnover or technological change, precisely because knowledge is embedded in processes and systems rather than trapped in individual people's heads.

01



Inclusive

“Every learner, in every language, on every device, can find and use knowledge.”

PILLAR 01



Multilingual, open content

Knowledge available in local languages and open formats, not locked behind paywalls.



Accessible by design

Platforms built to meet the needs of learners with diverse abilities from the start.



Community-driven curation

Local voices and lived experience shape what counts as relevant knowledge.



Diverse knowledge systems

Indigenous, traditional, and informal knowledge valued alongside formal science.

02

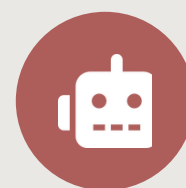


Innovative

*“The ecosystem experiments constantly —
turning new tools into new ways of knowing.”*

PILLAR 02

What Innovative Looks Like



AI-assisted discovery

Machine learning surfaces relevant knowledge and accelerates research and curation.



Open data practices

Shared data, open peer review, and reproducible methods speed collective learning.



Emerging technologies

Immersive media, simulation, and provenance tools expand how knowledge is experienced.



Agile, modular platforms

Systems designed to adapt quickly as tools, needs, and audiences evolve.



03



Equitable

“Access to knowledge should never depend on geography, income, or identity.”

PILLAR 03

What Equitable Looks Like



Bridging the digital divide

Investment in connectivity and low-bandwidth options for underserved regions.



Affordable, open access

Removing cost and licensing barriers that exclude entire communities.



Digital literacy & capacity

Training so people can not just access but critically use digital knowledge.



Fair governance & voice

Underrepresented groups included in decisions about knowledge systems.



04



Sustainable

“Built to endure — for the planet, institutions, and future generations.”

PILLAR 04

What Sustainable Looks Like



Green digital infrastructure

Energy-efficient data centers and mindful use of computing resources.



Long-term preservation

Digital archives and formats designed to remain usable for decades.



Resource-efficient systems

Reusing and interoperating with existing tools instead of duplicating effort.



Resilient & adaptable

Ecosystems that withstand disruption — funding gaps, outages, and change.



STRATEGIES OF KM ECOSYSTEMS IN DIGITAL AGE

Digital and Linguistic Inclusion:

Bridging the digital divide by providing infrastructure, devices, and content in local languages that are easily understood by diverse communities.

Democratization of Knowledge:

The process of creating and sharing knowledge is bidirectional. Anyone can be a creator and contributor of knowledge, rather than remaining a passive consumer (such as through open-source initiatives).

A system where no one is left behind in benefiting from or contributing to the advancement of universal knowledge.

Diversity of Voices and Perspectives:

Knowledge is not dominated solely by specific groups or cultures; instead, it values traditional knowledge, vernacular languages, and perspectives from underrepresented communities.

Barrier-Free Access:

Information and learning resources are not locked behind high financial walls (such as expensive paywalled journals) or digital designs that are difficult for marginalized groups or individuals with disabilities to navigate.

BUILDING AN INCLUSIVE KNOWLEDGE ECOSYSTEM: FOUR CORE PILLARS

1. BARRIER-FREE ACCESS

Information & learning resources are not locked behind financial walls or difficult designs.



OPEN
ACCESS

ACCESSIBLE
TECH

4. DIGITAL & LINGUISTIC INCLUSION

Bridging the digital divide with accessible infrastructure, devices, and content in local languages.



GLOBAL
REACH

LANGUAGE
OPTIONS

EQUAL
OPPORTUNITY

2. DIVERSITY OF VOICES & PERSPECTIVES

Knowledge values traditional wisdom, vernacular languages, and underrepresented communities.



MULTIPLE
CULTURES

INDIGENOUS
KNOWLEDGE

DIFFERENT
LANGUAGES

3. DEMOCRATIZATION OF KNOWLEDGE

Knowledge creation is bidirectional. Anyone can be a creator, not just a passive consumer.



OPEN-
SOURCE

CONTRIBUTOR
COMMUNITY

SHARED
LEARNING

INCLUSIVE
ECOSYSTEM:
NO ONE LEFT
BEHIND

Barriers to Overcome, Enablers to Build On

BARRIERS



Digital divide

Uneven connectivity and device access across regions.



Fragmented data standards

Incompatible formats slow sharing and reuse.



Rising infrastructure costs

Energy and hosting costs strain smaller institutions.



Skills and literacy gaps

Many users lack confidence navigating digital tools.

ENABLERS



Open standards

Shared formats make systems interoperable by default.



AI-powered access tools

Translation and search widen who can find knowledge.



Public-private partnerships

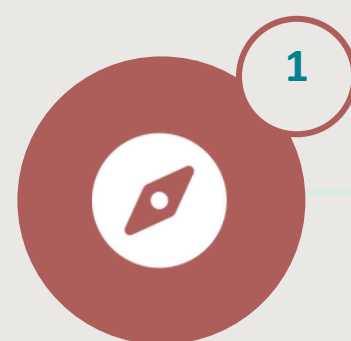
Shared investment scales infrastructure sustainably.



Capacity-building programs

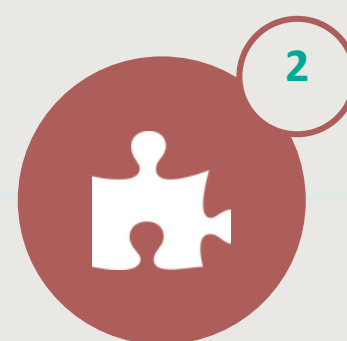
Structured training grows lasting digital confidence.

A Roadmap for Building the Knowledge Ecosystem



Assess

Map current knowledge flows, gaps, and communities served.



Design

Co-create inclusive, accessible platforms and standards.



Implement

Deploy tools, train users, and open access broadly.



Sustain

Monitor impact, reduce footprint, and keep evolving.

Pedagogical Innovation via "Didik Hibur" (Edutainment): Motivates Engagement and Bridges Learning Gaps



Culturally Safe Learning Environment

- To capture student attention and build confidence, Teacher A leverages music, arts, and the "didik hibur" (edutainment) modules produced by the Ministry of Education.
- Because indigenous students show exceptionally high interest in culturally aligned arts, this strategy creates a culturally safe space within the school environment.
- Additionally, this approach is paired with maintaining close relationships with indigenous parents to actively monitor and support student progress in basic literacy.

Immersive and Outdoor Pedagogies Reconnect Students with Nature and Heritage

Digital Edutainment & Local Flora

Teacher D incorporates digital edutainment, using animated educational videos that detail local flora and fauna to modernize traditional ecological concepts.

Experiential "Mesra Rimba" Program

Conversely, experiential pedagogical strategies like the "Mesra Rimba" program shift the classroom outdoors.

This aligns academic learning with the students' natural environment, utilizing physical activity and nature-based exploration to sustainably integrate indigenous heritage with formal schooling.

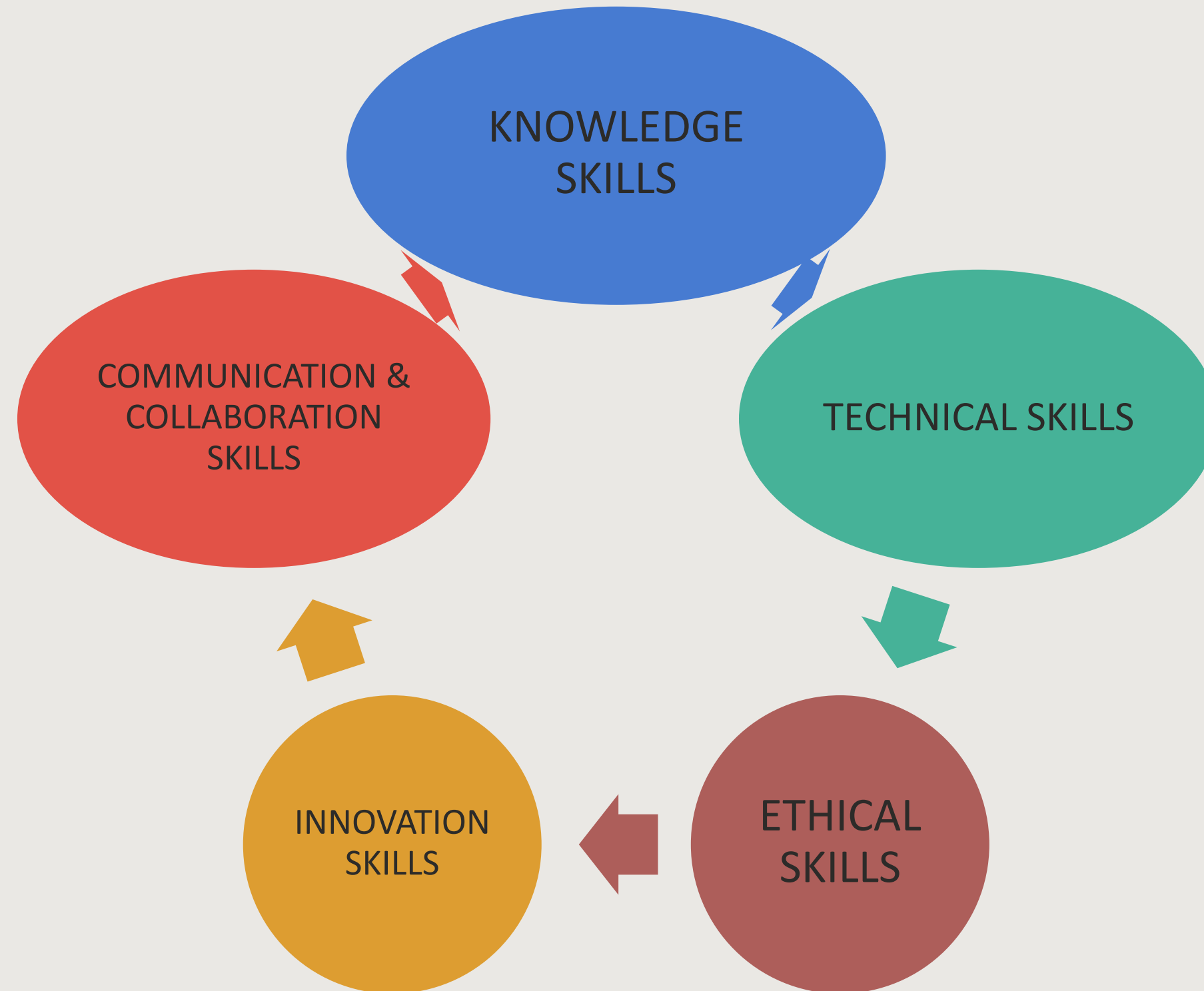


Integrating Modern Digital Literacy with Ancestral-Cultural Heritage is Crucial

- Digital literacy in the 21st century extends beyond using devices; it involves accessing, evaluating, and safely navigating digital content.
- Indigenous parents aspire for their children to thrive in the modern world while preserving their ancestral language and cultural heritage through mainstream schooling.
- However, significant barriers persist, including limited internet access, a lack of culturally relevant digital education materials, and challenges regarding data ownership and cultural sensitivity in documentation.



COMPETENCIES OF LIS PROFESSIONALS



FROM GATEKEEPER TO GUIDE

TRADITIONAL ROLE

- Custodian & organizer of print and licensed collections
- Cataloger applying fixed classification standards
- Reference desk answering discrete factual questions
- Gatekeeper controlling access to vetted information

EMERGING ROLE

- Curator and evaluator of AI tools, sources, and outputs
- Data & metadata strategist overseeing automated systems
- AI-literacy coach guiding critical, ongoing inquiry
- Ethical advisor on privacy, bias, and equitable access

AI-ready librarian



Technical & AI Literacy

Understanding AI/ML systems, tools, and their capabilities and limits

01



Information & Critical Literacy

Evaluating AI-generated content, sources, and algorithmic bias

02



Ethics & Data Stewardship

Safeguarding privacy, equity, transparency, and intellectual freedom

03



Human-Centered Skills

Empathy, adaptability, and guidance
AI cannot replace

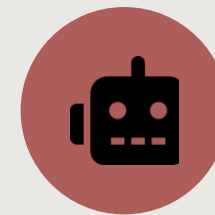
04

AI is already reshaping library work



Discovery & search

AI-driven discovery layers and generative search are replacing keyword catalogs as the first stop for information.



Technical services

Automated cataloging, metadata generation, and classification are shifting staff time from production to oversight.



Reference & literacy

Patrons increasingly arrive with AI-generated answers that need verification, context, and critical framing.



Governance & trust

Libraries are being asked to model responsible, transparent, and equitable AI use for their communities.

Rethinking LIS curricula

01



Embed AI & data science

Core coursework in machine learning basics, data ethics, and computational thinking alongside classic LIS theory.

02



Hands-on tool practice

Studio-style labs using real discovery, cataloging, and generative AI tools, not just case studies.

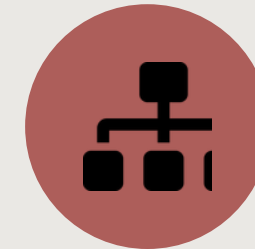
03



Ethics as a throughline

Privacy, bias, and equity woven across courses rather than isolated in a single seminar.

04



Cross-campus partnerships

Joint programs with computer science, information systems, and design schools to widen technical exposure.



A CHANGING ROLE

Beyond the bookshelf: the library as a platform

01

From collection to connection

The library's value increasingly lies in the people, skills, and relationships it brings together — not just the materials on the shelf.

02

From quiet to collaborative

Reading rooms now share space with maker labs, recording studios, and group project rooms designed for making, not just consuming.

03

From access point to launchpad

Libraries increasingly measure success by what patrons go on to do — a job landed, a business started, a skill gained.

Empowerment-driven library



Digital inclusion & access

Free internet, devices, and digital-literacy support that close the connectivity gap.



Maker & innovation spaces

3D printers, recording studios, and prototyping tools that turn ideas into things.



Lifelong learning & skills

Career coaching, language classes, coding workshops, and small-business support.



Civic & community engagement

Neutral, trusted ground for civic dialogue, voter info, and local organizing.

Roles of Librarian



🤖 Empowering Libraries with Artificial Intelligence (AI)



UiTM Library with AI

Our library is excited to launch a new initiative aimed at promoting awareness and understanding of Artificial Intelligence (AI) within our community. Through workshops, hands-on activities, and educational resources, we aim to make AI accessible to everyone—regardless of age or background. Whether you're a student, professional, or simply curious about the future of technology, join us to explore how AI is shaping the world and how you can be a part of it. Let's learn, innovate, and grow together!

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2025



03 NOVEMBER 2025

**Penggunaan Aplikasi
Kecerdasan Buatan
(AI) Membantu Dalam
Penghasilan
Kandungan Media
Yang Lebih Menarik**



31 OCTOBER 2025

**From Data to Defence:
Memperkasa
Keselamatan Digital
Melalui AI**

by PTDI Johor



22 OCTOBER 2025

**Xplorasi AI BERNAMA
Radio: Library
Transformation in the
Digital Era**

by PTAR, Shah Alam



15 AUGUST 2025

**Bengkel "Write Faster
with Mendeley &
Scopus AI" Perkukuh
Literasi Maklumat
Warga Fakulti Undang-
Undang**



02 JULY 2025

**Program Resensi Buku
Bersama
Pentadbir@Iqra' Corner
UCS Siri 2 : Artificial
Intelligence (AI)**

by PTAR Puncak Alam



25 JUNE 2025

Program CSR Vitamin Ilmu Siri 5: Celik AI Bijak Pustaka

by PTA



20 JUNE 2025

AI Made Simple: Perkasa Literasi Digital dan Inovasi Tempat Kerja

by Perpustakaan Al-Bukhari



03 JUNE 2025

Program Revolusi Pengurusan Rekod Bibliografik: Peranan AI Dalam Era Digital

by PTAR, Shah Alam



09 MAY 2025

Introducing SCOPUS AI - Your Smarter Research Assistant!

by PTAR, Shah Alam



14 APRIL 2025

BPDl Podcast: PERMATA x AI

by PTAR, Shah Alam

Suggestions & Recommendations

Sustainable Knowledge Ecosystems Demands Community Engagement and Smart Partnerships

- Integrating indigenous cultural elements into standard national syllabus
- Schools must prioritize parental input in policy-making and host culturally relevant events.
- Promoting digital literacy and cultural preservation must be community-led, prioritizing knowledge sovereignty.

SMART Partnerships

Sustainable preservation requires smart partnerships connecting school management, indigenous parents, related industries, private & government agencies, and universities.

***"Systemic support ensures
Indigenous knowledge communities
thrive."***



CONCLUSION

- Knowledge ecosystems is crucial to develop digital citizenship and librarian play an important roles to guide and prepare the lifelong learning in digital age
- The digital age has fundamentally reshaped how knowledge is created, shared, and valued, transforming static bodies of information into dynamic, interconnected ecosystems.
 - **Inclusiveness** forms the structural foundation of a healthy ecosystem.
 - **Equity** extends inclusiveness from representation into structure. An equitable knowledge ecosystem is not satisfied with simply adding diverse voices; it actively redistributes power,
 - **Innovation** is the ecosystem's generative output. Digital connectivity has distributed knowledge production across borders and disciplines,
 - **Sustainability** transforms momentary progress into lasting resilience, ensuring — practices, policies, to sustain that potential over time

