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JOURNEY TO 2125

BOOK CLUB
RESOURCES



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**ONE CENTURY,
ONE FAMILY,
RISING TO CHALLENGES**

Book Club Resources

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GLOSSARY

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AGI (Artificial General Intelligence)—Defined sparsely as a computer software AI capable of performing “general intelligent action.” Within the field of philosophy, the “strong AGI” definition is reserved for machines capable of experiencing a subjective conscious experience.

Multiple definitions of AGI have existed from the beginning of the 21st century, including:

- 1) a type of AI that could learn to accomplish any intellectual task that human beings or animals can perform or surpass human capabilities in the majority of economically valuable tasks.
- 2) an intelligence that is not specialized in any particular task, but rather has the ability to outperform humans at nearly any economically valuable work. The key characteristic of AGI is its capacity for generalization and adaptation across a wide range of tasks and domains.
- 3) an intelligence that is broadly intelligent, context-aware, and able to adapt to open-ended environments, in contrast to narrow AI systems that are specialized for specific tasks.
- 4) an intelligence that is capable of running an entire organization on its own without human input. This stage is an AI that can perform better than humans across every task, and requires the abilities to reason, to act independently, to create innovative content unaided, and to possess broad intelligence.

Two primary human fears surround the attainment of AGI by a machine. First is the fear that achieving “strong

AGI” leads to replacement of humans, and minimally the need to address moral and ethical responsibilities to AGIs as fellow sentient or conscious creations. Second is the fear that AGIs will replace most human jobs.

Regarding the second fear, perhaps a useful working definition would be that a **practical economic AGI is a computer AI, deployed with ecological validity in economic settings, that is recognized as consistently performing, unaided by any human, a reasonably complete set of capabilities superior to those possessed by an intelligent 25-year-old educated person.** Capabilities include the ability to learn and adapt goals in a dynamic environment.

The definition for practical economic AGI focuses on the fear of human economic displacement. Such an AGI would fall between definitions for a “Competent AGI” and “Expert AGI” that is deployed (in the form of a robot) with ecological validity for the workplace. (See Google DeepMind “Levels of AGI”—<https://arxiv.org/abs/2311.02462>.) Central to this definition is the realization of an economic AGI that does not require humans even for oversight duties.

AI (Artificial Intelligence)—A simulation of human intelligence processes by a machine, as computational software. The AI refers to the software code, which may reside in cloud servers, PIDsAs, and inside robots as the “brain.”

allbook—A connected reading and learning device that presents text and rich video content. Through the 21st century it became a platform to distribute free educational material.

ARMO (Augmented Reality Map Overlay)—Loaded in a personal communication device such as a PAWN or a CLAIR, the ARMO traces a map onto a display lens interface so the user can follow the map while walking.

autonomous sub (or autonomous underwater vehicle, AUV)—A robot that travels underwater without requiring

continuous input from an operator, AUVs can be used for commercial, research, and military purposes.

autocar or AV (autonomous vehicle)—A vehicle controlled by an AI. Early in the 21st century, also known as a self-driving car.

autohover—Standard aircraft for short-haul transport, controlled by an AI, introduced to replace helicopters in the mid-21st century.

BioBricks—Standardized DNA sequences used in synthetic biology. These parts conform to a restriction-enzyme assembly standard, allowing them to be combined into synthetic biological circuits and incorporated into living cells.

biometric ID tile—An electronic device embedded in the skin above the sternum that authenticates the wearer via combined biological and behavioral biometric data, providing a secure password.

blockchain token—A digital asset that represents ownership rights or utility within a blockchain network. Tokens enable the secure transfer and tracking of digital ownership, empowering individuals to possess and control their digital assets in a decentralized manner.

brain-computer interface (BCI)—A device that allows the human brain to communicate with and control external software or hardware, for example, a PIDA, a computer, or robotic limb.

challenges of the century ahead—Arguably nine of the most difficult challenges facing humanity in the century ahead are:

1. Avoiding widescale nuclear war.
2. Mitigating climate change.

3. Dealing with migration of peoples, especially migration driven by climate change.
4. Dealing with the lack of jobs for people, driven by the proliferation of AI and robotics.
5. Deciding how market economic systems likely need to evolve, and to what new form, driven by the wholesale automation of production.
6. Protecting individual privacy from erosion, as technology permits ubiquitous data collection.
7. Keeping the information commons open and free, yet uncontaminated. In the information age, the question centers on who should control information (private corporations, governments, or individuals), and how to ensure that the choices may not erode individual speech and freedom.
8. Protecting democracy, as information control impedes free public discourse and choice.
9. Deciding and enforcing limits to engineering of the human germline genome.

Note: The portrait of outcomes described herein are not all the best outcomes, but in many cases act as warnings of possible scenarios if decisive action is not taken in time.

Climate Wars—Wars spanning a decade around the turn of the twenty-second century that erupted over diminishing food, water, and arable land resources.

(the) commons and the tragedy of the commons—A wide range of shared assets form the commons. The economic theory of a tragedy was first conceptualized in 1833 by British writer William Forster Lloyd, and is a situation in which individuals with access to a public resource act in their own interest and, in doing so, ultimately deplete the resource.

communication devices—Personal communication devices evolved during the 21st century with multiple generations of devices. Beginning with smart phones, the devices became smaller, smarter, incorporated AI and PIDA

(personal intelligent digital assistant) software, connected seamlessly to the net and other devices, and incorporated new connection approaches such as smart contact lenses replacing screens, and later, corneal implants and embedded chips. The evolution of personal communication devices is given here. Variations of PAWN, HASP, and CLAIR competed during the century, each adding features and shedding weight, leading to ubiquitous 22nd-century versions incorporating embedded biochips and corneal implants.

HASP—An early-21st-century wearable communication device, containing an AI chip. The screenless device operated via voice command, touch, or pinch motion.

PAWN—A wearable communication device, introduced in the 21st century and evolving through several generations, first resembling a pair of 20th-century eyeglasses, becoming less visible and intrusive with each new model.

PAWN incorporated augmented reality (such as an augmented reality map overlay, or ARMO), interaction with the net, and private chat features. User interaction with the device included input via hand movement (e.g., pinch) and output via projection onto lens surfaces and contact lenses. The acronym derives from the features of a Phone, an AI assistant, that is Wearable, and that provides Net access.

CLAIR—Corneal Link and AI Repository—A late 21st-century embedded communication device improving on the earlier PAWN technologies. The device includes a PIDA, uses various input modes and outputs high resolution images to corneal inserts that double as a net display and an augmented reality interface.

creative destruction—A concept in economics that describes a process in which new innovations replace and obsolete older innovations. Identified by Joseph Schumpeter, referring to the linked processes of the accumulation and

annihilation of wealth, characterized as a driving force of capitalism.

credit\$ and dark credit\$—Cryptocurrency using blockchain and rolling anti-quantum decryption technology. Dark credit\$ are not sanctioned by the government but are widely used globally to avoid data collection.

digital twin—A virtual real-time model of a physical object. Digital twins in medicine may assist disease diagnosis and treatment and research. Digital twins in manufacturing systems can be used for monitoring, analyzing, and optimizing the actual system. An AI digital twin that replicates a person might mimic their personality traits, preferences, and decision-making patterns, allowing it to take actions that align with how the person would respond in various situations.

DREADD (Designer Receptors Exclusively Activated by Designer Drug)—Engineered protein used in neuroscience and in chemogenetics to selectively control cellular activity. The technology allows researchers to manipulate specific cell populations in living organisms, and cellular activity can be modulated on-demand by administering the designer drug, allowing for precise temporal control.

futures studies—The systematic study of how people will live in the future. Also known as strategic foresight, the discipline best practices emphasize scientific, rigorous, and precise forecasts with assigned probabilities and time frames, based on holistic research. Within science fiction, a forerunner related idea was demonstrated in Isaac Asimov's *Foundation* Series, where the character Hari Seldon developed a theory of psychohistory, a mathematics of sociology to predict the future of large populations.

Chaos theory in mathematics, which developed beginning about the same time in the 1960s, suggests that large systems are inherently nonlinear. Chaos theory and

complexity science suggest that a theory of psychohistory is impossible. Long time-scale predictions are doomed to failure.

Notwithstanding this apparent fact of the universe, people still try. Rigorous futurists generally limit forecasts to short periods. A dozen examples of predictions that reach beyond the defensible time frames—in the realm of science fiction—are given below.

1. By midcentury, some entirely new personal communication devices to replace smart phones will be adopted by more than half the global population. Communication devices will incorporate chips and sensors embedded in the human body, allowing seamless operation.
2. Within the next one hundred years, significant improvements will appear in transportation. While systems will be integrated with AI and with automated dispatching, general air transport will remain mostly subsonic. Flying cars will not be popular.
3. By midcentury, over three-fourths of all US long-distance trucking will be handled by autonomous trucks, without a human driver in the vehicle. Jobs for truck drivers will remain for another two decades, primarily focused on the “last mile” within cities.
4. By midcentury, developed nations will have instituted individualized AI-driven health systems to monitor health, predict illness and provide care.
5. Before the end of the 21st century, fighter airplanes will be autonomous for the forces of the three leading military powers, and no human fighter pilots will be trained.
6. No AI or robotic system before the year 2075 will reach “practical economic AGI,” or be recognized as consistently performing, unaided by any human, a reasonably complete set of capabilities equivalent to those possessed by an intelligent 25-year-old educated person. While AIs will astonish us with many insights and intelligent responses across many topics, humans will not trust these AIs to independently manage activities as much as they do a typical 25-year-old educated human.

Therefore, the AIs by this definition will not advance beyond human general intelligence.

7. No AI or robotic system will reach “strong AGI” within the next one hundred years.
8. Within a century, pets with bioengineered features will be legal and acceptable, but subject to regulation.
9. Within the 21st century, the game of professional American football will disappear, due to its decline in high school and college sports, driven by concerns about chronic traumatic encephalopathy (CTE) injuries.
10. Within the 21st century, a new US sport will become more popular than baseball and American football.
11. The use of neural implants for personal communication devices will be developed but will not be deployed and used by over 5% of the population by century-end, even in developed countries.
12. Non-invasive neural readers, capable of reading some emotional states, will be deployed by century-end.

hacker—A person skilled in information technology who achieves goals by non-standard means. A **white hat hacker** is an ethical security hacker. A **black hat hacker** is a hacker who violates laws or ethical standards for nefarious purposes.

HDSET—A 21st-century device, worn on the head, that provided mixed reality and an immersive experience. Multiple versions were introduced over decades, that progressively became less intrusive, blending the actual world with the net and VR, to provide communication and information retrieval, 3D entertainment, and productivity benefits.

holo-com—Holographic light field display used as a communication device, allowing 3D videoconferencing.

holo-display—Holographic light field display device used to present 3D manipulable images and information from

the net. Similar to a holo-com, it is primarily used for information retrieval, display and manipulation.

human germline editing—The process of making genetic modifications to human reproductive cells (eggs, sperm, or early embryos) that would be passed on to future generations, which leaves such techniques controversial because of safety risks and the potential for unintended multigenerational effects.

hyperlev—An advanced train using maglev technology, faster than the maglev train.

Levels Acts—Laws enacted in the early 22nd century, developed as the *quid pro quo* for the nationalization of economic production. The Acts set Levels (i.e., from Level 1, the highest, to Level 99, the lowest), which assist in assigning jobs and setting certain restrictions on voting, travel, social interactions, and access to sponsored creative positions.

maglev—A train using magnetic levitation technology, which uses sets of magnets to push the train off the track, and to then move the “floating train” at high speeds to its destination; a predecessor to the faster hyperlev train.

MEDFLOW—A medical unit implanted beneath the skin, typically above the right hip, that monitors health and dispenses drugs into the bloodstream, based on a programmed protocol.

milspec—A military standard used to achieve standardization objectives, including interoperability of equipment.

MAOA gene—A gene that codes for monoamine oxidase A. A point mutation in this gene was associated with several diseases, including Brunner syndrome, and certain psychiatric disorders linked to aggression. The paradigm of behavioral research shifted against linking single genes to complex

behavioral traits, and an earlier characterization of the mutation as indicating a “warrior gene” has been deemed to be incorrect.

Moore’s Law—The observation that the number of transistors on an integrated circuit roughly doubles every two years.

net—Formerly named the Internet, an electronic communication system spanning the Earth and the space bases.

NPC—Non-player character, found in gaming, usually referring to a character controlled by the computer.

PIDA (Personal Intelligent Digital Assistant)—An AI residing in a HASP, PAWN, or CLAIR, allowing verbal input and connection to display devices. The PIDA was personalized based on the user’s personality, usage, and daily habits. Users frequently anthropomorphized their PIDAs, though the units never reached strong AGI during the century.

Princess Kandake—Kandake was the royal title for queens of the ancient kingdom of Kush in east central Africa. One fictionalized legend speaks of a Princess Kandake who opposed Alexander the Great, preventing his conquest of Nubia. She appeared on the battlefield mounted on a war elephant while leading her army, and he turned away, preferring to go to Egypt instead.

quantum computing—A quantum computer is a type of computer that makes use of quantum mechanics to perform operations, which can solve certain problems far more efficiently, and some that classical computers cannot solve.

robots containing an AI:

medbot—A specialized robot augmented with medical devices for surgery and general health care.

copbot—A robot used for police work. Initial designs were introduced in the twenty-second century.

exoskeleton—An external skeleton or support structure worn by a human that enhances strength. While the rig includes AI chips for refining control, the human operator's movements directly control the device.

firebot—A robot used to fight fires, used in situations considered dangerous for humans, and often dropped into forest fires via aircraft.

slim drip—Weight reduction and control medication, typically microdosed via a MEDFLOW unit.

smart object—A digital representation of a physical entity that is enhanced with computing capabilities, sensors, and connectivity. Part of the Internet of Things (IoT) ecosystem, they can bridge the gap between digital applications and the physical world. Smart objects enhance the interaction with not only people but with other smart objects.

synjug—A synthetic biology jug, which is a biodegradable container used to hold various liquids.

synpsychs—Synthetic biology psychotropics and other mind-altering pharmacology.

synthetic biology—A field of science that focuses on living systems and organisms, and it applies engineering principles to develop new biological parts, devices, and systems.

Three Laws of Robotics—Introduced in Isaac Asimov's *Robot* series, the Three Laws are:

Law 1: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Law 2: A robot must obey the orders given it by human beings, except where such orders would conflict with the First Law.

Law 3: A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

Addendum (added in the last century): A robot must protect other robots' survival, so long as such protection does not violate the first three laws.

von Mises's economic calculation problem—The question of how individual subjective values are translated into the objective information necessary for rational allocation of resources in society. Economist Ludwig Heinrich Edler von Mises (1881–1973) described the nature of the price system under capitalism, arguing that economic calculation is only possible by information provided through market prices.

Wikipedia—A multilingual online encyclopedia created and maintained as an open collaboration project. Created in the early twenty-first century by Jimmy Wales and Larry Sanger, the net resource continues as a trusted source of information, miraculously avoiding censorship and the politicization that affected many other information sources. Wikipedia was renamed Netpedia circa 2125. Many definitions therein have become the default standard summaries of certain information. The original Wikipedia entries in this vidsnap include portions of those for AUV, creative destruction, hacker, MAOA gene, smart object, synthetic biology, Three Laws of Robotics, human germline engineering, Moore's Law, and von Mises's economic calculation problem.

Journey to 2125 is the prequel to another book in this two-book series. Learn more about the other book, [*Unfettered Journey*](#).

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