

The Evolution Of Useful Things How Everyday Artifa Study Guide

The evolution of useful things how everyday artifacts

Understanding the development of everyday artifacts offers a fascinating glimpse into human ingenuity, adaptation, and technological progress. These items, often overlooked, have played a crucial role in shaping modern life, making daily tasks more efficient, comfortable, and accessible. Tracing their evolution reveals not only innovations in materials and design but also cultural shifts and societal needs that have driven their transformation over centuries.

Historical Overview of Everyday Artifacts

The history of useful objects reflects the progression of human civilization. From primitive tools to sophisticated gadgets, each era has contributed unique innovations that address the challenges faced by societies at the time.

Ancient Civilizations and Early Tools

- Stone Age Tools: Early humans crafted simple stone tools for hunting, cutting, and scraping.
- Bronze and Iron Age Innovations: The introduction of metalworking led to more durable and functional artifacts such as knives, spears, and cooking utensils.
- Basic Household Items: Items like pottery, woven baskets, and simple furniture began to emerge, improving daily life.

Medieval and Renaissance Periods

- Advancements in Craftsmanship: Better metallurgy and craftsmanship resulted in more refined tools and household items.
- Invention of Paper and Printing: Facilitated the dissemination of knowledge, leading to innovations in design and manufacturing.
- Introduction of Mechanical Devices: Early clocks, water mills, and simple machines started to appear.

Industrial Revolution and Modern Era

- Mass Production: The advent of factories revolutionized the production of household items, making them more affordable and widely available.
- Technological Innovations: The development of electricity, plastics, and electronics transformed everyday artifacts.
- Smart Technology: Today, artifacts such as smart thermostats, robotic vacuum cleaners, and wearable devices integrate seamlessly into daily routines.

The Evolution of Common Everyday Artifacts

Examining specific categories of artifacts illustrates how innovation has transformed their functionality and design.

Kitchenware and Cooking Devices

- Ancient Tools: Handheld stones, rudimentary fire pits.
- Evolution Over Time: Introduction of metal utensils, pressure cookers, microwave ovens, and smart kitchen appliances.
- Modern Innovations: IoT-enabled devices that allow remote control, automated cooking, and energy efficiency.

Personal Care Items

- Early Implements: Bones and shells used for grooming.
- Development: Comb teeth, razors, and toothbrushes made from metal and plastic.
- Current Trends: Electric shavers, electric toothbrushes, and skincare gadgets with advanced features.

Transportation and Mobility Artifacts

- Initial Modes: Walking, animal-drawn carts.
- Progression: The wheel, bicycles, automobiles, and airplanes.
- Contemporary Devices: Electric scooters, hoverboards, and self-driving cars contributing to efficient personal mobility.

Communication Devices

- Ancient Means: Smoke signals, carrier pigeons.

- Evolution: Telegraphs, telephones, radios, and televisions.
- Modern Era: Smartphones, tablets, and wearable communication devices enabling instant connectivity.

Home Comfort and Security Devices

- Early Solutions: Simple locks, basic lighting.
- Advancements: Electric lighting, alarm systems, and CCTV cameras.
- Smart Home Technology: Voice-controlled assistants, smart locks, and integrated security systems enhancing safety and convenience.

Materials and Design Innovations Driving Change

The evolution of everyday artifacts is heavily influenced by advancements in materials and design principles.

Materials Innovation

- Metals: Transition from bronze to stainless steel for durability.
- Plastics: Revolutionized manufacturing, enabling lightweight, inexpensive, and versatile products.
- Composite Materials: Enhanced strength and flexibility in tools and gadgets.
- Smart Materials: Responsive to environmental stimuli, used in modern electronics and clothing.

Design Principles and Ergonomics

- User-Centered Design: Focused on ease of use, safety, and aesthetics.
- Minimalism: Simplified forms for better usability and maintenance.
- Modular Design: Components that can be easily replaced or upgraded.
- Sustainable Design: Emphasis on eco-friendliness and resource efficiency.

Impact of Technology on Everyday Artifacts

Technology has been the primary driver of change, making artifacts smarter, more efficient, and more integrated into our lifestyles.

Automation and Smart Technology

- Automation: Devices perform tasks automatically, reducing human effort.
- Connectivity: Internet of Things (IoT) connects devices for seamless operation.
- Data-Driven Optimization: Artifacts learn user habits and optimize functionality.

Artificial Intelligence and Machine Learning

- Personalization: Devices adapt to individual preferences.
- Predictive Maintenance: Anticipate and address issues proactively.
- Enhanced User Experience: Intuitive interfaces and voice control.

3D Printing and Customization

- Rapid Prototyping: Accelerates development and testing.
- Customization: Allows tailored artifacts to specific user needs.
- Decentralized Production: Empowers consumers and small manufacturers.

Future Trends in the Evolution of Everyday Artifacts

Looking ahead, several trends indicate how useful objects will continue to evolve.

Integration of Artificial Intelligence

- Smarter, more autonomous devices that anticipate needs and act proactively.

Emphasis on Sustainability

- Eco-friendly materials and energy-efficient designs.
- Circular economy approaches encouraging reuse and recycling.

Enhanced Connectivity and Wearability

- Wearable tech with health monitoring.
- Embedded sensors in everyday objects for better data collection.

Personalization and Modular Design

- Customizable artifacts tailored to individual preferences.
- Modular components for easy upgrades and repairs.

Conclusion: The Continuous Journey of Innovation

The evolution of useful things and everyday artifacts exemplifies human creativity and adaptability. From primitive stone tools to sophisticated smart devices, each innovation has aimed to improve quality of life, safety, and efficiency. As technology continues to advance, future artifacts will likely become more integrated, sustainable, and personalized, further transforming daily routines. Understanding this evolution not only highlights our past achievements but also inspires future innovations that will shape the way we live, work, and connect.

The Evolution of Useful Things: How Everyday Artifacts Reflect Human Ingenuity and Cultural Shift

Throughout human history, the objects we create—our tools, utensils, furniture, and everyday artifacts—serve as tangible reflections of our ingenuity, cultural values, and technological progress. The evolution of useful things is not merely a chronicle of technological advancement but also a story of adaptation, innovation, and aesthetic sensibilities that shape daily life across civilizations. This in-depth review explores how everyday artifacts have transformed over millennia, emphasizing their functional improvements, cultural significance, and the seamless integration of art and utility.

Origins of Useful Artifacts: From Prehistory to Early Civilizations

The earliest useful objects date back to prehistoric times, where survival depended heavily on the creation of tools for hunting, gathering, and shelter. These artifacts, often crafted from stone, bone, or wood, laid the foundation for human innovation.

Primitive Tools and Their Functional Roots

- Stone Tools: The Oldowan tools (~2.5 million years ago) exemplify the earliest known manufactured objects, primarily used for cutting and processing food.
- Bone and Antler Implements: Used for sewing, digging, and hunting, showcasing resourcefulness in utilizing available materials.
- Fire-Starting Devices: Such as friction-based methods, marking a significant technological leap in controlling environment and food preservation.

From Utility to Cultural Identity

As civilizations emerged, artifacts began to reflect not just utility but also societal values and aesthetics:

- Pottery from ancient Mesopotamia and Egypt, blending function with decoration.
- Jewelry and ornamentation, signifying status and identity.
- Tools with elaborate craftsmanship indicating social hierarchies.

The Middle Ages and Renaissance: Refinement of Craftsmanship

During these periods, the production of everyday artifacts became more sophisticated, reflecting advances in metallurgy, textile production, and artistic techniques.

Improvements in Material and Manufacturing

- Metalwork: Introduction of iron and steel improved durability and functionality of tools.
- Textiles and Clothing: Spinning and weaving technologies led to more comfortable and durable garments.
- Household Items: The development of locks, keys, and household utensils increased security and convenience.

Artisanship and Standardization

- Guild systems ensured quality and innovation.
- Artistic embellishments on utilitarian objects elevated their aesthetic value.
- The emergence of prototypes and standards for manufacturing.

Industrial Revolution: Mass Production and Accessibility

The 18th and 19th centuries marked a pivotal era where technological innovations revolutionized the production and dissemination of everyday artifacts.

Mechanization and Innovation

- Steam Power: Enabled the mass production of textiles, utensils, and furniture.
- Assembly Line: Pioneered by figures like Henry Ford, drastically lowered costs and increased availability.
- Material Innovations: Introduction of plastics, aluminum, and synthetic fibers broadened design possibilities.

Design for Function and Form

- The Arts and Crafts movement, emphasizing craftsmanship and aesthetic harmony.
- Functionalist approaches, exemplified by modernist designs focusing on simplicity and utility.

Impact on Daily Life

- More affordable household goods increased standards of living.
- Standardized products facilitated global trade and cultural exchange.

Modern Era: Integration of Technology and Aesthetics

The 20th and 21st centuries have seen an unprecedented fusion of technology, design, and utility in everyday artifacts.

Smart and Connected Devices

- Introduction of appliances with embedded electronics (e.g., smart refrigerators, thermostats).
- The rise of wearable technology (smartwatches, fitness trackers).
- Internet of Things (IoT) transforming homes into connected ecosystems.

Design Philosophy: Form Follows Function

- Prominent in Mid-century Modern design, emphasizing clean lines and practicality.
- Minimalism and ergonomic considerations dominate contemporary product development.
- Sustainability and eco-consciousness influence material selection and lifecycle.

Examples of Evolving Useful Artifacts

- Kitchen Gadgets: From manual hand-cranked devices to automated smart appliances.
- Transportation: The evolution from horse-drawn carriages to electric and autonomous vehicles.
- Communication Devices: The progression from handwritten letters to smartphones.

Cultural and Societal Influences on Artifact Development

The trajectory of useful objects is deeply intertwined with cultural shifts, economic factors, and technological breakthroughs.

Art as Utility

Throughout history, art has enhanced the usefulness of artifacts:

- Decorative ceramics and glassware that serve both aesthetic and functional purposes.
- Artistic motifs on textiles and clothing.
- Architectural ornamentation that combines beauty with structural integrity.

Globalization and Cultural Exchange

- Cross-cultural influences have led to hybrid designs, blending utility with diverse artistic traditions.
- The spread of industrial manufacturing has made artifacts more accessible worldwide.

Environmental and Ethical Considerations

- The modern push for sustainable materials and processes.
- The ethical sourcing of raw materials.
- Reusable and recyclable artifacts gaining prominence.

Future Directions: The Next Evolution of Everyday Artifacts

Looking ahead, the evolution of useful artifacts continues, driven by technological innovation and societal needs.

Emerging Technologies

- 3D printing enabling customized, on-demand artifacts.
- Artificial intelligence integrating into everyday objects for smarter functionality.
- Biodegradable and bio-engineered materials reducing environmental impact.

Designing for Human-Centric Utility

- Adaptive and inclusive designs catering to diverse populations.
- Enhanced ergonomic and sensory experiences.
- Seamless integration of artifacts into digital and physical environments.

Challenges and Opportunities

- Balancing technological sophistication with simplicity and accessibility.
- Ensuring privacy and security in connected devices.
- Promoting sustainability amidst rapid innovation.

Conclusion: The Continuing Journey of Useful Artifacts

The evolution of useful things underscores a fundamental human pursuit: creating objects that serve our needs efficiently while reflecting our cultural identities and aesthetic sensibilities. From rudimentary stone tools to sophisticated smart devices, each iteration embodies a response to societal demands, technological possibilities, and artistic expression. As technology advances and societies evolve, so too will the artifacts that populate our daily lives, continually shaping and mirroring the human experience.

Understanding this progression offers valuable insights into how innovation can harmonize utility and beauty, ensuring that future artifacts remain not only functional but also meaningful and inspiring parts of our shared cultural heritage.

Question How have everyday artifacts evolved to become more user-friendly over time? Throughout history, designers and engineers have focused on improving functionality, ergonomics, and simplicity, leading to artifacts that are easier and more intuitive to use, such as the transition from manual tools to automated appliances. What role does technological innovation play in the evolution of common household items? Technological advancements have transformed everyday artifacts by integrating smart features, increased efficiency, and enhanced durability, thereby making daily tasks more convenient and reducing manual effort. How have cultural and societal shifts influenced the design of useful everyday artifacts? Cultural values and societal needs have driven the design and adaptation of artifacts to prioritize sustainability, accessibility, and aesthetic appeal, reflecting changing lifestyles and priorities. In what ways have sustainable practices shaped the development of everyday artifacts? Sustainable practices encourage the use of eco-friendly materials, energy efficiency, and recyclability, leading to artifacts that are not only functional but also environmentally responsible. What is the significance of 'everyday artifa' in shaping modern lifestyles? Everyday artifacts serve as functional art that seamlessly integrates into daily life, enhancing convenience, efficiency, and even cultural expression, thus playing a crucial role in shaping modern lifestyles.

Related keywords: evolution of tools, everyday artifacts, technological development, household inventions, design innovation, functional objects, historical appliances, material culture, user-centered design, lifestyle evolution

The challenge of things

The challenge of things is a concept that resonates across various disciplines, from philosophy and psychology to everyday life and organizational management. It encapsulates the inherent difficulties and complexities associated with understanding, managing, and interacting with the multitude of objects, ideas, and phenomena that populate our world. Whether it's the mundane task of organizing physical possessions or the profound challenge of making sense of abstract concepts, the challenge of things remains a central theme that prompts reflection, innovation, and adaptation.

Understanding the Challenge of Things

What Are "Things" in Context?

In a broad sense, "things" refer to any objects, entities, or phenomena that exist in our environment or consciousness. This includes tangible items like tools, devices, and natural resources, as well as intangible aspects such as ideas, emotions, and social constructs.

Examples of "things":

- Physical objects: furniture, vehicles, gadgets
- Digital entities: files, data, online profiles
- Abstract concepts: love, justice, freedom
- Natural phenomena: weather, ecosystems
- Social constructs: laws, institutions, norms

Why Is the Challenge of Things Significant?

The significance stems from several factors:

- Complexity: As the number and diversity of things increase, so does the difficulty in understanding and managing them.
- Interdependence: Many things are interconnected, creating complex systems that are hard to predict or control.
- Perception: Our perception influences how we interpret and prioritize different things, affecting decision-making.
- Resource Management: Efficiently allocating resources among competing needs involves addressing the challenge of things.

The Multi-Dimensional Nature of the Challenge

Cognitive Challenges

Humans constantly strive to comprehend the vast array of things they encounter. Cognitive challenges include:

- Information Overload: The sheer volume of data and objects can overwhelm our mental capacity.
- Categorization Difficulties: Deciding how to classify and prioritize things is often complicated.
- Memory Limitations: Remembering all relevant details about numerous things is impossible, leading to reliance on heuristics.

Organizational Challenges

Managing things in organizational contexts involves:

- Inventory Management: Keeping track of physical assets.
- Data Management: Organizing digital information efficiently.
- Workflow Optimization: Ensuring smooth interactions among various components.

Philosophical and Existential Challenges

On a deeper level, the challenge of things prompts questions about:

- Existence and Reality: What is the nature of things around us?
- Meaning and Value: How do things acquire significance?
- Control and Acceptance: To what extent can we influence or accept the presence of certain things?

Strategies to Address the Challenge of Things

- Effective Organization and Categorization

Organizing things systematically can mitigate chaos and improve accessibility.

Methods include:

- Taxonomies and Classifications: Developing hierarchical structures.
- Labeling Systems: Using tags and labels for quick identification.

- Digital Tools: Employing software for inventory and data management.
- Leveraging Technology

Technological advancements play a critical role:

- Automation: Robots and AI can handle repetitive tasks involving things.
- Data Analytics: Insights derived from data help in understanding complex systems.
- Internet of Things (IoT): Connecting physical objects to networks for better management.
- Philosophical and Mindfulness Approaches

Adopting philosophical perspectives can aid in dealing with the existential aspect:

- Minimalism: Focusing on essentials reduces the burden of managing numerous things.
- Acceptance: Recognizing that not everything can be controlled or understood.
- Presence: Mindfulness practices help in appreciating the transient nature of things.
- Sustainable and Ethical Practices

Managing things responsibly involves:

- Environmental Sustainability: Reducing waste and conserving resources.
- Ethical Consumption: Choosing products and services that align with moral values.
- Lifecycle Thinking: Considering the entire lifespan of a thing from creation to disposal.

The Impact of the Challenge of Things on Society

In Personal Life

- Clutter and Stress: Excess possessions can lead to stress and decreased well-being.
- Decision Fatigue: Choosing among many options can be exhausting.
- Time Management: The need to organize and maintain things consumes significant time.

In Business and Industry

- Supply Chain Complexity: Managing global networks of physical and digital goods.
- Data Overload: Making sense of vast amounts of data for strategic decisions.
- Innovation Challenges: Developing new things while managing existing ones.

In Technology and Innovation

- Rapid Obsolescence: Keeping up with constantly changing technological things.
- Security Concerns: Protecting digital and physical assets from threats.
- Ethical Dilemmas: Addressing issues related to artificial intelligence and automation.

Future Perspectives on the Challenge of Things

Embracing Complexity

The future requires embracing complexity rather than simplifying it excessively:

- Complex Systems Thinking: Viewing things as interconnected systems.
- Adaptive Management: Flexibility in dealing with changing circumstances.

Integrating Sustainability

Sustainable practices will become more vital:

- Circular Economy: Designing things for reuse and recycling.
- Green Technologies: Innovations that reduce environmental impact.

Enhancing Human-Technology Collaboration

Advances in AI and robotics will:

- Augment Human Capabilities: Assisting in managing complex systems.
- Improve Decision-Making: Providing insights and automation.

Conclusion

The challenge of things is an enduring aspect of human existence, reflecting our ongoing quest to understand, manage, and coexist with the myriad objects and concepts that surround us. By adopting effective strategies?ranging from technological solutions and organizational practices to philosophical acceptance?we can navigate this challenge more effectively. Embracing complexity, prioritizing sustainability, and fostering innovation will be essential as we move forward in a world increasingly populated with an abundance of things. Understanding and addressing the challenge of things not only enhances our personal and collective well-being but also paves the way for a more harmonious and sustainable future.

The Challenge of Things: Navigating Complexity in a World of Material and Conceptual Obstacles

In an era characterized by rapid technological advancement, societal upheaval, and an ever-expanding universe of ideas, the concept of "things" takes on multifaceted significance. From tangible objects to intangible ideas, "the challenge of things" encapsulates the difficulties faced in understanding, managing, and transforming both material and conceptual entities. This investigative exploration delves into the layered nature of these challenges, examining their origins, implications, and potential pathways forward.

Understanding "The Challenge of Things": A Multidimensional Perspective

At its core, "the challenge of things" is a phrase that encompasses a broad spectrum of issues?ranging from physical obstacles in engineering to abstract dilemmas in philosophy and ethics. To appreciate the depth of this challenge, it is essential to dissect its various dimensions.

Material Challenges: The Tangible Realm

Material challenges pertain to physical objects, infrastructure, and environmental factors. These include:

- Design and Manufacturing Constraints: Limitations in materials science and manufacturing processes can hinder innovation.
- Environmental Impact: The ecological footprint of producing and disposing of goods poses significant challenges.
- Complexity of Physical Systems: Managing intricate systems such as transportation networks or energy grids requires sophisticated coordination.

For example, developing sustainable energy solutions involves overcoming the challenge of creating efficient, durable, and affordable technologies that can be integrated into existing infrastructure.

Conceptual Challenges: The Realm of Ideas

Beyond the physical, "things" also refer to ideas, beliefs, and societal constructs. Challenges here include:

- Understanding and Interpretation: Differing cultural or philosophical perspectives can complicate consensus.
- Ethical Dilemmas: Advances in technology often outpace societal norms, creating moral quandaries.
- Knowledge Gaps: Scientific uncertainty or incomplete data can hinder decision-making.

An illustrative case is the ethical debate surrounding artificial intelligence and autonomous systems, where defining "acceptable" levels of machine autonomy remains contentious.

Interplay Between Material and Conceptual Challenges

Often, material and conceptual challenges are intertwined. For example:

- Developing new medical devices (material challenge) raises questions about data privacy and consent (conceptual challenge).
- Implementing smart city infrastructure must reconcile technical feasibility with social equity and privacy concerns.

This interplay underscores the complexity inherent in "the challenge of things," demanding interdisciplinary solutions.

Historical Context: The Evolution of Challenges with Things

Understanding how humanity has navigated challenges related to "things" provides insight into current struggles and future directions.

Ancient Innovations and Material Constraints

From the invention of the wheel to early metallurgy, ancient societies grappled with material limitations. The challenge was often about sourcing, shaping, and utilizing raw materials effectively.

Industrial Revolution: Scaling Complexity

The Industrial Revolution marked a turning point, introducing mass production, mechanization, and

complex supply chains. Challenges expanded to managing large-scale systems and environmental impacts.

Digital Age: Intangibility and Data Challenges

Today, the proliferation of digital "things"—from software to data—has shifted some challenges from physical constraints to issues of cybersecurity, data integrity, and digital ethics.

Contemporary Challenges of Things in Various Sectors

The modern landscape presents specific, pressing challenges across sectors.

Technology and Innovation

- Obsolescence and E-Waste: Rapid product turnover leads to environmental and logistical issues.
- Cybersecurity: As "things" become interconnected (IoT), vulnerabilities increase.
- User Privacy: Balancing personalization with privacy rights remains a core concern.

Environmental Sustainability

- Resource Scarcity: Finite natural resources limit material availability.
- Climate Change: The challenge of adapting existing "things" (infrastructure, agriculture) to changing conditions.
- Pollution: Managing waste and emissions from manufacturing and consumption.

Societal and Ethical Dimensions

- Accessibility: Ensuring equitable access to technological "things."
- Cultural Resistance: Overcoming societal inertia and skepticism.
- Regulation and Governance: Developing policies that keep pace with technological advancements.

Strategies and Approaches to Overcoming the Challenge of Things

Addressing the multifaceted challenges requires comprehensive strategies.

Design Thinking and Human-Centered Approaches

Prioritizing user needs and sustainability can lead to more adaptable and responsible "things."

Techniques include:

- Empathy mapping
- Iterative prototyping
- Stakeholder engagement

Interdisciplinary Collaboration

Combining expertise from engineering, social sciences, ethics, and environmental studies enables holistic solutions.

Technological Innovation

Harnessing emerging technologies such as:

- Sustainable materials
- AI for optimized design
- Blockchain for transparency

Policy and Governance

Developing adaptive regulations that foster innovation while safeguarding societal interests.

Future Outlook: Navigating the Evolving Challenge of Things

As "things" continue to evolve?both physically and conceptually?the challenges will also transform.

Emerging Trends

- Smart and Autonomous Systems: Increased reliance on AI and machine learning.
- Circular Economy Models: Emphasizing reuse, repair, and recycling.
- Decentralization: Distributed systems reducing centralized vulnerabilities.

Potential Risks and Ethical Considerations

- Loss of human agency

- Privacy erosion
- Socioeconomic disparities

Opportunities for Innovation

- Creating resilient infrastructure
- Developing sustainable products
- Fostering inclusive technological adoption

Conclusion: Embracing Complexity with Purpose

The challenge of things is a defining feature of human progress. It compels us to confront physical limitations, ethical dilemmas, and societal complexities. While these challenges are formidable, they also present opportunities for ingenuity, collaboration, and responsible stewardship. Recognizing the layered nature of "things"—both material and conceptual—is essential for crafting solutions that are sustainable, equitable, and adaptive in an ever-changing world.

Through continuous inquiry, multidisciplinary approaches, and a commitment to ethical innovation, humanity can navigate the intricate web of challenges associated with "things" and harness their potential for positive transformation. The path forward demands not only technological prowess but also philosophical reflection and societal engagement, ensuring that "the challenge of things" becomes an impetus for progress rather than an obstacle.

Question What does the phrase 'the challenge of things' typically refer to? It generally refers to the difficulties or obstacles encountered when dealing with various aspects of life, work, or personal growth, emphasizing the importance of perseverance and problem-solving. How can embracing 'the challenge of things' lead to personal development? Facing and overcoming challenges fosters resilience, enhances skills, and builds confidence, ultimately contributing to personal growth and a stronger character. What are some common strategies to tackle 'the challenge of things' effectively? Effective strategies include setting clear goals, maintaining a positive mindset, seeking support when needed, breaking problems into manageable steps, and staying adaptable. Why is accepting 'the challenge of things' important in today's fast-paced world? Acceptance encourages adaptability, innovation, and continuous learning, which are essential for success and well-being in a rapidly changing environment. Can 'the challenge of things' vary across different cultures or contexts? Yes, perceptions of challenges and the ways to address them can differ based on cultural values, societal norms, and specific situational factors. How does understanding 'the challenge of things' help in leadership and decision-making? It helps leaders anticipate obstacles, develop resilience, and create effective solutions, leading to better decision-making and successful outcomes.

Related keywords: adaptability, resilience, problem-solving, innovation, change management, uncertainty, perseverance, growth mindset, complexity, transformation

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