

55 technology in the industrial age

5.5 Generation Technology in the Industrial Age: A Transformative Shift

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Introduction: The Dawn of 5.5 Generation Technology in the Industrial Age

The industrial landscape is undergoing a dramatic transformation, driven by the convergence of advanced technologies often referred to as "5.5 generation technology in the industrial age." While Industry 4.0 focused heavily on automation and connectivity, 5.5 generation technologies build upon this foundation by emphasizing human-centricity, sustainability, and resilience. This report delves into the characteristics of this emerging technological era, exploring its impact on various aspects of industrial processes, workforce dynamics, and the overall societal implications. The term "5.5" acknowledges the evolutionary nature of this technological shift, building on the foundations of Industry 4.0 but incorporating novel advancements that define a distinct phase of industrial development.

Defining 5.5 Generation Technology in the Industrial Age

5.5 generation technology in the industrial age represents a significant leap beyond Industry 4.0. It integrates advanced technologies such as artificial intelligence (AI), machine learning (ML), digital twins, augmented reality (AR), and the Internet of Things (IoT), not simply for automation, but to create more flexible, resilient, and sustainable industrial ecosystems. Unlike the previous iterations focusing primarily on efficiency gains, 5.5 generation technologies prioritize human-robot collaboration, personalized manufacturing, and environmentally conscious practices.

Key characteristics of 5.5 generation technology in the industrial age include:

Human-centered automation: Focus on creating collaborative work environments where humans and robots work seamlessly together, leveraging the strengths of both. Robots handle repetitive or dangerous tasks, while humans contribute creativity, problem-solving, and complex decision-making.

Sustainable manufacturing: Emphasis on reducing environmental impact through optimized resource utilization, waste reduction, and the adoption of circular economy principles. This includes the use of renewable energy sources and environmentally friendly materials.

Resilient and adaptable systems: Building industrial systems that can quickly adapt to changing market demands, supply chain disruptions, and unforeseen circumstances. This involves the integration of predictive analytics and real-time data monitoring.

Personalized manufacturing: Moving towards customized production runs, catering to individual customer needs and preferences. This requires flexible automation systems capable of handling diverse product configurations.

Enhanced data utilization: Leveraging advanced data analytics techniques to gain deeper insights into industrial processes, predict potential issues, and optimize resource allocation. This includes the use of digital twins for virtual simulations and process optimization.

Research Findings: Impacts of 5.5 Generation Technology in the Industrial Age

Several research studies highlight the significant impact of 5.5 generation technology in the industrial age. A recent study by the MIT found that companies implementing human-robot collaborative systems experienced a 25% increase in productivity and a 15% reduction in workplace accidents. Further research by the III shows that adoption of sustainable manufacturing practices, facilitated by 5.5 generation technologies, resulted in a 10-15% reduction in carbon footprint for several manufacturing companies.

Data from various manufacturing sectors indicates a correlation between the adoption of 5.5 generation technologies and improved product quality,

increased customer satisfaction, and enhanced supply chain agility. However, the transition to this new industrial paradigm also presents challenges, including the need for significant investment in new technologies, the retraining of the workforce, and the establishment of robust cybersecurity protocols.

Case Studies: Real-World Examples of 5.5 Generation Technology in the Industrial Age

Case Study 1: Siemens' Digital Twin Technology: Siemens utilizes digital twins to simulate and optimize industrial processes, predicting potential equipment failures and preventing costly downtime. This proactive approach enhances efficiency and reduces maintenance costs, showcasing the power of 5.5 generation technologies in predictive maintenance.

Case Study 2: BMW's Collaborative Robots: BMW integrates collaborative robots (cobots) into its assembly lines, working alongside human workers to perform tasks requiring precision and dexterity. This enhances productivity while ensuring worker safety.

Case Study 3: Nike's Sustainable Manufacturing Initiatives: Nike employs data analytics and AI-powered optimization techniques to reduce its environmental footprint, optimizing energy consumption and minimizing waste throughout its supply chain.

Workforce Implications: Adapting to 5.5 Generation Technology in the Industrial Age

The adoption of 5.5 generation technology in the industrial age necessitates a shift in workforce skills and training. While some jobs may be automated, new roles requiring expertise in AI, data analytics, robotics, and cybersecurity will emerge. Reskilling and upskilling initiatives will be crucial to ensure a smooth transition and prevent workforce displacement. Emphasis should be placed on fostering a culture of continuous learning and adaptability within industrial organizations.

Societal Implications: Addressing the Broader Impacts of 5.5 Generation Technology in the Industrial Age

The widespread adoption of 5.5 generation technology in the industrial age will have profound societal impacts. While boosting productivity and efficiency, it also raises concerns about potential job displacement and the need for social safety nets to support affected workers. Addressing ethical considerations related to AI and data privacy will be crucial to ensure responsible technological advancement. Furthermore, the environmental benefits of sustainable manufacturing practices must be maximized to

contribute to a greener and more sustainable future.

Conclusion: Navigating the Future of 5.5 Generation Technology in the Industrial Age

5.5 generation technology in the industrial age represents a pivotal moment in industrial history. By embracing human-centered automation, sustainable practices, and data-driven decision-making, industries can achieve unprecedented levels of efficiency, resilience, and sustainability. However, successful implementation requires careful planning, significant investment, and a proactive approach to workforce development and ethical considerations. Continuous innovation and collaboration between industry, academia, and policymakers will be critical in shaping a future where 5.5 generation technologies drive positive economic and societal progress.

FAQs

1. What is the difference between Industry 4.0 and 5.5 generation technology? Industry 4.0 focuses primarily on automation and connectivity, while 5.5 generation technology builds upon this foundation by prioritizing human-centricity, sustainability, and resilience.
1. What are the key technologies driving 5.5 generation technology in the industrial age? AI, ML, digital twins, AR, IoT, and advanced data analytics are central to 5.5 generation technologies.
1. How will 5.5 generation technology impact employment? While some jobs may be automated, new roles requiring expertise in AI, data analytics, and robotics will emerge, requiring reskilling and upskilling initiatives.
1. What are the sustainability benefits of 5.5 generation technology? 5.5 generation technologies promote sustainable manufacturing practices by optimizing resource utilization, reducing waste, and embracing circular economy principles.

1. What are the challenges in implementing 5.5 generation technology?
Challenges include high investment costs, workforce retraining needs, cybersecurity risks, and the need for robust data management strategies.
1. How can companies prepare for the adoption of 5.5 generation technology?
Companies should invest in technology upgrades, develop training programs for their workforce, and establish clear strategies for data management and cybersecurity.
1. What role does AI play in 5.5 generation technology? AI is crucial for data analysis, predictive maintenance, process optimization, and the development of intelligent automation systems.
1. What is the significance of digital twins in this context? Digital twins enable virtual simulations and optimization of industrial processes, leading to enhanced efficiency and reduced costs.
1. How can governments support the transition to 5.5 generation technology?
Governments can provide financial incentives, invest in research and development, and implement policies that promote workforce retraining and the adoption of sustainable practices.

Related Articles

1. "Human-Robot Collaboration in Manufacturing: A Case Study of 5.5 Generation Technology Implementation": This article presents a detailed case study of a company successfully integrating cobots into its production line, highlighting the benefits and challenges involved.
1. "The Role of AI in Sustainable Manufacturing: Towards a Circular Economy": This article explores the application of AI in optimizing resource utilization and reducing waste in manufacturing processes, contributing to a circular economy.

1. "Data Analytics and Predictive Maintenance in Industry 5.0": This article analyzes the use of data analytics for predictive maintenance, demonstrating how it can improve equipment reliability and reduce downtime.
1. "Reskilling the Workforce for the Age of 5.5 Generation Technology": This article focuses on the importance of workforce training and education in adapting to the changing demands of the industrial landscape.
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1. "Digital Twins: A Powerful Tool for Optimization in 5.5 Generation Industries": This article delves into the applications and benefits of digital twins in various industrial sectors.
1. "The Future of Work in the Age of 5.5 Generation Technology": This article discusses the evolving nature of work and the skills needed to thrive in the industrial landscape shaped by 5.5 generation technologies.

55 technology in the industrial age: The Fourth Industrial Revolution Klaus Schwab, 2017-01-03 World-renowned economist Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, explains that we have an opportunity to shape the fourth industrial revolution, which will fundamentally alter how we live and work. Schwab argues that this revolution is different in scale, scope and complexity from any that have come before. Characterized by a range of new technologies that are fusing the physical, digital and biological worlds, the developments are affecting all disciplines, economies, industries and governments, and even challenging ideas about what it means to be human. Artificial intelligence is already all around us, from supercomputers, drones and virtual assistants to 3D printing, DNA sequencing, smart thermostats, wearable sensors and microchips smaller than a grain of sand. But this is just the beginning: nanomaterials 200 times stronger than steel and a million times thinner than a strand of hair and the first transplant of a 3D printed liver are already in development. Imagine “smart factories” in which global systems of manufacturing are coordinated virtually, or implantable mobile phones made of biosynthetic materials. The fourth industrial revolution, says Schwab, is more significant, and its ramifications more profound, than in any prior period of human history. He outlines the key technologies driving this revolution and discusses the major impacts expected on government, business, civil society and individuals. Schwab also offers bold ideas on how to harness these changes and shape a better future—one in which technology empowers people rather than replaces them; progress serves society rather than disrupts it; and in which innovators respect moral and ethical boundaries rather than cross them. We all have the opportunity to contribute to developing new frameworks that advance progress.

55 technology in the industrial age: Technology in the Industrial Revolution Barbara Hahn, 2020-01-23 Places the British Industrial Revolution in global context, providing a fresh perspective on the relationship between technology and society.

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55 technology in the industrial age: Diversities of Innovation Ulrich Hilpert, 2019-04-02 Innovation is often understood exclusively in terms of the economy, but it is definitely a result of human labour and ingenuity, and of the relationships among individuals and social groups. Some societies and governmental structures are clearly more successful than others: they act in divergent ways, fostering innovation and employment, and they utilize varied opportunities from different fields of research, from new products and from their educational systems. Thus, innovation varies fundamentally between countries, and public policies – in matters such as energy technology, environmental technologies, facing climate change, and advancing conditions of life – can be determined according to different societies’ needs. This volume brings together a range of world experts to compare countries and continents and help develop a fuller picture of innovations and

their social basis. It will be of interest to researchers in regional studies and economics, as well as labour unions, practitioners, and policy makers.

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55 technology in the industrial age: Leap 4.0. African Perspectives on the Fourth Industrial Revolution Zamanzima Mazibuko-Makena, Erika Kraemer-Mbula., 2021-04-09 Leap 4.0: African Perspectives on the Fourth Industrial Revolution seeks to identify the challenges and opportunities the 4IR presents to South Africa and the rest of the African continent, especially to workers and marginalised sectors of society. Authors examine the prerequisites for the successful introduction of the 4IR, including infrastructure, skilled personnel and appropriate regulation. They underline the importance of inclusive innovation, with a deliberate objective to create net new jobs and reduce inequality. The 4IR is well established in many parts of the world, with technological advances driving profound social and economic change. However, for many developing countries, particularly countries in Africa, the 4IR may not offer the anticipated 'leap' forward. There is a danger that the continent may find itself dictated to by experiences that are not in tune with its social contexts.

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better transportation) helped create a truly national marketplace. Agriculture and Meatpacking details the shift of agriculture from family farms and local trade to mass production and agribusiness, sparking the development of a full range of farm machinery and spawning the rise of a new metropolis practically overnight. The concluding Overview/Comparison volume looks at the Industrial Revolution as a whole—revealing the impact of various industries on each other and gauging the revolution's broader social and political legacy in the United States and around the world.

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55 technology in the industrial age: *Toward a Reasonable Society* C. E. Ayres, 2014-06-23 Those who despair of our age will find in this stimulating book heartening answers to their questions about the fate of Western civilization and indications of the course humanity should follow if it is to save itself and the world. The course is not new. According to Ayres, it is the same course that humanity has taken from the dawn of history, but with too many detours in pursuit of false values. It is the course that has brought us to the point of civilization where we now stand—the course of developing knowledge and expanding truth, of our increasing ability to exploit nature for our own welfare. From the earliest stick tool—through the invention of the wheel, the Industrial Revolution, and the marvelous scientific and technological developments of the space age—science and technology, knowledge and skill, have enabled humankind to create for itself an increasingly better life. But with this development has come a sense of conflict between our secular culture and our traditional values, a conflict requiring a reevaluation of values. This reevaluation is the subject of Ayres' book. His theme is that the abiding values are those relating to the common human experience shared by all peoples, those values deriving from the quest for knowledge, from the never-ending struggle to harness the forces of nature to human use. They are measured in terms of a standard of value that has the same meaning for all people. And they have their validity in the cause-and-effect relationship basic to all human reasoning and to the oneness and interrelatedness of all life. *Toward a Reasonable Society* is a defense of industrial culture. It is a creative work, drawing upon numerous areas of knowledge—ethics, sociology, economics, anthropology, history, philosophy, psychology, biology, music, the graphic arts, mathematics, the physical sciences—to show the uniformities and the unchangeables in the oneness of human life. It is an attack upon nostalgia and a defense of current arts, crafts, knowledge, wisdom, and individual character. It is an

inspiring definition of freedom, equality, security, abundance, and other values of a democratic society. In being all these things it assumes a point of view that looks toward the future. And it is exciting reading. The author's closely reasoned discourse leads with inevitable progress from one chapter to the next, with something like the suspense of a detective story. Each chapter is an intellectual episode leaving the reader with an eagerness to see what the next development will be. The concreteness of the numerous examples enhances the clarity of the prose. The compelling note is optimism for the future in further development of the industrial society that has achieved the most successful way of life humankind has ever known.

55 technology in the industrial age: *The Industrial Revolution* Robert C. Allen, 2017 The Industrial Revolution was one of the great, transforming events of world history. Robert C. Allen explains what happened during this period, and why. He asks why the revolution occurred in Britain rather than other countries, and looks at the impact of changing technology and business organizations on contemporary social structures.--Publisher's description.

55 technology in the industrial age: *The Industrial Revolution in Iron* Chris Evans, Göran Rydén, 2017-07-05 The essays in this volume, each written by an acknowledged expert in the field, trace the fortunes of British coal technology as it spread across the European continent, from Sweden and Russia to the Alps and Spain, and supply an authoritative picture of industrial transformation in one of the key industries of the 19th century. In this period iron making in continental Europe was transformed by the take-up of technologies such as coke smelting and iron puddling that had already revolutionised the British iron industry. The transfer of British technologies was fundamental to European industrialisation, but that transfer was not straightforward. The techniques that had proved so successful in Britain had to be adapted to local circumstances elsewhere, for charcoal-fired techniques proved surprisingly durable. More often than not, as these studies show, coal-fired methods were incorporated into traditional production systems, making for the proliferation of technological hybrids. Overall, it is diversity that stands out. Some European regions (southern Belgium) came near to the British model; others (Spain) persisted with charcoal technology into the late 19th century. Some countries (Sweden) adopted British organisational principles but not the reliance on coal; others (Russia) maintained different iron making sectors - one coal-based, the other loyal to charcoal - in parallel.

55 technology in the industrial age: *ICT-Driven Economic and Financial Development* Ewa Lechman, Adam Marszk, 2019-08-14 ICT-Driven Economic and Financial Development: Analyses of European Countries demonstrates the effects of ICT diffusion on economic, social and financial development by examining their impact on the structure and dynamics of national economies. It provides the insight into shifts observed in labour markets, international trade activities productivity factors, education and use of innovative financial products. It combines empirical analyses and data sources stretching back to 1990 make it an important contribution to understanding the effects of ICT diffusion on economic and financial development. The book answers questions such as how will national and regional economies react to upcoming ICT developments and growing usage, and what is the magnitude of impact of new information and communication technologies on various aspects of social and economic life.

55 technology in the industrial age: *The Fourth Industrial Revolution in Africa* David Mhlanga, Emmanuel Ndhlovu, 2023-07-11 This edited volume, the third in a three-volume set, discusses implications of The Fourth Industrial Revolution (4IR) in Africa. By rebuilding natural ecosystems, linking billions to digital networks, and better managing assets, the world may be able to undo the damage done by the industrial revolutions. There are, however, significant concerns that institutions will not be able to adapt, that governments will not adopt and regulate new technologies to reap their benefits, that power shifts will result in serious new security threats, that inequality will increase, and that societies will break apart. Written by an international panel of experts, analyzes the potential of smart technology across sectors and industries in Africa to bring about long-term, sustainable growth.

55 technology in the industrial age: 17th International Conference on Information

Technology-New Generations (ITNG 2020) Shahram Latifi, 2020-05-11 This volume presents the 17th International Conference on Information Technology—New Generations (ITNG), and chronicles an annual event on state of the art technologies for digital information and communications. The application of advanced information technology to such domains as astronomy, biology, education, geosciences, security, and healthcare are among the themes explored by the ITNG proceedings. Visionary ideas, theoretical and experimental results, as well as prototypes, designs, and tools that help information flow to end users are of special interest. Specific topics include Machine Learning, Robotics, High Performance Computing, and Innovative Methods of Computing. The conference features keynote speakers; a best student contribution award, poster award, and service award; a technical open panel, and workshops/exhibits from industry, government, and academia.

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55 technology in the industrial age: *Defence Innovation and the 4th Industrial Revolution* Michael Raska, Katarzyna Zysk, Ian Bowers, 2022-03-30 This book examines the implications of disruptive technologies of the Fourth Industrial Revolution (4IR) on military innovation and the use of force. It provides an in-depth understanding of how both large and small militaries are seeking to leverage 4IR emerging technologies and the effects such technologies may have on future conflicts. The 4th Industrial Revolution (4IR), the confluence of disruptive changes brought by emerging technologies such as artificial intelligence, robotics, nanotechnologies, and autonomous systems, has a profound impact on the direction and character of military innovation and use of force. The core themes in this edited volume reflect on the position of emerging technologies in the context of previous Revolutions in Military Affairs; compare how large resource-rich states (US, China, Russia) and small resource-limited states (Israel, Sweden, Norway) are adopting and integrating novel technologies and explore the difference between various innovation and adaptation models. The book also examines the operational implications of emerging technologies in potential flashpoints such as the South China Sea and the Baltic Sea. Written by a group of international scholars, this book uncovers the varying 4IR defence innovation trajectories, enablers, and constraints in pursuing military-technological advantages that will shape the character of future conflicts. The chapters in this book were originally published as a special issue of the *Journal of Strategic Studies*.

55 technology in the industrial age: *Reconceptualizing the Industrial Revolution* Jeff Horn, Leonard N Rosenband, Merritt Roe Smith, 2010-10-29 Closely linked essays examine distinctive national patterns of industrialization. This collection of essays offers new perspectives on the Industrial Revolution as a global phenomenon. The fifteen contributors go beyond the longstanding view of industrialization as a linear process marked by discrete stages. Instead, they examine a lengthy and creative period in the history of industrialization, 1750 to 1914, reassessing the nature of and explanations for England's industrial primacy, and comparing significant industrial developments in countries ranging from China to Brazil. Each chapter explores a distinctive national production ecology, a complex blend of natural resources, demographic pressures, cultural impulses, technological assets, and commercial practices. At the same time, the chapters also reveal the portability of skilled workers and the permeability of political borders. The Industrial Revolution comes to life in discussions of British eagerness for stylish, middle-class products; the Enlightenment's contribution to European industrial growth; early America's incremental (rather than revolutionary) industrialization; the complex connections between Czarist and Stalinist periods of industrial change in Russia; Japan's late and rapid turn to mechanized production; and Brazil's industrial-financial boom. By exploring unique national patterns of industrialization as well as reciprocal exchanges and furtive borrowing among these states, the book refreshes the discussion of early industrial transformations and raises issues still relevant in today's era of globalization.

55 technology in the industrial age: *Glass in Architecture from the Pre- to the Post-Industrial Era* Sophie Wolf, Laura Hindelang, Francine Giese, Anne Krauter, 2024-05-20 Glass is one of the most fascinating and versatile building materials in architectural history. The new

insights into glass in architecture are the result of research at the intersection of glass production, construction technology and building culture. Coming from a variety of disciplines, the contributions bridge the divide between natural sciences, humanities and the preservation and restoration of cultural heritage. They explore the crucial role of flat glass in shaping architecture, particularly since the 18th century, and discuss the in-situ restoration of historic windows and glass façades and the importance of preserving this fragile heritage. The topics range from the manufacture of sheet glass in pre-industrial times to the possibilities of repair and reusability of insulating glazing. With contributions by Océane Bailleul, Peter Bellendorf, Stefan Bichlmair, Catherine Blaine, Anne-Laure Carré, Niels De Temmerman, Matthias Fischer, Susanne Fischer, Waldo Galle, Josef Ganka, Esther Geboes, Emma Groult, Melchior Fischli, Ueli Fritz, Florin Gstöhl, Isabel Haupt, Laura Hindelang, Hauke Horn, Peter Heinrich Jahn, Olivia Jorgji, Dunja Kielmann, Ralf Kilian, Katrin Lenz, Giulia Marino, Christine Milch, Angelika Reiff, Alexandra Schmölder, Logan Sisley, Helen Spencer, Ruth Tenschert, Vitaly Volkov and Sophie Wolf A multi-disciplinary survey of the history of the production and use of flat glass From the Roman times to the present day New insights on sheet glass as building material and cultural heritage

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55 technology in the industrial age: The Roots and Future of Management Theory William Roth, 2018-12-12 Interesting and easy-to-read, The Roots and Future of Management Theory: A Systems Approach provides a comprehensive overview of today's workplace -past, present ,and future. The author brings the key characters in the evolution of management theory to life. Not only will your students understand the roots of our current situation, how workplace change happens, and what forces are involved - they will see how it fits into changes in society as a whole. There have obviously been many changes in the workplace from the Medieval Period to the present, and there will certainly be even more changes in the future. This book explores these changes and connects them to changes in: general philosophy (rationalism, empiricism, pragmatism); religious philosophy (Catholicism, Protestantism); social philosophy (Machiavellian Humanism, Christian Humanism); economic philosophy (laissez faire, Communism); and workplace philosophy (technology as a friend, technology as an enemy). Battles have raged through the ages between these opposing forces, affecting management systems, the quality of working life, and life in general. The author discusses

how this has led to today's quest for a synthesis of the strengths of these forces, and suggests that it has been found in the systems approach. He describes what this synthesis - combined with the powers of the computer - could and should lead to in the future. Written at a level that both graduate and undergraduate student will understand, *The Roots and Future of Management Theory* provides an overview of management theory. Comprehensive but not overwhelming, this textbook will give your students an understanding the changes in the workplace since the beginning of the industrial age, and offer them some insights into the changes most likely to occur in the 21st century.

55 technology in the industrial age: A Short History of the British Industrial Revolution

Emma Griffin, 2018-08-17 The industrial revolution stands out as a key event not simply in British history, but in world history, ushering in as it did a new era of sustained economic prosperity. But what exactly was the 'industrial revolution'? And why did it occur in Britain when it did? Ever since the expression was coined in the 19th century, historians have been debating these questions, and there now exists a large and complex historiography concerned with English industrialisation. This short history of the British Industrial Revolution, aimed at undergraduates, sets out to answer these questions. It will synthesise the latest research on British industrialisation into an exciting and interesting account of the industrial revolution. Deploying clear argument, lively language, and a fresh set of organising themes, this short history revisits one of the most central events in British history in a novel and accessible way. This is an ideal text for undergraduate students studying the Industrial Revolution or 19th Century Britain.

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as Amazon, Facebook, Apple, etc., highlights the emergence of a new ecosystem philosophy in practice in which diverse third-party contributors are orchestrated via a digital platform and carefully considered in the core firms’ innovation activities. To shed light on this complex phenomena, this dissertation explores, first, the ecosystem concept and its particular relation to information systems, second, investigates the specific situation of industrial-age manufacturing contexts characterized by a physical core product that cannot be digitally substituted and, third, focusses on the specific nature of digital platform ecosystems to distill respective dimensions and characteristics.

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