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Cognitive AI: Transforming Human-Machine Interaction

Cognitive AI

Transforming Human-Machine Interaction

Learning Outcomes

- Explain what makes AI “cognitive” in practical PM terms
- Identify high-value PM use cases and where human oversight is required
- Recognize why AI fail and how “trustworthy AI” mitigations help
- Outline an implementation approach using an iterative, data-driven, AI-appropriate lifecycle

Cognitive AI

- Combines:
  - Perception/understanding
  - Reasoning
  - Learning to support (not just automate) human work
- Incorporates augmented intelligence going beyond “Generative AI”
- Includes seven distinct patterns of AI
- Importance for project managers, delivery teams, stakeholders:
  - Provide probabilistic solutions
  - Combines structured and non-structured data
  - Evolves continuously with learning systems
- Integrates governance through a trustworthy and ethical framework
- Provides a new interaction model with new delivery patterns

What Cognitive AI Enables

- Knowledge work acceleration
- Decision support / augmented reasoning
- Integration of structured and unstructured data
- Probabilistic outcomes
- Ethical, trust and governance controls
- Improved project outcomes
  - Speed
  - Quality
  - Stakeholder experience
  - Decision velocity

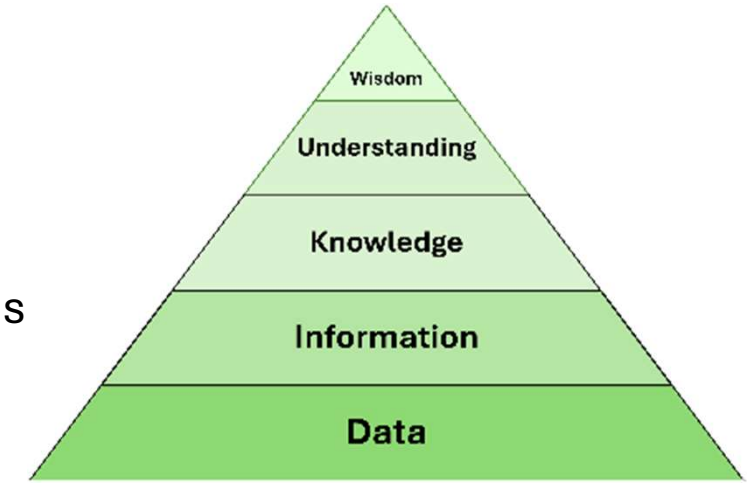
Seven Patterns of Cognitive AI

- Recognition Pattern (unstructured data)
- Conversation and Human Interaction Pattern (chatbots)
- Predictive Analytics and Decisions Pattern (predictions, forecasts)
- Goal-drive Systems Pattern (best path to achieve objective)
- Autonomous Systems Pattern (without human intervention)
- Patterns and Anomalies Pattern (fraud detection, outliers)
- Hyperpersonalization Pattern (individual profile, preferences)

- NOT Automation

Project Approach is Data-Driven

- Traditional projects:
  - Requirements elicited and defined upfront
  - Success measured at milestones
  - Risks reviewed periodically
  - Decisions justified by approvals and plans
- Cognitive, data-driven projects:
  - Requirements treated as testable hypotheses
  - Success measured continuously
  - Risks detected through leading indicators
  - Decisions justified by evidence and usage
- Key shift
  - From “Did we deliver what we planned?”
  - To ”Is what we delivered producing the intended outcome?”



Cognitive AI Lifecycle

- Business understanding
  - Define business problem, determine scope, value and applicability of AI (probabilistic)
  - Receive consensus with go/no decision
- Data understanding
  - Assess data availability, quality, and relevance
- Data preparation
  - Prepare, evaluate and govern data pipelines
- Model development
  - Experiment, train and refine models
- Model evaluation
  - Validate accuracy, impact, and compliance
- Model Operationalization
  - Deploy, monitor, and retrain continuously

Metrics

- Operational
  - Latency
  - Uptime
- Model
  - Accuracy
  - Drift
- Outcome
  - Cycle-time reduction
  - Rework reduction
  - Stakeholder satisfaction
- Adoption metrics
  - Usage
  - Opt-out rates

Trustworthy and Ethical Considerations

- Mutually reinforcing elements built in to the system by design
  - Ethical AI: “Do no harm”
  - Responsible AI: Humans remain accountable
  - Transparent AI: Make decisions visible
  - Governed AI: Establishment of data management and governance
  - Explainable & Interpretable AI: Justify decisions
- Help identify bias or unintended effects throughout the lifecycle
- Deployment relies on governance to ensure compliance

Visual: Adoption flywheel: Enable → Use → Measure → Improve → Govern

Why AI Projects Fail

- Weak business alignment
- Unrealistic expectations and application
- Insufficient executive support and change management
- Poor data readiness
- Insufficient model training, testing, validation
- Gaps in governance and data management
- No plan for continuous improvement as data and needs evolve

Requires Change Management

- Stakeholder alignment, trust, and adoption planning
- Changes in roles, processes, and expectations
- Understanding of transition from automation to decision-support
- Assessment of needs and training enablement
- Usage guidance (“when to trust / when to verify”)
  - Reduction in manual work
  - Cost-benefit analysis and KPIs
  - Transition readiness
- Adoption support strategies are targeted and adaptive
- Continuous improvement with iterations

Data-driven Approach

- Different from traditional automation or deterministic, programmatic systems
  - Perception – sense, interpret and understanding information
  - Predict – capability to forecast future outcomes
  - Planning – capacity to optimize to approaches to changing conditions
- Additional team members
  - Data scientist
  - Data engineer
  - Data governance
- Clear understanding of data
  - Organizational data understanding, lineage, sources, quality, access rights and privacy
  - Structured and unstructured
  - Big Data Vs (volume, variety, velocity, veracity)
  - Data preparation and transformation
- Infrastructure (on-prem, cloud-based, edge devices)

Data-driven Risk Management

- Risks are monitored through measurable signals
  - Low-confidence response rates
  - High-impact incorrect answers
- Changes needed
  - Data access, compliance and usage oversight
  - Evaluation metrics
  - Monitoring and retraining plans
  - Automatic trigger mitigations
  - Adjust to real vs trained data and behavior
- Risk management is operational, not theoretical

Key Takeaways

- Think big, and execute iteratively
- Establish benefits, scope and evaluation criteria
- Utilize a data-driven, iterative approach
- Design human oversight (human-in-the-loop)
- Establish a governance and compliance framework
- Trust is not a marketing message, it is a hard requirement

Data –> Understanding -> Reasoning -> Verification -> Output