From AI concepts to real-world use: How AI helps improve Food Safety and Quality.
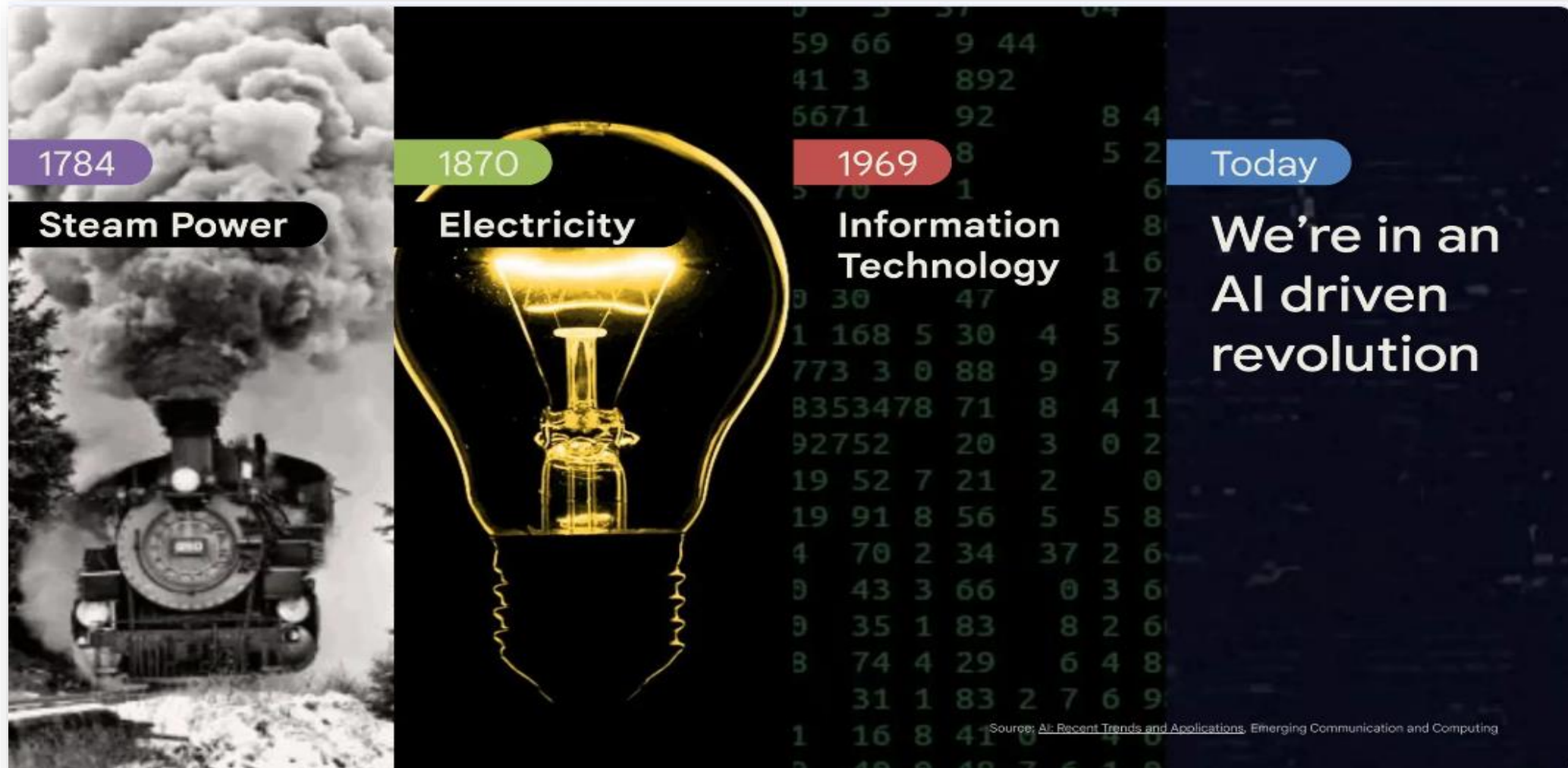
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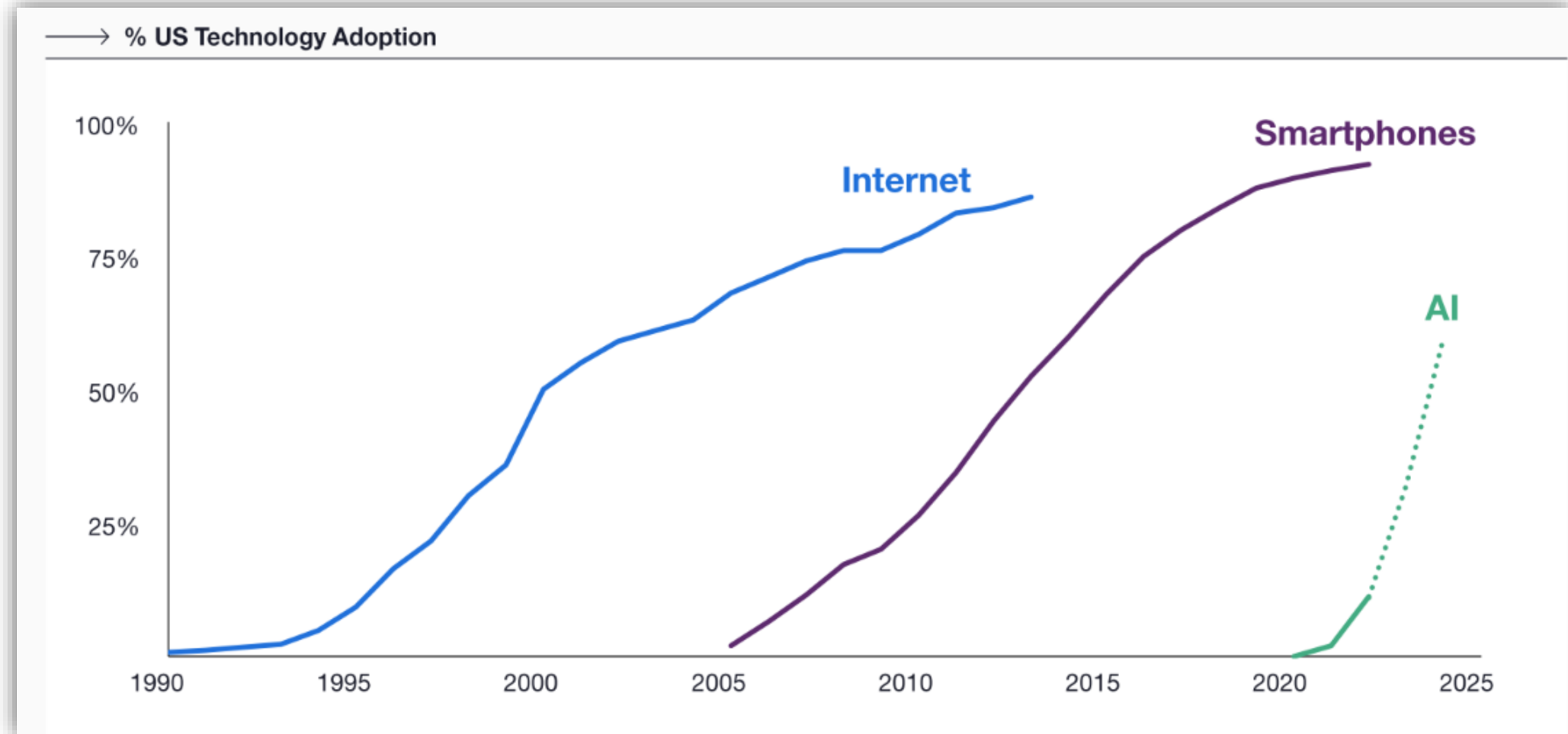
Silvana Susi,
Food & Beverage Certification and
Training Specialist for DNV

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We are in the AI-driven era

1784 Steam Power
1870 Electricity
1969 Information Technology
Today We're in an AI driven revolution

Source: AI: Recent Trends and Applications, Emerging Communication and Computing
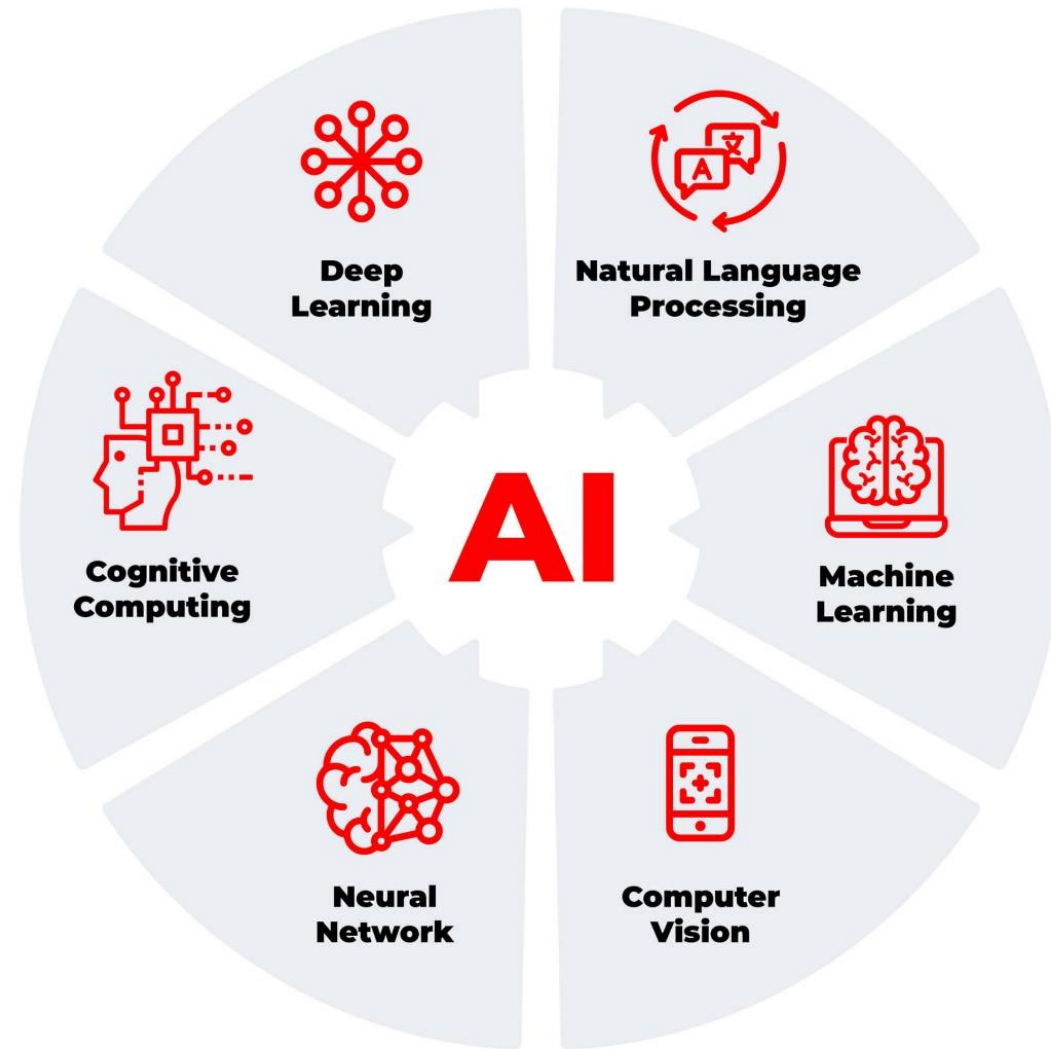
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We are at Rapid AI Adoption Rate

% US Technology Adoption

What *is* AI?

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Think about the Challenges in Food and Beverage How can AI Assist?

Food Supply Chain

| Food Raw Materials | Primary Production | Industrial Production | Transport logistics | Storage Household | Use Consumption | Storage Household |

Food Safety Quality

FSMS & Quality Systems

- FSQ in Design
- Specifications
- HACCP/FSP
- Allergen Mgmt
- **Supplier QA**
- Plant & Equipment Design/Capability
- Package Integrity

- Contracts
- Selection/ Approval
- Material Monitoring
- Continuous Improvement

- Specifications
- HACCP/FSP
- **Supplier QA**
- Traceability
- Sanitation & Allergen Control
- Complaint Mgmt
- Process Capability/Lean Six Sigma
- Infrastructure Investment
- FS Culture

- Traceability
- Warehouse Controls

- Complaints
- Warehouse Control

- Specification
- Labelling
- Consumer Feedback
- Process Capabilities

COMPLEX REGULATORY FRAMEWORK

DATA ≠ DATA INSIGHTS

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Expert Panel

Kathleen Wybourn,
Director of Food & Beverage North America for DNV

Dr. Vera Dickinson,
Founder & CEO of Innova-Q

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What are the top challenges in the industry seen from certification?

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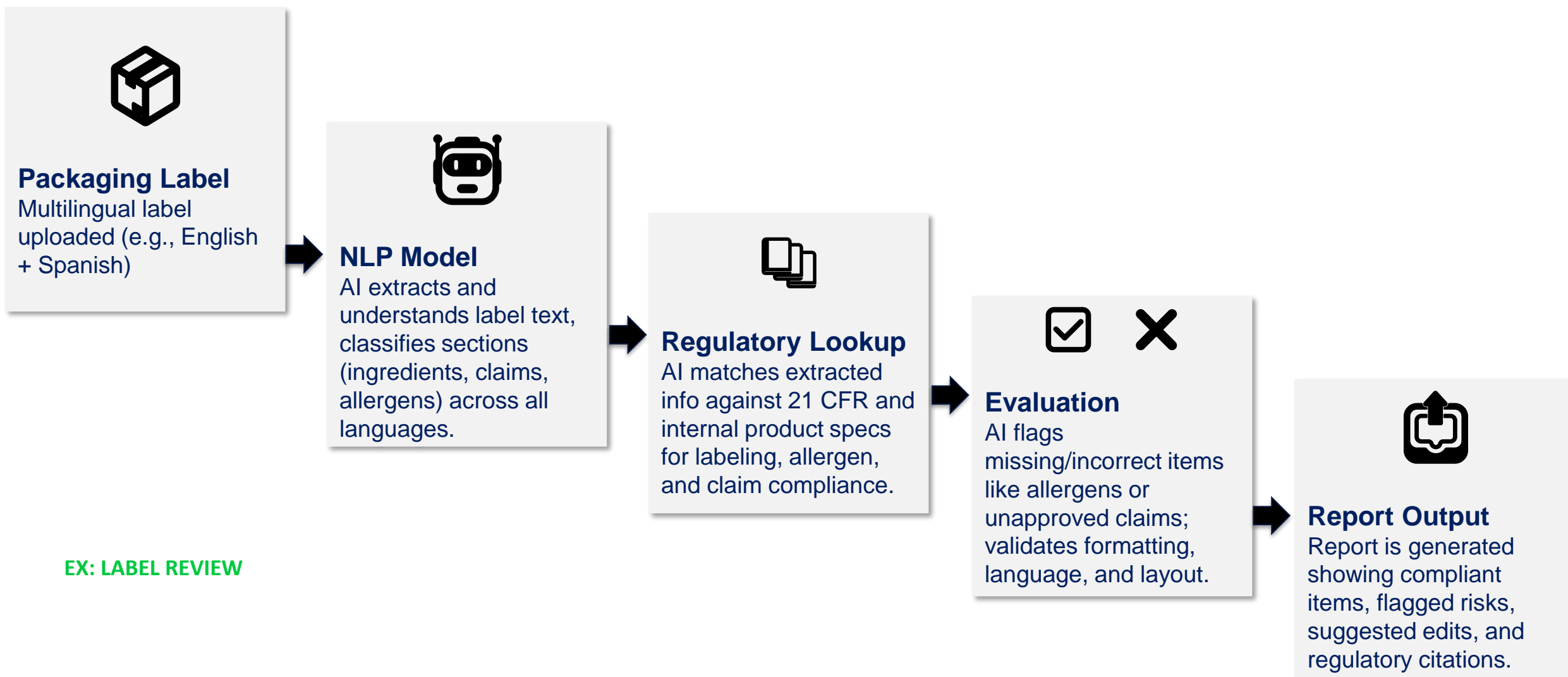# Can these challenges be addressed by AI?

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What are the watch-outs that you see associated with implementing AI solutions?

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Managing AI risks and rewards

- **ISO/IEC 22989** – Information Technology – Artificial Intelligence concepts and terminology

- **ISO /IEC 42001** – Information Technology – Artificial Intelligence – Management systems – Worlds first AI management system standard providing guidance on rapidly changing field of technology. ISO 42001 addresses the challenges with AI such as ethical, transparency and continuous learning. The main objective is a providing a structured way to manage risks and opportunities associated with AI, balancing innovation with governance.
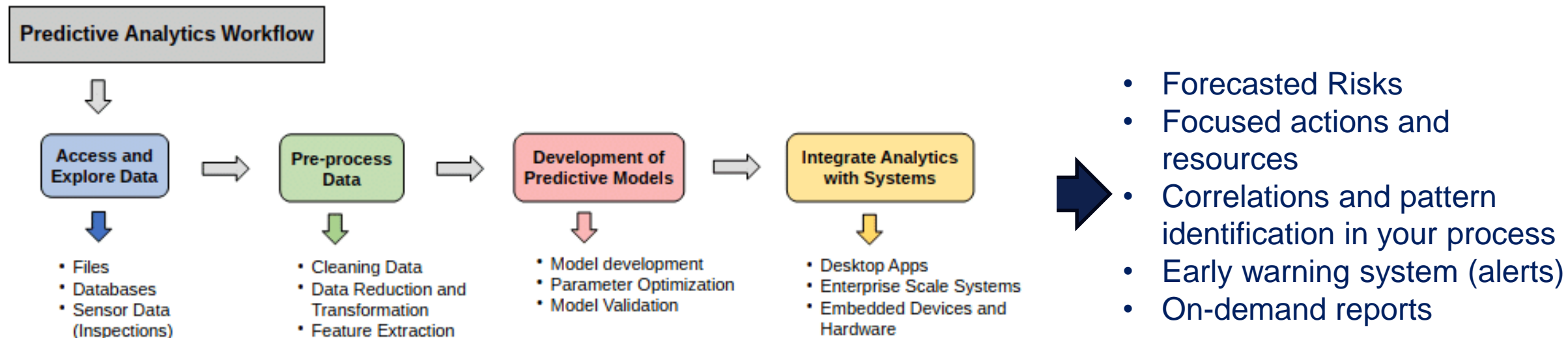
ISO standards enhance transparency, data quality, system reliability to mitigate risks incorporating comprehensive stakeholder inputs that can bridge the gap in regulations.

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1. COMPLIANCE MANAGEMENT with Natural Language Processing

Packaging Label
Multilingual label uploaded (e.g., English + Spanish)

EX: LABEL REVIEW

NLP Model
AI extracts and understands label text, classifies sections (ingredients, claims, allergens) across all languages.

Regulatory Lookup
AI matches extracted info against 21 CFR and internal product specs for labeling, allergen, and claim compliance.

Evaluation
AI flags missing/incorrect items like allergens or unapproved claims; validates formatting, language, and layout.

Report Output
Report is generated showing compliant items, flagged risks, suggested edits, and regulatory citations.

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2. MODERNIZED RISK MANAGEMENT with Machine Learning (ML)

Predictive Analytics Workflow

Access and Explore Data

- Files
- Databases
- Sensor Data (Inspections)

Pre-process Data

- Cleaning Data
- Data Reduction and Transformation
- Feature Extraction

Development of Predictive Models

- Model development
- Parameter Optimization
- Model Validation

Integrate Analytics with Systems

- Desktop Apps
- Enterprise Scale Systems
- Embedded Devices and Hardware

- Forecasted Risks
- Focused actions and resources
- Correlations and pattern identification in your process
- Early warning system (alerts)
- On-demand reports

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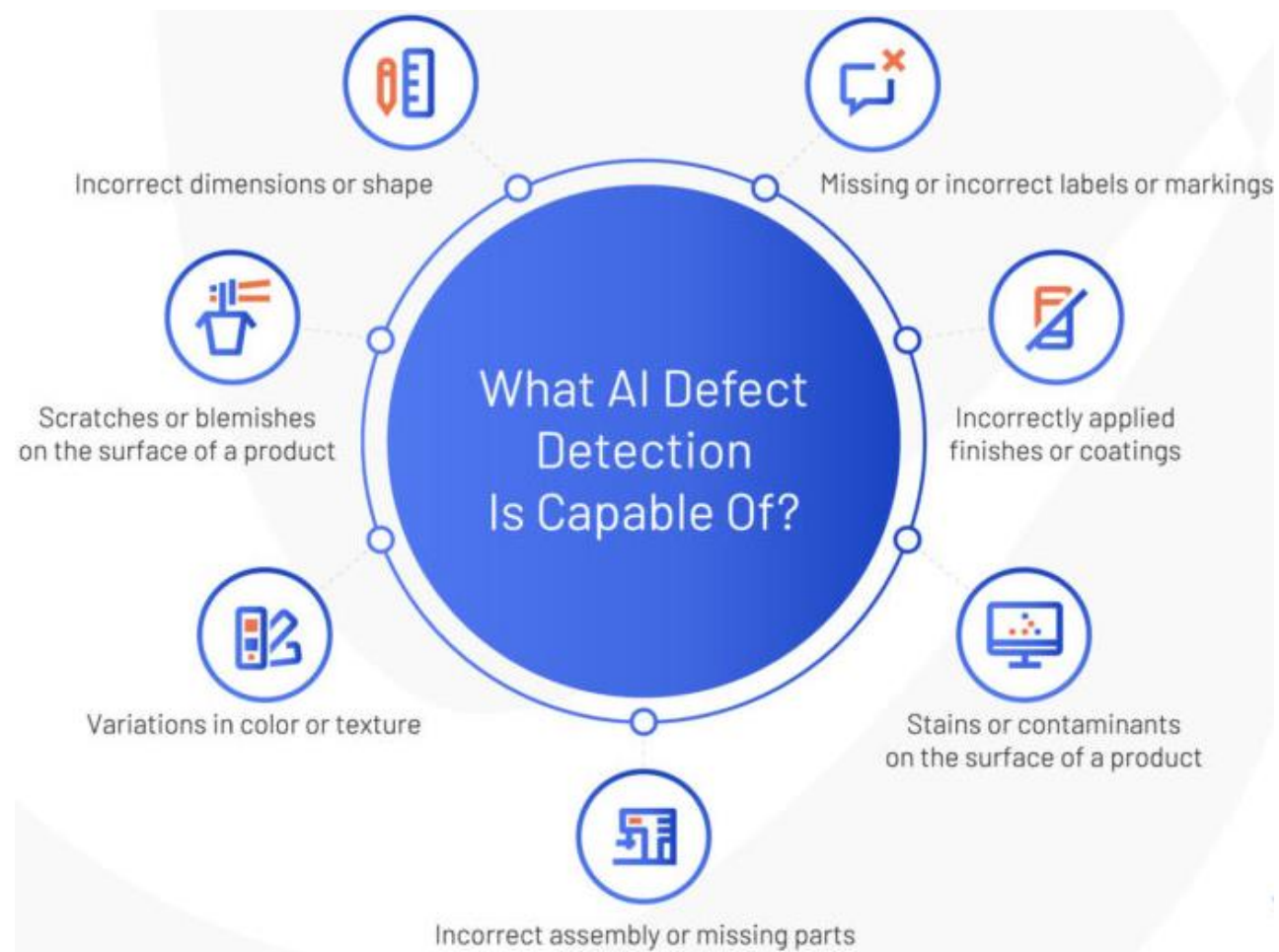
3. IMPROVED DECISION MAKING with Cognitive Computing
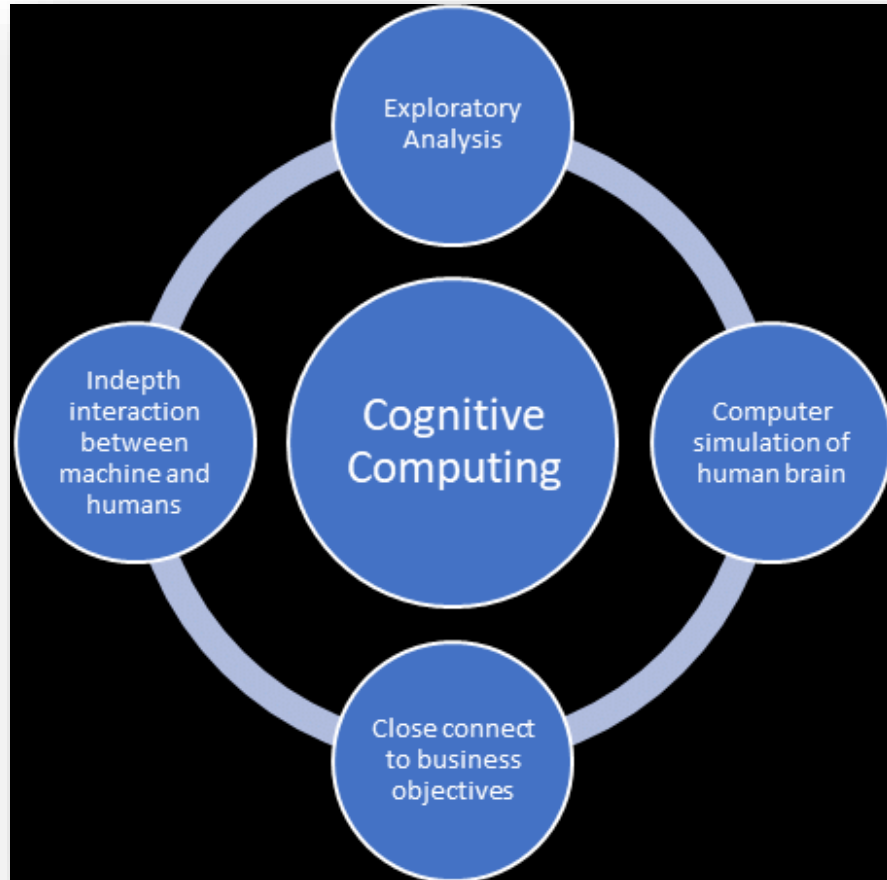
- Combines multiple sources (lab, complaint, supplier data) to suggest decisions

- Generates audit-ready documentation automatically

- Supports human-like reasoning in CAPA root cause analysis

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4. PROCESS CONTROL with Computer Vision

What AI Defect Detection Is Capable Of?

- Incorrect dimensions or shape
- Missing or incorrect labels or markings
- Scratches or blemishes on the surface of a product
- Incorrectly applied finishes or coatings
- Variations in color or texture
- Stains or contaminants on the surface of a product
- Incorrect assembly or missing parts

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5. IMPROVED TRACEABILITY
with AI and Data Intelligence

- Real-time data integration from suppliers, labs, and lines

- Automated label and barcode validation

- Real-time monitoring of ingredients and product flow

- Predictive alerts for traceability gaps

- Instant recall mapping with lot-level accuracy

- Audit-ready documentation with minimal effort

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Summary

- **AI is gaining its application in FSQ and Regulatory Management.**

- **Application of different types of AI will power a modern, proactive food safety and compliance system.**

- **AI becomes not just a technical advantage but a competitive and regulatory necessity.**

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DNV - A TRUSTED VOICE TO TACKLE GLOBAL TRANSFORMATIONS

Thank you

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