

# WG2 Conceptual Framework: Digitalization & Age Culture in Organizations

## 0. Purpose & Scope

This framework organizes and connects the theoretical resources relevant to Working Group 2 (WG2) – *Digitalization and Age Culture in Organizations*. It structures theories across levels of analysis (macro–meso–micro), articulates cross-cutting mechanisms (learning, identity, technology acceptance, stress/health, knowledge flows), proposes integrative hypotheses, and translates them into practical applications for WG2’s three core features: (1) knowledge collection and sharing on age culture/ageism/lifelong learning, (2) mapping data and practices, and (3) critical reflection on core concepts (e.g., “older workers”, “later life”).

This framework is designed to operationalise Working Group 2’s remit in the CA21107 Memorandum of Understanding by providing cross-country comparable tools, open-access resources, and evidence to inform policy and practice for age-inclusive digital transitions. The conceptual framework was designed based on three activities of the working group:

- 1) A scoping review which involved reviewing 83 articles (from 6510 sifted) exploring employer interventions to support older workers in adapting to workplace digitalization. This scoping review was a systematic search of peer-reviewed literature from 2019 to March 2024 across Scopus, Web of Science, and PubMed, focusing on employer and stakeholder interventions that support older workers (50+) in adapting to digitalization in the workplace. Three targeted searches were conducted to capture studies on digitalization, age-related employment challenges, and workplace learning interventions, including those affecting atypical workers. The review included quantitative, qualitative, conceptual, and systematic studies, with a dual-reviewer process and a third-party arbiter for selection and extraction. Non-English studies were considered if two native speakers could review them, and the review follows PRISMA and Arksey & O’Malley protocols.
- 2) Country reports: This country profile report analysed employer policies and practices related to older workers and digital technology, using European Company Survey data and grey literature. They included interviews with representatives from employer organizations, trade unions, and HR professional bodies to explore national challenges, adaptation strategies, and examples of best practice. The reports were structured into six thematic sections, culminating in a comparative analysis to support academic publication and future grant applications.
- 3) Webinars: Periodic online webinars were conducted to enable WG2 members to share their research on digitalization and age management within different labour market contexts.

In addition, a project team within the WG2 network assembled a proposal to Horizon Europe on intergenerational fairness at work from which we are also drawing from.

# 1. Architecture of the Framework

## 1.1 Levels of Analysis

- **Macro (societal/policy/techno-economic):** welfare regimes, demographic change, Industry 4.0, digital economy, innovation systems, labour market institutions, policy instruments (learnfare/active welfare), media discourses.
- **Meso (organizational/occupational):** age culture and climate, HRM, leadership, work design, knowledge management, production systems, ergonomics and HCI, intergenerational relations, unions/works councils, sectoral norms.
- **Micro (individual/interactional):** motivation, self-regulation, identity, perceived discrimination, digital skills and capital, cognition and learning, health and technostress, socioemotional goals.

## 1.2 Cross-Cutting Mechanisms (CCMs)

- **CCM-L – Learning & Skill Formation:** adult learning, situated learning, learn-to-learn; digital literacy; lifelong learning; learnfare.
- **CCM-I – Identity & Stereotypes:** ageism, stereotype embodiment, self-stereotyping, stereotype threat; intergenerational identity dynamics. Include intersectional perspectives (age, gender, migration contract type, disability) to capture layered vulnerability as emphasised in CA21107 MoU.
- **CCM-T – Technology Use & Acceptance:** TAM/UTAUT; adaptive structuration; autonomy paradox; telework; human–machine interaction; usability and design-for-all.
- **CCM-S – Stress, Health & Work Ability:** JD-R (extended), technostress, effort–reward imbalance (ERI), COR, self-determination theory (SDT), work ability (Finnish Work Ability House), neuroergonomics and mental workload.
- **CCM-K – Knowledge Flows & Careers:** knowledge capital, social capital, intergenerational knowledge transfer, protean careers, task-based approach (TBA), job/role crafting, job carving.

# 2. Taxonomy of Theories by Pillar

## Pillar A – Age Culture, Inequality & Labour Markets (Macro↔Meso)

- **Ageism & Age Culture:** organizational age climate; age norms in hiring/training/retirement; discrimination and subjective job insecurity (SJI).
- **Stereotype Embodiment & Threat:** internalisation of ageist beliefs; performance and learning consequences.
- **Relational Inequality Theory:** how organizational relations (authority, status, resource flows) produce age-linked disparities.
- **Digital Divide / Digital Capital / Digital Social Inequalities:** distribution of access, skills, usage, outcomes; *second- and third-level* divides.
- **SBTC/RBTC & “Race between Man and Machine”:** technological change and task reallocation; routine displacement; upskilling/reskilling demands.

- **Demographic Dividend Decline / Innovation Debates:** competing expectations regarding age structures and innovation (negative, null, or positive effects).
- **Extended Working Life & Retirement Models:** push/pull/jump/stay/stuck; early retirement schemes; policy feedback into firm behaviour.

#### Pillar B – Learning, Competence & Careers (Micro↔Meso)

- **Adult Learning & Situated Learning:** learning as participation in practice; three adult-learning dimensions—subjectivity, experience, context; focus on *skills* rather than decontextualised knowledge.
- **Self-Directed Learning (Grow’s stages), Experiential Learning (Kolb), Constructivism (Piaget), Gestalt, Russian cultural-historical theory:** mechanisms for designing learning for mid/late careers.
- **Learnfare & Active Welfare:** integration of lifelong learning into welfare states; incentives and supports aligned to labour market transitions.
- **Socioemotional Selectivity Theory (SST):** motivational shifts with age; implications for learning design (goal relevance, meaningfulness, time horizons).
- **Protean Career Theory:** self-directed, values-driven career navigation in turbulent, digital contexts.

#### Pillar C – Technology Acceptance, Use & Work Organization (Micro↔Meso)

- **TAM / UTAUT:** perceived usefulness, ease of use; performance/effort expectancy, social influence, facilitating conditions; moderation by age, experience.
- **Adaptive Structuration Theory:** technology–structure interplay; appropriation and emergent practices.
- **Autonomy Paradox & Work Intensification:** technology increases autonomy while extending control/availability; boundary blurring; telework; dissolution of time/place.
- **Algorithmic Management & AI-Driven Decision Systems:** fairness, transparency, and explainability issues critical for older workers.
- **Sociotechnical Systems:** joint optimisation of social and technical subsystems; design-for-all and age-inclusive systems.
- **Human–Machine Interaction & Ergonomics:** physical, cognitive, and affective fit; usability, accessibility, universal design; Industry 4.0/Operator 5.0; neuroergonomics; mental workload models (e.g., Redline model).

#### Pillar D – Health, Motivation & Work Ability (Micro↔Meso)

- **JD-R (Extended):** job demands, resources, and personal resources; integration with technostress creators/inhibitors; digital fatigue/recovery; boundary control.
- **Technostress:** creators (overload, invasion, complexity, insecurity); inhibitors (literacy facilitation, technical support, user involvement).
- **COR (Conservation of Resources):** resource loss spirals; interventions as resource gains.
- **SDT (Self-Determination Theory):** autonomy, competence, relatedness; design for need satisfaction in digital transitions.

- **Work Ability House:** health/capacity, competence, values/attitudes, work/community; diagnostics for ageing workforce.
- **Effort–Reward Imbalance & Transactional Stress:** strain from imbalance and appraisal processes.

#### Pillar E – Knowledge, Intergenerational Relations & HRM (Meso)

- **Knowledge Management (KM):** KM strategy/process; knowledge retention with ageing staff; communities of practice.
- **Intergenerational Learning & Leadership:** two-way mentoring; age-diverse teams; career-readiness competencies; talent management across ages.
- **Job Crafting / Job Carving:** person–job fit via proactive reshaping; task, relational, and cognitive crafting; inclusive reallocation of tasks.
- **Subjective Job Quality / Subjective Insecurity:** perceptual drivers of engagement and exit.
- **Aon/Kahn/Utrecht Work Engagement:** psychological conditions; vigour, dedication, absorption as outcomes of age-inclusive design.

#### Pillar F – Policy, Governance & Ethics (Macro↔Meso)

- **Active Welfare / Learnfare:** state–employer co-production of up/re-skilling infrastructures; metagovernance models (e.g., “Be Connected”).
- **Ethical Frameworks:** fairness, transparency, non-discrimination in AI/algorithmic management; worker voice.
- **Vulnerability Models (adapted from hazards/OH&S):** layered vulnerability (age × gender × contract × sector × technology).

### 3. Integrative Mind Map



### 4. Connection Logics & Hypotheses

#### 4.1 Cross-Pillar Mechanism Chains (Examples)

##### **Chain 0: Policy Incentives → Digital Reskilling → Retention & Innovation**

*Policy scaffolding (active welfare, EU digital skills agendas) encourages organizations to embed age-inclusive up/reskilling, leading to higher retention and innovation in ageing workforces.*

- **Chain 1: Age Culture → Identity → Acceptance → Learning → Work Ability**
  - Negative age culture increases self-stereotyping and threat (Pillar A), which dampens perceived competence (Pillar D: SDT), reducing technology acceptance (Pillar C: TAM/UTAUT) and training uptake (Pillar B), eroding work ability (Pillar D).
- **Chain 2: Tech Design → Demands/Resources → Health → Retention**
  - Poor usability and high complexity (Pillar C) raise demands (JD-R) and technostress (Pillar D), lowering engagement and increasing intention to exit; age-inclusive design and literacy facilitation invert the pathway.
- **Chain 3: Policy Scaffolding → Organizational Practices → Intergenerational KM → Innovation**
  - Learnfare incentives (Pillar F) enable firms to institutionalize age-inclusive HRD (Pillar E), which strengthens knowledge flows and team complementarity, supporting innovation despite older age structures (contesting simple “demographic dividend decline” expectations in Pillar A).
- **Chain 4: Telework & Boundary Blurring → Autonomy Paradox → JD-R**

- Telework increases autonomy but extends work; without boundary control and recovery norms, demands rise; age-aware boundary training and schedule design re-balance JD-R.

## 4.2 Agenda for future research for WG2 Studies

1. **(Age Climate–Learning):** Age-inclusive climate (index) positively predicts older employees' participation in digital upskilling; effect mediated by competence need satisfaction (SDT) and moderated by stereotype threat.
2. **(Design-Technostress):** Usability (SUS), accessibility and user involvement reduce technostress creators and increase technology continuance intention among 50+ employees.
3. **(Intergenerational Teams):** Structured two-way mentoring improves knowledge retention and digital process adherence; effects are strongest under high task interdependence (sociotechnical coupling).
4. **(Telework Boundaries):** Boundary control training reduces techno-invasion and off-hours work; effects on wellbeing are mediated by recovery experiences.
5. **(Learnfare Uptake):** Organizations embedded in active-welfare contexts show higher prevalence of age-inclusive HRM bundles and better work ability trajectories for older workers.
6. **(Crafting & Acceptance):** Job crafting interventions increase perceived usefulness of new systems via better task-technology fit; effect amplified in routine-biased settings undergoing digital transition.
7. **(Innovation & Age Mix):** Age-diverse units with strong KM routines exhibit equal or higher process innovation compared to younger-skewed units when digital literacy supports are present.

It should be noted that the scoping review found that there was no overarching theoretical framework which was universally applied to a predominant number of studies. In fact, studies were drawn from literature from studies in HRM, HRD, gerontology, lifelong learning, social policy and other fields. Because of this, there are several different directions which future research can take which is reflective of the review. On the other hand, this offers opportunities for multidisciplinary research to explore the convergence of organizational policies, public policies and older workers' responses in terms of adaptation to digitalization in work.

## 4A. Methodological Operationalization

This agenda could be operationalized through a multi-method comparative design:

- **Quantitative module.**  
A cross-national survey will integrate WG2's diagnostic tools (Age Culture & Climate Index, JD-R/Technostress Screen, Work Ability Snapshot, Technology Acceptance Scales). Translation and adaptation will follow the **TRAPD** protocol (Translation–Review–Adjudication–Pre-testing–Documentation) to ensure linguistic and conceptual equivalence.

- **Qualitative module.**  
Case studies in selected sectors (manufacturing, health & care, public administration, education, digital services) will collect data via interviews, focus groups and workplace observations. Each case will apply the WG2 Mechanism Chains (Section 4.1) as analytical templates.
- **Co-production module**  
Case studies involving older workers, employers, and trade unions to co-create interventions to support older workers in using new technology in work. An additional dimension of intergenerational collaboration can explore how older and younger workers can collaborate and exchange knowledge for mutual benefit.

## 5. Practical Applications for WG2

Drawing on the research activities particularly the scoping review the working group has been able to draw some practical implications for organizations on strategies to support older workers in the adaptation of digitalization in the workplace thereby reducing age inequality's the practical implications are targeted not just towards employers but also trade unions and business organizations in order to take a coordinated approach to addressing the challenges of digitalization and age management in addition to the research we are also relied on the working group's expertise in this area especially around the fields of age management HRM lifelong learning gerontology and sociology and working group members engagement with stakeholder organizations including publications of good practise guides as part of the development of the horizon Europe proposal the working group brought together 32 social partner organizations including age platform Europe who can maximise the impact of the working groups activities thereby creating a clear pipeline from the research to changing practises in organizations throughout Europe.

### 5.1 Audit & Diagnostic Toolkit (ready-to-field components)

- **Age Culture & Climate:** short organizational survey covering norms on learning allocation, intergenerational respect, training invitations, promotion and task assignment fairness.
- **Tech Acceptance & Design:** short scales for perceived usefulness, ease of use, facilitating conditions; heuristic usability checklist (design-for-all, readability, error tolerance, cognitive load).
- **JD-R + Technostress Screen:** demands (pace, complexity, interruptions, techno-overload/invasion), resources (autonomy, feedback, peer support, literacy facilitation), inhibitors (user involvement, helpdesk quality).
- **Work Ability Snapshot:** 4-pillar quick check (health/capacity; competence; values; work/community) with sector-specific anchors.

- **Knowledge Flow Map:** who-knows-what matrix; critical knowledge at risk; intergenerational ties; shadow knowledge.

All modules will be designed for cross-national comparability and FAIR data sharing, supporting COST Training Schools and Short-Term Scientific Missions.

## 5.2 Intervention Menus

- **Design-for-All Implementation:** co-design with 50+ users; “usability debt” remediation sprints; accessible defaults; reduction of needless complexity.
- **Learning Architecture:** micro-learning, coaching on the job, practice sandboxes, peer labs; tailored pathways by Grow’s stages; SST-congruent content (meaningful, proximate goals).
- **Intergenerational Leadership:** two-way mentoring charters; reverse mentoring with safeguards; age-diverse squads; conflict mediation scripts.
- **Job Crafting/Carving:** supervised task redistribution; emphasis on non-routine, judgement-heavy tasks for experienced staff; physical and cognitive ergonomics upgrades.
- **Boundary & Recovery Protocols:** telework charters; quiet hours; right-to-disconnect; recovery micro-breaks; attentional hygiene.
- **Technostress Inhibitors:** literacy facilitation, dedicated help channels, early adopter networks, recognition for “digital helpers”.
- **HRM Bundle:** age-inclusive recruitment, fair access to training, promotion transparency, phased retirement with role redesign, return-to-learn options after career breaks.
- **Governance/Ethics:** algorithmic impact assessments (age fairness), participatory data governance, worker councils for digital change.

## 5.3 Indicators & Dashboards

- Training participation by age × type; learning completion and transfer metrics.
- Technostress creator/inhibitor indices; JD-R balance ratio; off-hours digital load.
- Work ability trajectories; sickness absence; retention and internal mobility.
- Knowledge retention risk score; mentoring network density; process-deviation rates.
- Acceptance/continuance intentions; usability issue closure rate.
- Digital capital index (2nd- and 3rd-level divides), disaggregated by age, gender and migration status, to support the MoU’s comparability and inclusion aims.

## 6. Tables

Table 1. Pillars → Core Theories → Key Constructs

Pillar	Core theories/models	Core constructs
A. Age culture & inequality	Ageism/age climate; Stereotype embodiment/threat; Digital	Norms, discrimination, SJI; internalized stereotypes; access/skills/outcomes;

Pillar	Core theories/models	Core constructs
	capital/divides; Relational inequality; SBTC/RBTC; Extended working life	authority/status/resource flows; task composition; push/pull factors
B. Learning & careers	Adult/situated learning; Self-directed learning (Grow); Experiential (Kolb); SST; Learnfare/active welfare; Protean career	Subjectivity/experience/context; self-direction stages; cycles (CE–RO–AC–AE); motivational time horizons; institutional scaffolding; values-driven mobility
C. Tech acceptance & work organization	TAM/UTAUT; Adaptive Structuration; Sociotechnical systems; Autonomy paradox; Telework; HMI/ergonomics; Industry 4.0/Operator 5.0	Usefulness, ease, facilitating conditions; appropriation; joint optimization; boundary blurring; usability, accessibility, workload; cyber-physical systems
D. Health, motivation & work ability	JD-R (extended); Technostress; COR; SDT; Work Ability House; ERI; Transactional stress; Neuro-ergonomics/Mental workload	Demands–resources–personal resources; overload/invasion/complexity/insecurity; resource gain/loss; autonomy/competence/relatedness; 4-pillar ability; imbalance; appraisal; workload indices
E. Knowledge & intergenerational	KM strategy/process; Communities of practice; Intergenerational leadership; Job crafting/carving; Subjective job quality/insecurity; Engagement models	Retention/transfer; legitimate peripheral participation; reverse/two-way mentoring; task redesign; perceived quality/insecurity; vigor/dedication
F. Policy & governance	Active welfare/learnfare; Meta-governance; Ethical AI; Vulnerability models	Incentives/funding; networked delivery; fairness/transparency; layered risk mapping

Table 2. Cross-Pillar Mechanisms → Data Needs → Typical Instruments

Mechanism	Data needs	Examples of instruments
CCM-L Learning	Learning history; modality; transfer; barriers	Short learning pathways survey; LMS analytics; observation rubrics

Mechanism	Data needs	Examples of instruments
CCM-I Identity/stereotypes	Perceived norms; threat; belonging	Climate & inclusion scales; stereotype threat items; qualitative diaries
CCM-T Tech acceptance/design	PU/PEOU; facilitating conditions; usability; accessibility	Short TAM/UTAUT scales; heuristic usability checklists; task-technology fit walkthroughs
CCM-S Stress/health/ability	Demands/resources; technostress; recovery; work ability	JD-R screen; technostress creators/inhibitors; recovery experience questionnaire; work ability snapshot
CCM-K Knowledge flows	Expertise map; mentoring ties; knowledge at risk	Who-knows-what matrix; network mapping; KM effectiveness items

Table 3. WG2 Features → Operationalization & Outputs

WG2 Feature	Operationalization	Outputs
<b>Feature One:</b> Collect & share knowledge	Repository of theories, measures, and practice cases; typology by Pillar/Mechanism; evidence briefs	Public repository; theory-to-practice fiches; <i>How-To</i> guides for HR/line managers
<b>Feature Two:</b> Analyse data, map practices	Common WG2 survey modules (climate, technostress, acceptance, work ability); sectoral case protocols; practice audits	Cross-country comparative datasets; sector maps; practice typologies; benchmark dashboards
<b>Feature Three:</b> Critical reflection	Concept audits of “older worker”, “later life”, “digital literacy”; positionality notes; equity impact assessments	Concept notes; equity impact briefs; vocabulary for reflexive reporting

Table 4. Intervention Bundles by Challenge

Challenge	Bundle	Example actions
Negative age culture	<b>Culture reset</b>	Leadership framing; inclusive language policies; training invitation audits; age-diverse project staffing
Low acceptance	<b>Facilitated adoption</b>	Mobile peer labs; shadow-mode training;

Challenge	Bundle	Example actions
High technostress	<b>Stress inhibitors</b>	usability sprints; clear benefit framing (PU) Right-to-disconnect; helpdesk SLAs; micro-break protocols; simplification backlogs
Knowledge loss risk	<b>KM &amp; mentoring</b>	Two-way mentoring; critical knowledge capture; communities of practice
Boundary blurring	<b>Boundary hygiene</b>	Quiet hours; availability norms; focused-work windows; recovery training
Skills gap	<b>Learning pathway</b>	SST-aligned micro-credentials; recognition of prior learning; practice sandboxes

Table 5. Measurement & Evaluation

Domain	Indicator	Unit/Target
Age culture	Training invitation parity index (50+ vs <50)	≥ 0.95
Acceptance	Continuance intention among 50+	≥ 80%
Technostress	Creator index (standardized)	-0.5 SD within 12 months
Work ability	% with improved 4-pillar score	+15 pp
Knowledge	Mentoring network density	+25%
Innovation	Process-deviation reduction post-digitization	-20%

## 7. Sectoral Notes (illustrative)

- **Manufacturing/Logistics:** RBTC exposure; HMI, cobots, exoskeletons; Operator 5.0. Interventions: ergonomics upgrades, task reallocation to judgement-heavy steps, mentoring on tacit process control.
- **Health & Care:** Documentation systems, telehealth, AI triage. Interventions: co-design of interfaces, reduction of clicks, protected training time in shifts, peer super-users.
- **Public Administration:** Workflow automation and e-services; high proceduralism. Interventions: simplification sprints, boundary hygiene for telework, learning credits.

- **Social care:** Electronic data management, assistive equipment, telework, learning, robotics
  - **Finance:** E-wallets, AI credit scoring, blockchain, fintech
  - **Retail:** Automated logistic systems, omnichannel platforms, AI-powered personalization, virtual assistants
  - **Agriculture:** Digitalized supply chains, agri-fintech, precision farming, digitalized machine repair and right to repair
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## 8. Summary and Next Steps for WG2

WG2's conceptual framework translates complex theory into measurable and actionable elements for policy, organizational design and research. The next phase will focus on:

1. **Validation and pilot testing** of the WG2 diagnostic toolkit across at least three contrasting national or sectoral contexts.
2. **Integration with WG1 and WG3 datasets** to align organizational-level results with macro-policy indicators and individual-level learning pathways.
3. **Development of open-access resources**—survey codebook, data dictionary, theory-to-practice fiches—for use in COST Training Schools and STSMs.
4. **Dissemination** through a policy brief on *Age-Inclusive Digitalization in Organizations* and a joint WG2-WG4 publication.
5. **Preparation of an applied handbook** outlining intervention bundles (Section 5.2) and evaluation metrics (Table 5) for practitioners and policy stakeholders.

An age-inclusive digital organization is not an HR add-on; it is a sociotechnical system that aligns *culture, design, and learning* at macro–meso–micro levels. WG2's theory-in-use connects (i) equitable age cultures that dismantle stereotypes, (ii) learning architectures tuned to adult development and motivation, and (iii) age-aware technology and work design that minimize technostress and maximize capability. Implemented as coherent bundles and tracked with shared indicators, these elements transform digital transitions from sources of inequality into engines of retention, productivity, and well-being across the life course.

# Glossary

- **Active welfare / Learnfare** — Welfare-state instruments that embed lifelong-learning rights and incentives to sustain employability through digital transitions.
- **Adaptive Structuration Theory** — Technologies and organizational structures co-evolve via users' appropriation; examine "use-in-practice" versus formal intent.
- **Age culture / Organizational age climate** — Shared norms and routines that shape age-linked opportunities (training access, tasking, promotion); target for equity audits.
- **Ageism** — Stereotypes, prejudice, and discrimination by age across HR and daily coordination; antecedent of job insecurity and training avoidance.
- **Algorithmic impact assessment (age fairness)** — Ex-ante review of data-driven systems to detect and mitigate disparate impact on older workers.
- **Algorithmic management & ethical AI** — Governance of data-driven coordination (fairness, transparency, non-discrimination, worker voice).
- **Autonomy paradox** — Digital tools expand discretion while intensifying control and availability; manage via boundary norms and recovery design.
- **Communities of Practice (CoP)** — Peer learning structures that sustain tacit/explicit knowledge flow; key mechanism for intergenerational transfer.
- **Constructivism; Gestalt; cultural-historical theory** — Learning as active, context-embedded construction; informs design of practice-based learning for mid/late careers.
- **Conservation of Resources (COR)** — Resource loss/gain spirals under digital demands; design interventions that trigger gain spirals (autonomy, literacy, support).
- **Demographic dividend (decline) & innovation debates** — Age structure–innovation links are contingent on knowledge-management routines and digital literacy supports.
- **Design-for-all / Accessibility / Universal design** — Reduce exclusion by default through usability, readability, error tolerance, and assistive affordances.
- **Digital divide / digital capital / digital social inequalities** — Stratification across access, skills, use, and outcomes; address second- and third-level divides.
- **Effort–Reward Imbalance (ERI)** — Strain when exertion is not matched by pay/esteem/career rewards, especially during disruptive change.
- **Experiential Learning (Kolb)** — CE→RO→AC→AE cycle structuring practice-based upskilling and transfer.
  - **CE — Concrete Experience**  
Direct, situated doing. A real task or realistic simulation that produces observable outcomes and emotions (e.g., operating a new HMI screen, running a digital workflow).
  - **RO — Reflective Observation**  
Structured reflection on what happened and why: compare expectations vs. results; surface errors, surprises, and feelings; observe peers' strategies.
  - **AC — Abstract Conceptualisation**  
Generalise the experience into principles, rules, or mental models (task maps, heuristics, SOP updates). Link to theory (usability, TTF, SDT) and formalise "what works when."

- **AE — Active Experimentation**  
Test the new concepts in practice: iterate settings, try alternative sequences, stress-test edge cases. Feed the outcomes into the next **CE**—the cycle repeats.
- **Extended working life models (push/pull/jump/stay/stuck)** — Typology of retirement/continuation drivers; align HRD, role redesign, and incentives accordingly.
- **Human–Machine Interaction (HMI) & ergonomics** — Fit of interfaces/workflows to physical, cognitive, and affective capacities; includes cobots and exoskeletons.
- **Industry 4.0 / Operator 5.0** — Cyber-physical, data-rich production with a human-centric turn foregrounding safety, wellbeing, inclusion.
- **Job crafting / Job carving** — Employee-initiated (crafting) and managerially supervised (carving) task redesign to improve person–job fit and inclusion.
- **Job Demands–Resources (JD-R, extended)** — Outcomes arise from the balance of demands and resources; integrate technostress, autonomy, and recovery.
- **Knowledge management (KM) strategy/process** — Systematic capture, retention, and diffusion of know-how; mitigates age-related knowledge loss.
- **Learn-to-learn (meta-competence)** — Self-regulatory skills that accelerate new tool/task acquisition; a prime target in program design.
- **Metagovernance** — Multi-actor orchestration of skills ecosystems and interventions across public–private–civic arenas.
- **Neuroergonomics & mental workload** — Brain- and behaviour-informed workload assessment to guide interface/process redesign.
- **Protean career theory** — Self-directed, values-driven career navigation under turbulent digital conditions.
- **Relational Inequality Theory** — Age-linked disparities emerge from authority, status, and resource flows within organizations.
- **Routine-biased / skill-biased technological change (RBTC/SBTC)** — Automation displaces routine tasks and complements non-routine, higher-skill work.
- **Self-Determination Theory (SDT)** — Autonomy, competence, and relatedness as basic needs; design jobs and learning to satisfy them.
- **Self-Directed Learning (Grow’s stages)** — Progression from dependent to self-managing learner; tailor pedagogy and supports to stage.
- **Situated learning** — Learning via participation in real work practices; leverage CoPs, shadowing, and on-the-job scaffolding.
- **Socioemotional Selectivity Theory (SST)** — With age, preferences shift to meaningful, near-term goals; reframe learning value propositions accordingly.
- **Sociotechnical systems** — Joint optimisation of social and technical subsystems; prerequisite for inclusive, reliable digitised work.
- **Stereotype embodiment** — Internalised age stereotypes that depress motivation and performance.
- **Stereotype threat** — Performance-impairing anxiety about confirming negative age stereotypes.
- **Task-based approach (TBA)** — Target tasks (not job titles) for redesign and training in digital transitions.

- **Task–technology fit** — Performance rises when system functionality aligns with task requirements; improve via crafting plus usability.
- **Technology Acceptance Model (TAM)** — Adoption driven by perceived usefulness and ease of use; improve both in design and change framing.
- **Telework & boundary blurring** — Dissolution of time/place boundaries; manage via boundary control, right-to-disconnect, and recovery protocols.
- **Technostress (creators/inhibitors)** — Overload, invasion, complexity, insecurity versus literacy facilitation, social support, and user involvement.
- **Transactional stress (appraisal)** — Strain determined by appraisal of demands, resources, and coping options in specific digital contexts.
- **Unified Theory of Acceptance and Use of Technology (UTAUT)** — Performance/effort expectancy, social influence, facilitating conditions; age/experience moderate effects.
- **Vulnerability models (layered vulnerability)** — Intersecting risks (age × gender × contract × sector × technology) used to prioritise mitigations.
- **Work Ability House** — Four-pillar diagnostic (health/capacity, competence, values/attitudes, work tasks) for late-career sustainability.
- **Work engagement (Kahn/Utrecht)** — Conditions and processes yielding vigour, dedication, and absorption; design outcome of age-inclusive HRM.

## Acronyms (A–Z)

- **AI** — Artificial Intelligence.
- **CoP** — Communities of Practice.
- **COR** — Conservation of Resources.
- **ERI** — Effort–Reward Imbalance.
- **HMI** — Human–Machine Interaction.
- **HRD** — Human Resource Development.
- **JD-R** — Job Demands–Resources model.
- **KM** — Knowledge Management.
- **LMS** — Learning Management System.
- **OH&S** — Occupational Health & Safety.
- **PEOU** — Perceived Ease of Use (TAM).
- **PU** — Perceived Usefulness (TAM).
- **RBTC / SBTC** — Routine-Biased / Skill-Biased Technological Change.
- **SDT** — Self-Determination Theory.
- **SJI** — Subjective Job Insecurity.
- **SLA** — Service-Level Agreement.
- **SST** — Socioemotional Selectivity Theory.
- **SUS** — System Usability Scale.
- **TAM** — Technology Acceptance Model.
- **TBA** — Task-Based Approach.
- **UTAUT** — Unified Theory of Acceptance and Use of Technology.