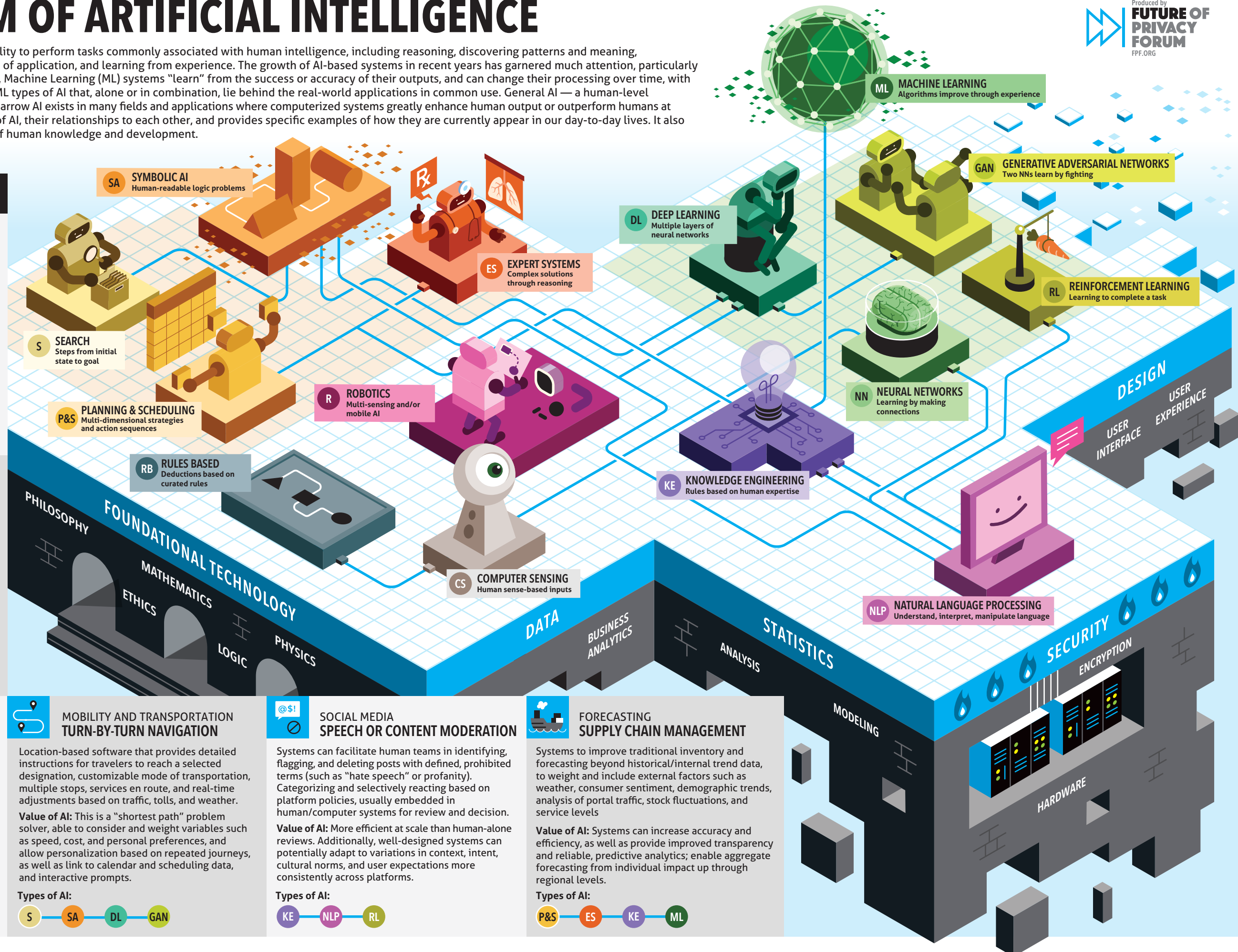# THE SPECTRUM OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is the computerized ability to perform tasks commonly associated with human intelligence, including reasoning, discovering patterns and meaning, generalizing, applying knowledge across spheres of application, and learning from experience. The growth of AI-based systems in recent years has garnered much attention, particularly in the sphere of Machine Learning. A subset of AI, Machine Learning (ML) systems "learn" from the success or accuracy of their outputs, and can change their processing over time, with minimal human intervention. But there are non-ML types of AI that, alone or in combination, lie behind the real-world applications in common use. General AI — a human-level computational system — does not yet exist. But Narrow AI exists in many fields and applications where computerized systems greatly enhance human output or outperform humans at defined tasks. This chart explains the main types of AI, their relationships to each other, and provides specific examples of how they are currently appear in our day-to-day lives. It also demonstrates how AI exists within the timeline of human knowledge and development.

ML MACHINE LEARNING
Algorithms improve through experience

SA SYMBOLIC AI
Human-readable logic problems

GAN GENERATIVE ADVERSARIAL NETWORKS
Two NNs learn by fighting

DL DEEP LEARNING
Multiple layers of neural networks

ES EXPERT SYSTEMS
Complex solutions through reasoning

RL REINFORCEMENT LEARNING
Learning to complete a task

S SEARCH
Steps from initial state to goal

R ROBOTICS
Multi-sensing and/or mobile AI

NN NEURAL NETWORKS
Learning by making connections

P&S PLANNING & SCHEDULING
Multi-dimensional strategies and action sequences

RB RULES BASED
Deductions based on curated rules

KE KNOWLEDGE ENGINEERING
Rules based on human expertise

CS COMPUTER SENSING
Human sense-based inputs

NLP NATURAL LANGUAGE PROCESSING
Understand, interpret, manipulate language

FOUNDATIONAL TECHNOLOGY
PHILOSOPHY
MATHEMATICS
ETHICS
LOGIC
PHYSICS

DATA
BUSINESS ANALYTICS
STATISTICS
ANALYSIS
MODELING

DESIGN
USER INTERFACE
USER EXPERIENCE

SECURITY
ENCRYPTION
HARDWARE

AI USE CASES AND CONTEXTS

FINANCE
TAX COMPLIANCE

A software platform that distills tax laws into a program, creates a personalized decision system, and enables individuals to quickly and accurately file their taxes.

Value of AI: Tax compliance requires complete accuracy. This efficient, interactive system that provides precise and logically connected results allows taxpayers to understand, confirm, and have confidence in the outcome. KE provides transparent and clear explanations.

Types of AI:
KE — NN — NLP

HEALTHCARE
AMBIENT CHARTING

The use of background voice-to-text processing during a patient/medical provider exchange to record those interactions into the patient's chart, along with extracting tasks, symptoms, and recommendations for further action as required.

Value of AI: Medical providers spend significant time documenting, with uneven outputs, as well as difficulty in correlating between providers. Ambient systems encode conversations, target key phrases, and present a summary for provider edit/acceptance.

Types of AI:
SA — DL — NLP

TRACKING
WORKPLACE MONITORING

Embedded systems can monitor physical and digital traffic, data usage, device management, and some employee behaviors for efficiency and security management of time, assets, and resources.

Value of AI: Monitoring enables necessary enforcement of data security policies and protocols. Also, systems can monitor and manage time reporting and project management tools, as well as ensuring appropriate supervision, training, and support, including for remote workers

Types of AI:
RB — CS — NN

MOBILITY AND TRANSPORTATION
TURN-BY-TURN NAVIGATION

Location-based software that provides detailed instructions for travelers to reach a selected designation, customizable mode of transportation, multiple stops, services en route, and real-time adjustments based on traffic, tolls, and weather.

Value of AI: This is a "shortest path" problem solver, able to consider and weight variables such as speed, cost, and personal preferences, and allow personalization based on repeated journeys, as well as link to calendar and scheduling data, and interactive prompts.

Types of AI:
S — SA — DL — GAN

SOCIAL MEDIA
SPEECH OR CONTENT MODERATION

Systems can facilitate human teams in identifying, flagging, and deleting posts with defined, prohibited terms (such as "hate speech" or profanity). Categorizing and selectively reacting based on platform policies, usually embedded in human/computer systems for review and decision.

Value of AI: More efficient at scale than human-alone reviews. Additionally, well-designed systems can potentially adapt to variations in context, intent, cultural norms, and user expectations more consistently across platforms.

Types of AI:
KE — NLP — RL

FORECASTING
SUPPLY CHAIN MANAGEMENT

Systems to improve traditional inventory and forecasting beyond historical/internal trend data, to weight and include external factors such as weather, consumer sentiment, demographic trends, analysis of portal traffic, stock fluctuations, and service levels

Value of AI: Systems can increase accuracy and efficiency, as well as provide improved transparency and reliable, predictive analytics; enable aggregate forecasting from individual impact up through regional levels.

Types of AI:
P&S — ES — KE — ML