J.B INSTITUTE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

TECH HON

TECHNICAL MAGAZINE
JUNE 2023

About JBIET

As one of the top ten most preferred institutions in Telangana, JBIET continues to strive to impart technical (engineering) and professional education of very high standards.

The aim of JBIET is to mould young learners into globally competitive professionals who are professionally deft, intellectually adept and socially responsible.

The expert faculty at JBIET inculcate the best values and principles, ascribing to a modern curriculum; while the students imbibe pragmatic perception and a pro-active nature, which spurs them towards exploration and advanced inquiry, resulting in valuable insights.

The Placement record of JBIET over the years is proof of our right efforts in enabling the best in class engineering, technical and professional education to aspirants.

Vision of the College

To be a center of excellence in engineering and management education, research and application of knowledge; to benefit society by blending ethical values with globally relevant learning.

Mission of the College

- To provide world class engineering education, encourage research and development.
- To evolve innovative applications of technology and develop entrepreneurship.
- To mould the students into socially responsible and capable leaders.

About the Department

- Established in 1998 with B.Tech CSE with intake 60
- M.Tech CSE Started in 2005 with intake of 18
- Present intake B.Tech CSE 180 M.Tech CSE 18
- Total Faculty 31 Non-Teaching :8
- No of labs :10
- Dept. Library
- No of MOU'S with industry :6
- Good Placement Record& Higher Education
- R&D and Project Labs
- Professional Chapters
- Good Teaching and Learning process
- Good Student Supporting System

Vision of the Department

To meet the emerging trends in Computer Science and Engineering, strive for self-reliance enabled through high end research by adapting a futuristic approach.

Mission of the Department

M1: To impart qualitative education, prepare students refurbish their latent talents and aspire for a pragmatic career in Computer Science and Engineering

M2: To provide an ambiance to develop strategic areas of advance study with perception to foster industry centric education in computer science and Engineering.

M3: To inculcate self-learning among students to make them self-reliant and socially responsible.

Program Outcomes (POs)

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	**Design / Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5	**Modern Tool Usage**: Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to professional engineering practice.
PO7	**Environment and Sustainability**: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	**Individual and Teamwork**: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance**: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change. Any signatory needs to provide an overview of its learning outcomes and confirm that compliance of programs.

Program Educational Objectives (PEOs)

Program outcomes are narrower statements that describe what students are expected to know and be able

To do upon the graduation. They are formed in line with the graduate attributes of NAAC. These relate to the Skills, knowledge, attitudes, values and behavior outcomes that students acquire through the program.

PEO1	To prepare graduates to apply the knowledge and skills acquired in Mathematics, Basic Science and Engineering to succeed in their career, pursue research and or obtain higher/advanced degree.
PEO2	To prepare graduates to learn emerging technologies, work in multidisciplinary fields , apply computer engineering solutions within a global ,societal, environmental context, acquire leadership qualities and enable them to become successful entrepreneurs.
PEO3	To prepare graduates communicate effectively, exhibit professionalism with integrity, morals, ethical conduct and engage in lifelong learning.

Program Specific Outcomes (PSOs)

PSO 1	Ability to design and develop computing system using mathematical knowledge and expertise other disciplines.
PSO 2	Ability to test and analyze quality of various systems to integrate them in larger computer systems.

Chairman's Message

In my position as the Chairman of all the J.B. Group of Educational Societies and all the J.B. Group of Educational Institutions, I convey my best wishes to all our relentlessly advancing institutions nestled in a sprawling woody campus of about 106 acres of land, on the main road at Yenkapally, Moinabad Mandal, and R.R. District. The efficacy of the group can be witnessed from the establishment of three Engineering Colleges; J.B. Institute of Engineering &Technology. Joginpally.B.R. Engineering College; and Bhaskar Engineering College, besides the manifestation of Bhaskar Medical College and Bhaskar General Hospital. My lifetime ambition and objective being the provision of education, from KG to PG, to the underprivileged students of rural background, we have been providing free education, up to High School level in English Medium, to the poverty- stricken destitute of our countryside. We established J.B. Institute of Computer Technology during 1996-97 with PG Courses in MCA and MBA, in the vicinity of Lord Balaji's abode, Tirupathi, as well. The management started two new Women's Engineering Colleges at Hyderabad and Tirupathi from the academic year 2008-09. The management encourages the youth of this state to find their careers in the noble profession of medical practitioner, by imparting quality medical education, and help our people lead healthy lives.

The World since recent times had been moving amazingly fast and fiercely competitive in all spheres of human activity. The said situation called for massive expansion of career focused education, particularly in Engineering, Management and such other professional areas. As a result, there had been mushroom growth of Institutions at a phenomenal level in the private sector. However; it is unfortunate to observe that the quality of education started eroding. The urgent need of the times was to lay emphasis on quality education and to strive vigorously for global excellence and acceptability. It is exactly at this critical juncture of time i.e. in the year 1993, J.B. Educational Society was established to serve the cause of the spread of general, Professional and Engineering education by a team of enlightened persons, under my Chairmanship.

The J.B. Group of Educational Societies has been maintaining an excellent academic track record for more than a decade. The J.B. Institute of Engineering & Technology (1998), Bhaskar Engineering College and Bhaskar Pharmacy college (2007) by J.B.EducationalSociety.Joginpally B.R. Engineering College (2002), Bhaskar Medical college (2005) and

JoginpallyB.R. Pharmacy College (2007), were established under the banner of JoginpallyB.R. Educational Society.

J.B.I.E.T. has well developed infrastructural facilities, such as adequate built up area, well equipped laboratories, libraries and information centers with digitalization and automation and on line transaction facilities in the campus. All facilities such as Medical, Transport, Canteen and Games & Sports, are available besides Seminar Halls, Conference Halls, Indoor Auditorium, Open-Air Theatre, Post Office and Banking.

We have encompassed Jawaharlal Knowledge Centre at J.B.I.E.T and J.B.R.E.C. to empower students to acquire Interactive Communication skills, Technical and employable skills to compete in the Global job market. The policy of this Management is to impart quality education and train the students and for the accomplishment of the same, we have recruited resourceful faculty that are dynamic dedicated and committed to the goal oriented efficient teaching with effective methodology. We have recruited seven Professors with Ph.D. Degrees to hold the posts of HODs of the respective seven branches, apart from the principal with vast experience in the field.

J.B.I.E.T., being an NBA accredited institution and the winner of the status of JNTUs Permanent Affiliation, is one of the best 10 Engineering Colleges of the state, and also is the most preferred institution for aspiring students and their parents. The enrollment of students in JBIET has crossed the 3000 mark and went even higher in the academic year 2008-09.

The institute has launched a host of Faculty and Staff Development Programs, R&D, and Industry and other external project consultancy activities. We have taken up faculty, staff and students Welfare and other HRD measures.

I have great pleasure in conveying the tiding that we have submitted proposals to the U.G.C. authorities for grant of Deemed to be University Status, for which the Government of Telangana and JNTU were pleased to issue No Objection Certificates. We are expecting that the said grant will be accorded in 2009.

National Seminars and Conferences are being organized frequently at our M.N. Rao Auditorium (air conditioned). Experts from Academia and Industry are invited to address and interact with the students. The Management has been sponsoring the deserving students and faculty to present technical papers and participate in the International Conferences in India and abroad. The Management has taken all possible measures for the career development and placement of all the qualified students domestically and globally.

NBA team of experts have visited and inspected J.B.R.E.C. on 20th & 21st February, 2009 to consider for the grant of Accreditation of four U.G. programs offered at the College.

We are fortunate to have the three renowned Academic Administrators, eminent scholars and the former illustrated Vice Chancellors of Osmania University and JNTU on the panel of Governing Bodies and the Advisory Bodies of J.B. Group of Educational Institutions, who extend their precious advice, and expert guidance, from time to time to formulate strategies in the cause of holistic development of the students.

On the eve of the Annual Day celebrations of JBIET, Bhaskar Engineering College, Bhaskar Pharmacy College, Joginpally B.R. Engineering College, Joginpally B.R. Pharmacy College, this year, we organized Spoorti-2009 (A Techno Cultural Fete) in the most befitting manner.

I have immense pleasure to welcome and congratulate all the Principals, Faculty, Staff and Students of all the colleges housed in the Campus for their laudable efforts in organizing Infoquest-2009 and Inxs-2009, studded with several student centric activities, spanning over three consecutive days i.e. on 26th, 27th and 28th February, 2009 and also for bringing out a souvenir 'Spoorti-2009' to commemorate the events.

J.V. KRISHNA RAO
MBA HR - USA

Secretary Message

"Education is the passport to the future, for tomorrow belongs to those who prepare for it today".

JB Institute of Engineering & Technology was established in the year 1997 under the umbrella of JB Group of Educational Institutions, Hyderabad. At present JBIET is a UGC Autonomous Institution and permanently affiliated to JNTU Hyderabad.

The Speedy development in the field of Information & Technology has accelerated the demand for the value based education in the stream of Engineering, Technology and Management which is qualitative, progressive and multidimensional in competitive global environment. We provide quality education beyond the four walls of classroom to cope up with the corporate world.

The aim of JBIET is not only to produce mere degree holders, but the bright, talented men and women equipped with all round development of personality. Our vision of the institute is to impart quality education with Life Skills in all core disciplines of knowledge by developing global leaders who are passionate, committed and confident to take initiative in the nation building and create a peaceful environment for WORK, WORKER AND WORKPLACE.

Director's Message

I am delighted to extend a warm welcome to you at J. B. Educational Society, situated on a sprawling 106-acre campus in Hyderabad. Established in 1993 under the dynamic leadership and educational entrepreneur, our founder chairman, the late Sri J. Bhaskar Rao Garu. The goal of society is to provide holistic education for students. We want to impart relevant education and create knowledge through research and innovation to cater to the needs of industry and society. Since inception, campus life has been vibrant and stimulating with the help of collaborations and mentoring by experts from industry and academia. Our students are taught by an experienced faculty in a healthy academic environment. We firmly believe that education forms the cornerstone for fostering future innovators who will contribute to creating a better tomorrow.

The success of collaborative, innovative, and multidisciplinary approaches has helped us to achieve better institutes in Hyderabad and at the state level. The students realize their professional aspirations, and the training and development cell conducts a range of training programs so that students excel professionally. The extra-curricular activities, industry exposure, invited talks, various student chapters, student clubs, technical exhibitions, sports, and arts as part of the academic life of students make this overall teaching and learning process complete.

I congratulate all the teachers, supporting staff, alumni, and students on all their treasured achievements for the committed service and dedication they have shown to enhance the image of the J.B. group of educational institutions. I strongly believe that academic excellence is a continuous process, in pursuit of which the J.B. Educational Society has contributed to this world with good citizens, professional technocrats, innovative scientists and researchers, and successful entrepreneurs. I humbly invite all the stakeholders to join hands with us in taking J.B. Educational Society to the next level.

I Wish You All the Best.

Professor Chintakindi Sanjay

Director, JBIET.

Dr. P. C. Krishnamachary

MTech , Ph.D

Principal's Message

"Change is the end result of all true learning"

Welcome to the vibrant world of JB Institute of Engineering and Technology, Hyderabad, I on behalf of all the faculties and staff, congratulate you for choosing JBIET to reach the life goal. This Institute established in the year 1998 under the aegis of JB Group of Educational Institution's. JBGEI is the brain child of our visionary leader and founder chairman Late Sri. J. Bhaskar Rao Garu. In Consonance with the needs of time and to cope up with the dynamic changes in the era of technology dominant world.

At JBIET we the team are continuously working on to fulfil the local, regional, national and global aspirations of the youth of Telangana and Andhra in particular and India at large for providing the world class technical education to benefit all the sections of the society. In the current context of rapidly changing Socio-Economic Scenario, Demographic Dividend of India playing a major role in performing unexpected results. We go beyond the normal education system at our campus. The overall holistic development of the budding professional / technocrats of JBIETians with value addition education systems with Employability and Life Skills, Techno Sessions, Cultural Fest, Technical Fest, QUIZ, Guest Lectures, Industry Institute Interactions and the most important is the curriculum design in consult with Industry and university is extending full support to empower our institution. Our Institute is committed to maintain an academically rich and professionally compete tent environment by encouraging the enterprising skills of our students. Our institute has consistently produced excellent results and its alumni are making their Mark in distinguished organizations in India and overseas. We are constantly making efforts to ensure that our students showcase their academic talent with high moral values and make responsible citizens of the society and humanity.

I am confident that we as an Institute will grow and contribute positively and actively in transforming the society. With warm wishes.

Dr.P.C. Krishnamachary

Principal, JBIET.

Constitution of Editorial Board:

Editor and Editorial Board, for the publication of Technical Magazines, Newsletters is appointed by the HOD. The student representatives in this publication are also decided by the HOD. Technical Magazine and News Letters covers of following items:

- News about latest Technical inventions and innovations.
- Technical activities and achievements in the Department.
- Articles from Department Faculty and Students related to various areas of interest.
- Details about Seminars, Workshops, Conferences at JBIET.
- Achievements of the students & faculty.

Process of Publishing:

- Editor with the help of the Editorial Board collects the news items related to CSE from various Magazines, Newspapers and Professional Societies and also calls for the articles publications from students and faculty giving a fixed target time.
- These articles are screened by Editorial Committee for publication into Magazines/Newsletter.
- Technical activities and achievements in the Department are collected based on the information available to HOD.
- Sometimes, special issues are planed based on the current topics and new technological trends.
- Details about Seminars, Workshops, and Conferences at JBIET are collected from IQAC.
- After collection, a basic draft is created and submitted to advisory board for proof reading. Later, this content is formatted on publishing software like Microsoft Publisher, Scribus etc.
- Frequency of Publishing Magazine Once in a Year and News Letters is Twice in a Year.

Process of Dissemination:

- E-copy of the Newsletter/Magazines are disseminated through JBIET Website. Printed copies of the same are available in the Department and Central library.

Ensuring Students Participations

- Students are encouraged to write articles and submit news items.
- Students get recognition and appreciation for their articles published by them, among their Cohorts.
- Student's achievements are also published to keep them motivated.
- Student's representation is also made in the editorial board.

Board of Editors

Chief Editor:

Dr. G. Sreenivasulu, Associate Professor, HOD, Dept. of CSE

Associate Editor:

Dr. Niraj Upadhayaya, Professor, Dept. of CSE

Faculty Coordinators:

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M.Deepak

III B.Tech, Dept. of CSE

1. The Rise of Social Commerce: Exploring the Integration of Social Media and E-commerce

Introduction

In recent years, the integration of social media platforms with e-commerce has given birth to a powerful phenomenon known as social commerce. This emerging trend combines the influence of social media with the convenience of online shopping, transforming the way consumers discover, research, and purchase products. In this article, we will delve into the world of social commerce, exploring its impact on consumer behavior and the opportunities it presents for sellers in the ever-evolving digital landscape.

Social commerce represents the convergence of social media and e-commerce, combining the power of social interactions with online shopping. It enables users to discover, research, and purchase products seamlessly within the social media platforms they already use and trust. This integration has revolutionized the way consumers interact with brands and make purchase decisions, opening up new opportunities for businesses to engage with their target audience.

2. Understanding Social Commerce

Definition and Concept

Social commerce refers to the use of social media platforms to facilitate online shopping activities. It goes beyond traditional e-commerce by incorporating social elements such as user reviews, recommendations, and social interactions. Social commerce platforms allow users to browse products, read reviews, ask questions, and make purchases, all within the social media ecosystem.

Evolution of Social Commerce

Social commerce has evolved with the rise of social media platforms. Initially, social media served as a medium for brand awareness and engagement, but it gradually transformed into a transactional space. Features like “Buy Now” buttons, shoppable posts, and integrated payment gateways have made social media platforms a viable sales channel for businesses of all sizes.

The Impact of Social Commerce on Consumer Behavior

Social commerce has had a significant impact on consumer behavior. Here are some key ways in which it influences the consumer journey:

Discovery and Inspiration

Social media platforms act as discovery engines, allowing users to explore a wide range of products and services through posts, stories, and advertisements. Consumers can find inspiration from influencers, friends, or brands they follow, leading to impulse purchases or further research.

Social Proof and Trust

Social commerce leverages the power of social proof, as consumers rely on reviews, ratings, and user-generated content to validate their purchase decisions. Positive reviews and recommendations from friends or influencers can instill trust and confidence in a product or brand.

Personalized Recommendations

Social media algorithms analyze user data and preferences to deliver personalized product recommendations. This tailored approach enhances the shopping experience, exposing users to products that align with their interests and preferences.

Seamless Shopping Experience

Social commerce offers a seamless shopping experience by reducing the number of steps required to make a purchase. Users can complete transactions within the social media platform itself, eliminating the need to navigate to external websites or applications.

Opportunities for Sellers in Social Commerce

Social commerce opens up exciting opportunities for sellers to connect with their target audience and drive sales. Here are some key strategies for leveraging social commerce:

Building Brand Awareness and Engagement

Social media provides a powerful platform for building brand awareness and engaging with consumers. By consistently sharing valuable content, fostering conversations, and responding to user inquiries, businesses can establish a strong online presence and cultivate a loyal following.

Influencer Marketing and Collaborations

Influencer marketing plays a crucial role in social commerce. Collaborating with influencers allows brands to tap into their large and engaged audiences, leveraging their influence to promote products and drive sales. Influencers act as trusted advocates, influencing purchase decisions through authentic and relatable content.

Social Advertising and Targeting

Social media platforms offer sophisticated advertising tools that enable businesses to target specific demographics, interests, and behaviors. By creating targeted ad campaigns, sellers can reach their ideal customers and drive conversions. Social ads can be tailored to different stages of the consumer journey, from awareness to purchase intent.

User-Generated Content and Social Proof

Encouraging user-generated content (UGC) can amplify social commerce efforts. UGC, such as customer reviews, testimonials, and unboxing videos, provides social proof and builds trust among potential buyers. Sharing UGC on social media platforms helps create an authentic connection with the audience.

Direct Selling and Shoppable Posts

Direct selling through social media platforms has become increasingly popular. By utilizing features like shoppable posts and integrated payment gateways, businesses can streamline the purchasing process and enable users to make quick and convenient transactions without leaving the social media platform.

Challenges and Considerations in Social Commerce

While social commerce presents exciting opportunities, it also comes with challenges and considerations for sellers:

Maintaining Authenticity and Transparency

Maintaining authenticity and transparency is crucial in social commerce. Businesses must strive to create genuine connections with their audience and avoid misleading or deceptive practices. Transparency in pricing, shipping policies, and customer support is essential for building trust.

Privacy and Data Security

Social commerce involves the collection and processing of user data. Sellers must prioritize data privacy and security to protect customer information. Complying with relevant data protection regulations and clearly communicating data usage practices are vital to maintaining customer trust.

Competition and Saturation

With the rise of social commerce, competition among sellers has intensified. Standing out in a saturated market requires unique value propositions, compelling content, and innovative marketing strategies. Businesses must continuously adapt and differentiate themselves to maintain a competitive edge.

Future Trends in Social Commerce

Social commerce is an ever-evolving field, and several trends are shaping its future. Here are some noteworthy trends to watch out for:

Augmented Reality (AR) and Virtual Try-Ons

AR technology allows users to visualize products in real-time and tries them virtually. AR-powered try-on experiences for fashion, cosmetics, and home decor items enhance the shopping experience, helping users make more informed purchase decisions.

Live Shopping Experiences

Live shopping experiences enable sellers to host live video broadcasts showcasing their products. Users can interact in real-time, ask questions, and make purchases directly during the live stream. This trend blurs the line between entertainment and shopping, creating a sense of urgency and excitement.

Social Commerce Integration in Messaging Apps

Messaging apps are increasingly integrating social commerce features, allowing users to browse products, make purchases, and seek recommendations within the messaging interface. This integration capitalizes on the popularity of messaging apps and the convenience of seamless transactions.

Social Commerce in Emerging Markets

Social commerce is gaining traction in emerging markets where access to the internet and e-commerce may be limited. The combination of social media penetration and mobile adoption in these regions presents immense opportunities for businesses to reach and engage with a growing consumer base.

Conclusion

Social commerce has revolutionized the way consumers discover, research, and purchase products. By integrating social media platforms with e-commerce functionalities, social commerce provides a seamless and engaging shopping experience. For sellers, it offers new avenues to connect with consumers, build brand awareness, and drive sales. As social commerce continues to evolve, businesses must stay agile, embrace emerging trends, and prioritize authenticity and customer trust.

Dr. G.Sreenivasulu, M.Tech, Ph.D

Associate Professor, HOD, CSE Dept.

2. Sustainable Technology Solutions

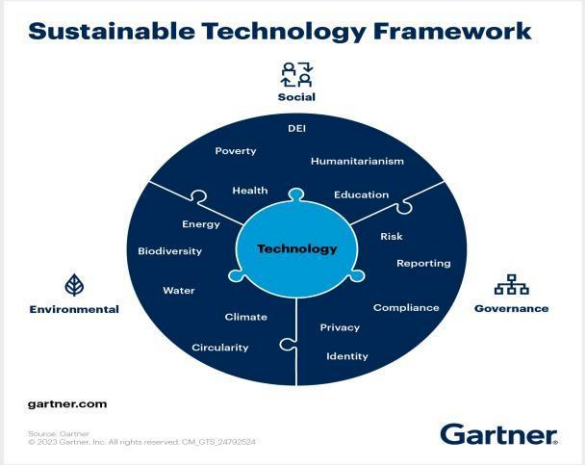
Introduction

Sustainable technology, one of the Gartner Top Strategic Technology Trends for 2024, is a framework of digital solutions that drives ESG outcomes. Make the most of it.

Gartner expects that by 2027, 25% of CIO's compensation will be linked to their sustainable technology impact. But focusing only on the sustainability of internal IT operations ("sustainable IT") is too narrow a way to think about sustainable technology. Instead, also think of enabling a whole host of sustainable outcomes using technology.

Gartner defines sustainable technology as a framework of digital solutions that can enable environmental, social and governance (ESG) outcomes for the enterprise and its customers.

"Sustainable technology is increasingly important operationally — for optimizing costs, energy performance and asset utilization, for instance — but it also drives ESG outcomes like improving wellness and providing the traceability needed to ensure responsible business practices," says Gartner Senior Principal Analyst Autumn Stanish. "Sustainable technology also facilitates new business models and tech-enabled products to better serve customers."



Sustainable technology drives ESG outcomes in three areas

Sustainable technology creates opportunity in three critical areas of the business: internal IT, enterprise and customer operations.

Internal IT operations

Sustainable IT means selecting and working with the right tools, hardware and vendors to deliver the maximum possible output using the minimum viable resources.

Sustainable IT goals will include reducing Scope 2 and 3 greenhouse gas (GHG) emissions — indirect emissions associated with the electricity used by IT and emissions outside the direct control of the enterprise (such as the embodied carbon in decommissioned IT). Also needed is a firm focus on critical subjects like human rights, ethical sourcing and supply chain transparency.

Solutions may include moving to more dynamic and efficient methods for balancing power distribution in data centers, like using pre deployed power distribution features, or using Data center infrastructure management (DCIM) software to plan, measure and document sustainable data center operations.

Benefits include new procurement models and services for IT delivery from improved IT operations. For example, consumption-based pricing ties costs to resource utilization, which in turn equates to sustainability impacts (including reduced carbon emissions and e-waste).

Enterprise operations

Examples include providing transparency on sourcing and trade practices, improved energy and material efficiency, reduced emissions and fair labor practices.

Opportunities to advance ESG goals across the business include:

- **Automation** to reduce resource-intensive activities
- **Artificial intelligence (AI)** and natural language processing to predict the impact of climate on business
- **Advanced analytics** to capture real-time performance analysis
- **Cloud** to transform processes and enable remote work

To best support sustainable enterprise operations, identify and prioritize technology investments that can further those initiatives most material to the organization's sustainability strategy.

Customer operations

Sustainable technology also provides a prism through which to deliver products and services that enable customers to meet their own sustainability goals.

This requires a thorough understanding of customers' key priorities and a balance of their desires, which can occasionally conflict with one another. For example, customers may want a sustainable product but are unwilling to compromise on quality and cost. Make it easy for customers to see how their engagement with your products and services contributes to their sustainability goals.

Act now to create an effective sustainable technology portfolio

Ultimately, sustainable technology will incorporate both well-established and leading-edge technologies. Prioritize technology investments based on the top material issues that your enterprise has identified as most important to future success.

Here are a few trends likely to be important for the business and key stakeholders:

- **Cloud services** can be used to achieve sustainability benefits within economic, environmental and social systems. The elasticity of cloud service models allows organizations to use only what they need, increasing utilization of shared resources and reducing environmental impacts.
- **AI for sustainability** can improve business operations and optimize difficult processes to reduce the organization's carbon and environmental footprint and mitigate material risks. AI can be environmentally sustainable with the use of techniques that help create and run models at the lowest carbon footprint without compromising accuracy.
- **Sustainability and ESG software** consists of sustainability-related data discovery, collection, analysis, insight and reporting tools, which may take a variety of forms.

Dr.Niraj Upadhayaya, M.Tech, Ph.D

Professor, DEAN R&D, CSE Dept.

3. Open Digital Ecosystems (ODEs)

Introduction

Today's organizations are constantly enhancing their systems and services as new opportunities arise, inspiring new forms of collaboration while relying on open ecosystems and open source software. However, while open ecosystems offer benefits such as increased flexibility, faster development, and improved collaboration, they also present new observability challenges. In turn, this drives the need for increased integration of heterogeneous telemetry data such as metrics, logs, and traces, and intelligent awareness of context across disparate data types.

To realize the benefits of open ecosystems, organizations must plan for ecosystem-level observability.

Open Digital Ecosystems (ODEs)

ODEs are the public infrastructure that we need for an increasingly digital world. We define them as *"*open and secure digital platforms that enable a community of actors to unlock transformative Solutions for society, based on a robust governance framework".

ODEs enable interoperability between soiled systems so that innovators can build solutions on top, by leveraging open source software, open data, open standards, open licenses, and open APIs.

It is believed that 'non-tech' layers of ODEs – governance, and community, play a critical role in determining both benefits and potential harms.

Principles for Responsible ODEs

It is important to build responsible ODEs that maximize economic, societal, and governance impact potential while minimizing potential harms. This requires the adoption of certain guiding principles and best practices for robust design and functioning of the ecosystem. We have defined 15 principles encompassing both the tech and non-tech ODE layers.

Digital Platforms

1. Be open and interoperable

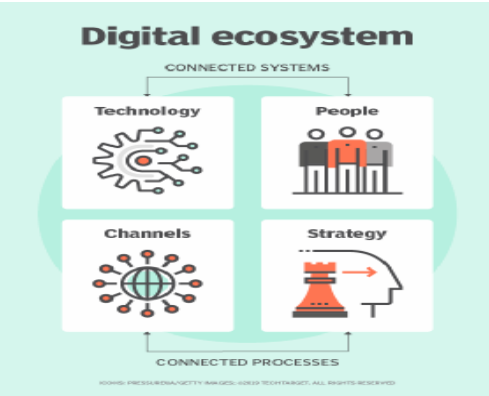
Use and / or build open source codes, standards, licenses, databases, APIs, etc., so that different digital platforms and their components can talk to each other.

2. Make unbundled, extensible, and federated

Incorporate a 'building blocks' architecture, with each block designed to be minimal yet extensible, so that the existing architecture is unaffected by modified or new functionalities. Incorporate federated architecture to connect various databases for greater privacy and security.

3. Be scalable

Use elastic and flexible design to enable the platform to easily accommodate any unexpected increase in demand and / or to meet expansion requirements without changing existing systems.



4. Ensure privacy and security

Adopt a Privacy by Design (PbD) approach that embeds key technology and security features within the core design of the solution to ensure individual privacy and data protection.

5. Develop minimally and iteratively

Build incrementally to develop Minimum Viable Products (MVPs) to which additional features can be added in response to new use cases and as our understanding of user behavior gradually evolves.

Community

6. Ensure universal access

Encourage the build of ODEs that minimize or overcome barriers to access (economic, technical, or social) to ensure inclusion, empowerment of end-users, last-mile access, and user rights, irrespective of their backgrounds.

7. Drive participatory design and end-user engagement

Encourage the participation of all community actors at all stages including plan, design, build, and operate to facilitate and promote a culture of openness and collaboration. Enable the development of user-centric solutions and facilitate a widespread and sustained adoption of the digital platform.

8. Cultivate a network of innovators

Proactively engage with innovators to spur the development of new services and solutions on top of the digital platform.

9. Be analytics-driven for continuous user-focus

Leverage the data generated by the digital platform to acquire insights around user profiles and engagement, adoption barriers, and platform performance. Analyze user data to improve user-centricity, support robust policy-making, and incentivize the design of new solutions.

10. Enable responsive grievance redressal

Define accessible and transparent mechanisms (offline and online) for grievance re addressal, i.e. user touch-points, processes, responsible entities, with a strong focus on actions for resolution.

Governance

11. Define accountable institutions

Ensure a designated institution for the ODE and create the right legal and organizational structure, operating processes, etc., in line with its objectives. Promote multi-stakeholder governance involving key stakeholders, including government bodies, private actors, and individuals to enhance transparency.

12. Establish and align with robust rules of engagement

Define clear rules around the responsibilities, rights, and liabilities of all actors in the ecosystem government bodies, private sector participants, individuals), in adherence with domain-specific laws and rules and other overarching national policies and frameworks.

13. Create transparent data governance

Outline clear standards and policies on data ownership, collection and contribution, consumption, and sharing, especially with respect to sensitive personal data. Ensure that these are easily understood and readily available to all users. Establish a set of mechanisms to monitor and drive adherence.

14. Ensure the right capabilities

Nurture partnerships and establish HR policies and practices to attract and retain the relevant talent required to successfully build and operate the digital platform.

15. Adopt a sustainable funding model

Develop a sustainable long-term funding model, which is aligned with the overall goals of the platform, to ensure uninterrupted operations and continuous user-focused enhancements.

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4. Cloud Gaming- A Multi-Platform Gaming

Introduction

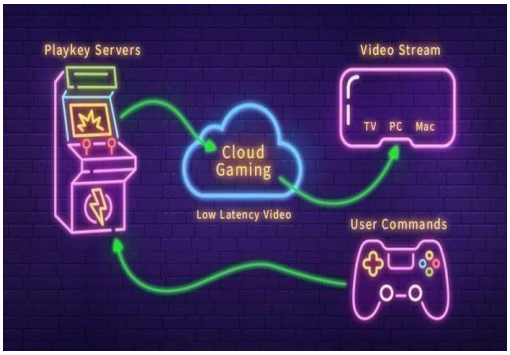
Cloud gaming technology made its first appearance in 2000 at E3 with Game Cluster; it was then packaged and ready for public release in 2003. But despite the promising early model for cloud gaming, it never latched on in the 2000s, thanks to a lack of reliable infrastructure. It wasn't until Microsoft, Sony, and even Google came into the picture that cloud streaming finally took off; as more businesses took the leap, more parties built platforms for cloud streaming.

Cloud gaming aims to grant everyone access to AAA games without the pressure of purchasing additional (expensive) hardware from every manufacturer. Hypothetically, you can turn your newly bought premium Android tablet into a gaming device without using the Play Store (to download games); you can launch xCloud to play Star field.

But even with this lower barrier of entry to play AAA games, there are some caveats to using these cloud streaming services. To help catch everyone up to the pros and cons of cloud gaming, we outline how the technology works while addressing its benefits and concerns with gaming.

Working

You're essentially playing a game remotely. Games are hosted on remote servers and are streamed to your device. All the processing power to run these games depends on the virtual server, but your device needs to handle the internet bandwidth required.



This is an acceptable trade for not having to install these games directly while saving cash by not having to purchase powerful/expensive hardware.

The downfall of playing games streamed from a server is the potential for high latency and dropped frames. When you press a button, there can be a perceptible delay with that action. That's a recipe for disaster when playing games that require high response times to function, so not every game will translate well when played over cloud gaming technology.

Cloud gaming relies on a stable internet connection

Cloud gaming relies heavily on your internet connection, so if your connection drops often or isn't steady, your cloud gaming experience will vary. Not everyone will have the luxury/access to a dependable internet connection, which may lead to the downfall of depending on this technology for your primary gaming experience.

Streaming is great for Android

Mobile gaming brings unwanted limitations, like storage space constraints and the lack of AAA titles released on the platform. Storage space is a considerable issue for the general populace, and it isn't feasible to ever fork out for extra storage space to match up to hefty software. Imagine needing almost a Terabyte of storage, as you would on PC — that's not plausible for most, especially for an Android phone or tablet. However, thanks to streaming, it doesn't matter how many Gigabytes your phone has; you can still freely run these games.

So how do you alleviate these issues? The answer lies in cloud gaming technology. You don't have to download and install games with cloud gaming technology; you simply play them over an internet connection. This means your phone's specs don't really matter; you can play demanding games without the need for expensive hardware when streaming.

Cloud technology is a work in progress

This is why cloud gaming technology could enable a future for Android gaming where specs don't matter as much as they do now, but we are not quite there yet. We still have to worry about battery life, whether your device can connect to 5G, and you'll also care if your screen can fit the cluttered mess for on-screen controls. Sometimes we don't want the hassle of forcing cloud gaming as a solution when it isn't quite ready, and we may opt into dedicated hardware, anyway.

Major Cloud Gaming Services

Many companies picked up on the emergence of cloud gaming technology and have sought to host and become service providers for compatible devices and consoles. As a result, we've devised a small list containing the leading cloud gaming services available today.

- Microsoft xCloud
- Nvidia's GeForce Now
- Sony Playstation Now (merged with Playstation Plus)
- Amazon Luna
- Shadow

Most listed platforms will require signing up for a subscription plan to use cloud gaming services fully. Paying subscription fees has pros and cons, so you must weigh these out accordingly.

Dedicated streaming hardware

Hardware and peripheral manufacturers are also looking to make dedicated streaming hardware for gamers; more prominent names like Logitech, Razer, and Verizon are trying to hop on the bandwagon, along with a flurry of new gaming Chromebooks. But the jury is still out on whether these devices take off compared to the alternative, native high-end gaming hardware.

The perception of cloud gaming and the current state

As cloud gaming stands now, it is still a work in progress. First, companies must invest in streamlining the technology, setting up dedicated data centers and GPUs for everyone to access. Next, the cloud game catalog (with expected optimization) has to grow significantly to validate the subscription costs. But, of course, this takes time and a lot of money — and substantial proof that the market exists.

Even major tech giants like Google had a massive hiccup with Google Stadia, which led to the service's shutdown in early 2023. Others debate if cloud gaming is just a transient technology or if it will eventually overtake the market for gaming.

Phil Spence (Microsoft Gaming CEO) doesn't project the transformation into cloud gaming for the next few years. Overall, it doesn't mean the future is bleak; technology is constantly improving, and we are off to a much better start than we were a decade ago. Now, the market for cloud gaming is predicted to grow significantly by 2027 — so we might be even inching closer to a future where streaming becomes the more prominent choice for gaming.

The Future for multi-platform gaming is in cloud gaming

With platform exclusives and companies aggressively rigging the competition with their products, it becomes exhausting to keep up with next-gen consoles. And in other cases, you'd much prefer spending your hard-earned cash on a premium all-purpose phone or tablet over a device specialized for gaming.

It's why we turn to cloud gaming. It offers consumers more choices on how they want to play their games while still allowing brand-new devices to shine. Of course, only time can tell if the best Android games arrive in those additional spaces. Regardless, streaming AAA games using cloud technology is still the way to go if you plan to play on your smart TV or Android.

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5. Metaverse

Why is the metaverse important?

"Metaverse" became a household word when Facebook rebranded its corporate identity to Meta in October 2021 and announced plans to invest at least $10 billion in the concept that year. In addition to Meta, tech giants including Google, Microsoft, Nvidia and Qualcomm are also investing billions of dollars in the concept. Management consultancy McKinsey & Company has bullishly predicted that the metaverse economy could reach $5 trillion by 2030. E-commerce is expected to be the dominant engine, with gaming, entertainment, education and marketing in the metaverse also becoming important sectors.

Today, companies use the term to refer to many different types of enhanced online environments. These range from online video games like Fortnight to fledgling virtual workplaces like Microsoft's Mesh or Meta's Horizon Workrooms to virtual dressing rooms and virtual operating rooms.

Rather than a single shared virtual space, the current version of the metaverse is shaping up as a multiverse: a multitude of metaverses with limited interoperability as company's jockey for position.

The combination of uncritical enthusiasm for the metaverse and deep uncertainty about how it will pan out has sparked some backlash. Industry watchers have questioned if the metaverse will ultimately be much different from the digital experiences we have today -- or, if it is, whether the masses will be willing to spend hours a day in a headset navigating digital space.

Other futurists, however, argue that while it is early days for the metaverse and fundamental technical barriers still exist, the metaverse will happen. And, it will arrive with a big bang.

"It is clear that it is one of the most highly anticipated technology evolutions of the coming decade," Dave Wright, chief innovation officer at IT provider ServiceNow, told TechTarget writer George Lawton in "History of the metaverse explained."

What is the metaverse? A short history

The metaverse is a vision of what many in the computer industry believe is the next iteration of the internet: a single, shared, immersive, persistent, 3D virtual space where humans experience life in ways they could not in the physical world.

Some of the technologies that provide access to this virtual world, such as virtual reality (VR) headsets and augmented reality (AR) glasses, are evolving quickly; other critical components of the metaverse, such as adequate bandwidth or interoperability standards, are probably years off or might never materialize.

The concept is not new: The term *metaverse* was coined in 1992 by author Neal Stephenson in his sci-fi novel *Snow Crash*, and work on the technologies that underpin a virtual reality-based internet date back decade.

How does the metaverse work?

Because the metaverse is largely unbuilt, there is little agreement on how it will work.

Broadly speaking, however, the metaverse is a digital ecosystem built on various kinds of 3D technology, real-time collaboration software and block chain-based decentralized finance tools.

Factors such as the degree of interoperability among virtual worlds, data portability, governance and user interfaces will depend on how the metaverse pans out.

Lauren Lubetsky, senior manager at Bain & Company, speaking in a session on the metaverse at the 2022 MIT Platform Strategy Summit, outlined three possible scenarios:

- The metaverse remains a domain of niche applications, used by consumers for entertainment and gaming but stopping well short of an all-encompassing virtual reality.
- The metaverse is controlled by large competing ecosystems -- for example, Apple and Android meta worlds -- with limited interoperability.
- The metaverse is a dynamic, open and interoperable space, much like the internet but in 3D.

How is the metaverse accessed?

Two technologies considered important to the development and growth of the metaverse are virtual reality and augmented reality:

- **Virtual reality** is a simulated 3D environment that enables users to interact with a virtual surrounding in a way that approximates reality as perceived through our senses. This approximation of reality is now typically accessed through a VR headset that takes over a user's field of vision. Haptics, including gloves, vests and even full-body tracking suits, enable more lifelike interaction with the virtual environment.
- **Augmented reality** is less immersive than VR. It adds digital overlays on top of the real world via a lens of some type. Users can still interact with their real-world environment. The game Pokémon Go is an early example of AR. Google Glass and heads-up displays in car windshields are well-known consumer AR products.

Whether VR and AR experiences turn out to be the primary interfaces of the metaverse remains to be seen, Gartner senior principal analyst Tuong H. Nguyen told Lawton, adding that what we have now are precursors or pre-metaverse solutions.

At present, many of the metaverse-like experiences offered by gaming platforms such as Roblox, Decentraland and Minecraft can be accessed through browsers or mobile devices and a fast internet connection.

How virtual reality, metaverse relate to each other?

VR is often associated with the metaverse, but the terms aren't synonymous. Particular VR technologies, as noted, provide the means for interacting with the more expansive multiverse platforms.

Within that access role, VR can support a variety of metaverse use cases. For example, VR can combine with the allied field of digital twin technology, which lets organizations create virtual representations of physical devices, machines or processes. Technologists can use the VR extension of a digital twin to simulate various issues, according to Johna Till Johnson, CEO and founder of Nemertes Research.

VR contributes to the industrial metaverse

VR and digital twinning provide some of the basic building blocks for the emerging industrial metaverse, noted TechTarget news writer Jim O'Donnell in his article on how this metaverse subset is poised to transform manufacturing. The industrial metaverse will link digital twins into a wider virtual environment that encompasses machines, factories, products and supply chains.

Industrial design is another promising application, noted IT consultant Asim Rahal in his post on enterprise uses for virtual reality. Organizations can employ VR to consider the effects of different design decisions. They can also build simulated prototypes to avoid the cost of creating physical ones. VR, applied to product design and prototyping, could surface as an application within the industrial metaverse.

Organizations are also deploying VR for employee safety training, particularly in settings where employee mistakes can cause harm.

Assembly line workers can train in a virtual environment before hitting the factory floor, or emergency responders can use VR disaster training to practice in a safe environment.

Indeed, risk reduction is one of the key workplace benefits of such VR applications, according to Ria O'Donnell, author of "Transformative Digital Technology for Effective Workplace Learning."

VR sets stage for healthcare metaverse

VR-based training systems could eventually reside within an industrial metaverse, complimenting digital twins. But enterprise applications aren't limited to industrial markets such as manufacturing. In healthcare, for instance, VR could reform surgical training. VR training would let surgeons "repeat a specific on-demand procedure as often as the practitioner desires" and create a shorter learning curve, TechTarget's Xtelligent Healthcare Media division noted.

Medical researchers are also exploring the use of virtual reality in healthcare in fields such as pain management and pediatrics, Xtelligent reported.

Such applications represent the first vestiges of what might become a healthcare metaverse, in which VR could operate alongside other technologies such as blockchain and digital twins.

VR bolsters corporate training

While VR can bolster specialized training use cases, it has wider enterprise applicability, as detailed in this report on VR use cases for learning and development. Those include training for high-complexity scenarios, such as astronaut preparation, institutional knowledge transfer to record workers' knowledge before they retire, empathy lessons for customer service employees and soft skills training.

As for the latter, VR can benefit soft skills training in a couple of ways. VR, for one, can result in faster class completion rates, according to PwC research. The consultancy's study found its participants completed VR-based soft skills training as much as four times faster than classroom sessions. The same study noted participants were up to 275% more confident in the soft skills they developed through VR training.

The greater assurance stems not only from VR's so-called *immersive learning* techniques, but also

from the ability of learners to repeatedly practice skills in a comfortable setting. Indeed, training will likely emerge as a prominent metaverse deliverable, given the ability to virtualize scenarios too expensive or arduous to recreate in the physical world.

Other metaverse technologies

Several other technologies, in addition to virtual reality, play a role in shaping the metaverse. A definitive list, however, has yet to crystallize.

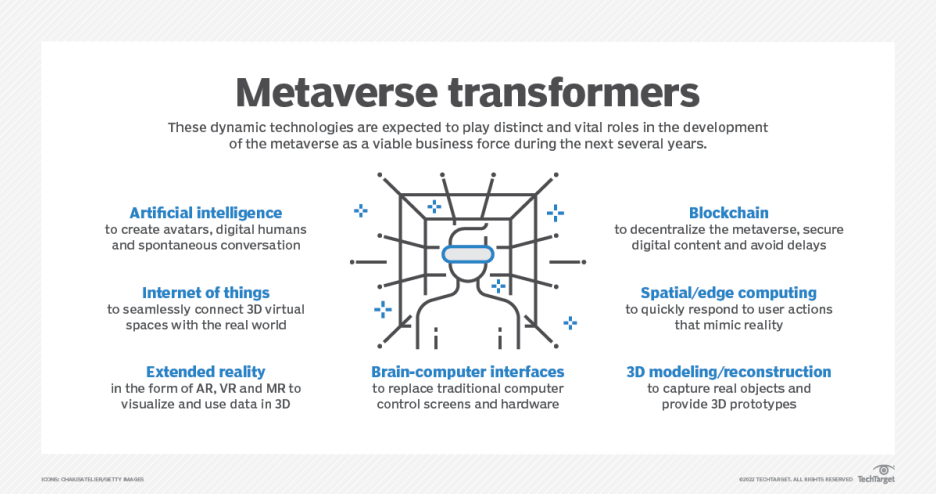
In her article "7 top technologies for metaverse development," technology writer Esther Shein explained that industry watchers shy away from codifying the technologies that will power the metaverse. This is in part because the metaverse is evolving and partly because many of the tools driving the metaverse are themselves made up of multiple technologies.

Gartner, for example, prefers to describe metaverse technologies in terms of "tech themes." The themes include spatial computing, digital humans, shared experiences, gaming and tokenized assets.

Forrester Research characterizes metaverse tools as "enablers of 3D development environments." Professionals skilled in 3D modeling and IoT for developing digital twins are among the talent companies will need to recruit for.

The consensus among Shein's expert sources was that these seven technologies will have the biggest impact on metaverse development over the next decade:

- Artificial intelligence.
- Internet of things.
- Extended reality, including virtual reality and augmented reality.
- Brain-computer interfaces.
- 3D modeling and reconstruction.
- Spatial and edge computing.
- Block chain.



How will the metaverse affect the future?

It must be underscored that the metaverse is still a set of possibilities, not a reality. There are many unknowns. How exactly the metaverse will become manifest -- who will control it, what it will encompass and how much of an impact it will have on our lives -- is still up for debate.

At one end of the spectrum are those who believe the metaverse will enhance our lives, enabling experiences we could not have in the physical world. Metaverse skeptics view it as merely an extension of the digital experiences we have today but not transformative -- and potentially something worse: a magnifier of the current social media ills, including disinformation campaigns, addictive behavior and tendencies toward violence.

In a 2022 survey performed in conjunction with Elon University's Imagining the Internet Center, Pew Research Center asked 624 technology innovators, business leaders and activists about the impact of the metaverse by 2040. The response was split. According to the report, 54% of these experts said they expect the metaverse will be a fully immersive, well-functioning aspect of daily life for at least a half-billion people globally, and 46% said it will not be.

Similarly, a recent survey of 4,600 business and technology leaders conducted by Accenture found that 71% of executives believe the metaverse will have a positive impact on their organization, but only 42% believe it will be a breakthrough or transformational development.

How should businesses prepare for the metaverse?

Creating successful metaverse work environments will require far more than grafting existing office spaces and protocols onto virtual spaces, according to employment experts interviewed by technology writer Lawton. Indeed, early research suggests that simply translating existing offices into a 3D virtual equivalent can reduce productivity and even cause nausea and motion sickness. VR motion sickness can happen when an end user's brain receives conflicting signals about self-movement in a digital environment.

Businesses should also prepare to deal with user experience issues such as the so-called screen door effect, which hinders the use of VR headsets by causing a mesh appearance that resembles looking through a screen door. Selecting a headset with higher resolution and dpi display can minimize this effect.

Still, like the internet in the 1990s, the metaverse represents an opportunity to "shrink the world," said Andrew Hawken, co-founder and CEO of Mesmerize, a VR technology vendor. Done right, the experts Lawton interviewed said, metaverse technologies could increase teleworker camaraderie, improve collaboration, speed up training, reduce the need for office space and make work a happier place in general. The metaverse will also eliminate jobs, requiring companies to reskill workers, said Frank Diana, managing partner and futurist at Tata Consultancy Services.

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6. Personalized Influencer and Marketing

The COVID-19 pandemic fueled significant growth in influencer marketing.

Almost one in three Gen Z and baby boomers said content creators provided a sense of community during the pandemic. With the need to appeal to Gen Z consumers and create a virtual experience, influencer marketing increased by 470% from 2016 to 2020.

An influencer is a celebrity, public figure or content creator with an organic and engaged audience. Influencer marketing leverages the credibility of a popular content creator to promote your brand through paid endorsements and recommendations.

Partnering with influencers gives you direct access to a segment of prospects that need and want to buy your product.

It's more than liking a post or sharing images. Think of influencer marketing as a loyal customer recommending your brand to thousands of their closest friends. When consumers see their favorite content creators wearing trendy clothing or using a new facial cleanser, they will likely purchase the items.

Still a relatively young digital marketing channel, there is a lot of uncertainty around how to use influencer marketing and how it can benefit your brand. Get answers to your questions and learn how influencers can increase your reach, followers and site traffic, attract more leads, build brand loyalty and drive sales.

Types of Influencer Marketing Opportunities to Explore

More businesses are using social media to engage with consumers. In 2021, 91.9% of U.S. company marketers with over 100 employees planned to use social media marketing.

The expansion of social media marketing has given consumers more options, making social media influencers essential to cut through the noise and genuinely connect with customers.

Sponsored content

The “classic” sponsored content is a paid post of a photo, video or blog featuring your offering. This type of content is favored because it's simple and effective. Sponsored content shouldn't feel like the influencer is selling something. It should be natural, tell a story and offer useful information.

You can secure sponsored posts by pitching a campaign brief that specifies your brand guidelines, posting instructions and requirements. Influencers may also contact you if they believe your brand fits their target audience.

Provide an influencer with a UTM link to your store or promo code to include in the content. Keep in mind that influencers are required to disclose when they are promoting sponsored content. If they use #ad or #sponsored, ensure they are visible and not buried in other hashtags.

You can compensate influencers with a flat fee or a pay-per-click arrangement with a minimum pay-out stipulation.

Affiliate links or discount codes.

Create a discount code and unique link for influencers to share with their followers. This content harnesses the influencer's audience to reach consumers and drive sales to your store. Send the influencer a product sample to help them create realistic content based on their experience. It's ideal to use this method with high-performing influencers that have the potential to scale.

You can also use the link to track conversion and influencer reach. Tracking your campaign performance is essential to help you make informed decisions and monitor investments.

Affiliate links can be profitable for influencers. When a customer purchases using the link, the influencer generally receives a 10-20% commission.

Contests and giveaways

Who doesn't like to win a prize or a free product? Contests and giveaways create buzz. They excite potential customers, get them talking about your brand and get your products into the hands of new buyers.

Influencers offer a prize (free product or service) in exchange for brand engagement. Followers will also share the opportunity with their network.

Centre your contest around a valuable offering that makes people eager to participate. Provide clear giveaway instructions and winner selection criteria with minimum steps such as liking, sharing or commenting on the post, tagging friends, following your brand's social media channel, subscribing to a newsletter, submitting user content as entries (i.e., photos, videos or Instagram stories) or registering an account with your ecommerce store. Since giveaways may only provide a short-term boost, combine them with other types of content to generate more traffic. You can compensate influencers with a free offering or discount.

Running content from influencers on your channels

Promoting influencer blog posts and other content on your platform is a win-win for both parties. You're helping the influencer market their personal brand while driving their audience to your channels.

Influencers are content creators who love receiving features for their work. It's best to partner with influencers with a highly engaged audience for maximum exposure and conversion. Let influencers know when you post the content. Add backlinks to their channels and a copy or quote to connect the two brands.

Run content from different influencers separately, so they don't have to share the spotlight. The good thing about this type of content is that it doesn't require formal payment.

Brand ambassadors

Brand ambassadors are long-term influencer partnerships. They are the face of your brand and build credibility, trust and awareness. Ambassadors can help promote product launches and diversify content to showcase your brand.

You may work together for several weeks, months or even years. The additional time gives the influencers the freedom to create ongoing, diverse posts and offerings. As their audience becomes more familiar with your brand, it increases sales and traffic.

While some companies choose a celebrity ambassador, collaborating with multiple influencers can maximize brand visibility, campaign momentum and ROI. Current followers and customers make excellent ambassadors because they know your brand and enjoy your product.

Why Influencer Marketing Continues to Grow?

When influencer marketing first appeared in 2006, they were bloggers who shared content about their lives and favorite products. They occasionally received a small fee or a free product.

PayPerPost was the first to compensate influencers, but many marketers were sceptical of the longevity

and authenticity of influencer marketing. The industry has changed significantly in the last 15 years.

Now influencing is a content marketing career that produces a living wage.

The good news is that more influencers increase your chance of finding the best content creator for your ecommerce store. No matter your industry, you can discover influencers to promote your product to their audience.

More people are becoming influencers

Social networks and blogs have traditionally been influencer's chosen forums. But with a growing need to connect to a Gen Z customer base and new platforms for content creators to transform their hobby into a profession, there are more opportunities than ever to break into the influencer marketing industry. Now anyone can be a successful influencer.

Content creators can choose from various channels to create and share content — Instagram posts, traditional blogs and video stories, etc. As the industry continues to innovate, more creators are inspired to become influencers and get a piece of the action.

Influencer marketing agencies are growing in popularity

Influencer marketing provides independence for content creators and brands seeking a new way to connect with leads. But the industry is still regulated and becoming more standardized.

Influencer agencies are available to help ecommerce brands who prefer a hands-off approach. They can connect you to the best influencers for your strategy, so you can take advantage of influencer marketing and rising trends without investing time and resources into mastering the field.

How Ecommerce Stores Use Influencer Marketing to Scale

Referrals are among the most effective marketing tools. Influencer marketing uses the same technique on a larger scale. Their followers learn about your brand from a trusted confidant, allowing you to capture the interest of new audiences from a single content creator or engagement effort.

Mutually beneficial partnerships with high-quality influencers can also be replicated throughout your content strategy to yield a significant return on investment, offering a more cost-effective option for increasing brand awareness and your bottom line.

Brand visibility

Influencers uniquely share your brand story, appealing to their follower's emotions and triggers. In a 2021 survey, eight in 10 users globally reported that social media platforms helped them learn about new products and brands.

For start-up brands, it can take years to build a solid following. Influencers can help shorten your process and build brand awareness faster.

Enhanced brand awareness may increase your social following and improve SEO. Social media isn't technically a ranking factor, but it still signals to search engines that you have a substantial online presence that adds to your brand's quality. You can also use content to drive organic traffic to your website.

Share user-generated content

Followers value the opinions of influencers over that of the brand and celebrities. Partner with an influencer to source content for your page. Repost content to showcase the partnership using their images, copy and hashtags. It's one thing to say how great you are, but it's much more valuable when someone else says it.

It's best to have a UGC plan that outlines when to share content so you can save influencer posts for upcoming product promotions, holidays or sale seasons.

Trusted testimonial

Online shoppers are sceptical of unknown brands. Adding testimonials to your store site can ease a customers' apprehension during purchase.

Having influencers provide honest feedback about the pros and cons of your product, service or customer care experience adds a layer of social proof. Specify the type of testimonials you want to include in your influencer marketing campaign to ensure influencers capture the most relevant content. Review videos, online testimonials and honest product ratings can help generate new leads and increase sales.

Testimonials are especially beneficial for emerging brands, as a positive review from a trusted influencer can introduce your products to a large market segment and result in your first sales.

Offer a promotion with an influencer.

Partner with an influencer to offer an exclusive promotion to their audience. This proven strategy drives conversion because followers feel they're getting a deal unavailable to the broader customer base and are inclined to purchase the offer.

Provide influencers with a link in the promotion to create a direct pathway to your store or product page and streamline the process.

Work with micro-influencers

A celebrity influencer may not be in your budget yet, but there are all levels of influencers. An influencer with a smaller following can have a significant engagement rate, while one with millions of followers doesn't guarantee clicks and product purchases.

Micro-influencers often have a loyal follower base. According to one study, "82% of consumers are 'highly likely' to follow a recommendation made by a micro-influencer."

While micro-influencers may not have access to advanced features like the swipe-up option, they can utilize other meaningful methods, such as direct messaging, to connect with their followers and introduce them to your brand. Influencers with a smaller following have a more targeted reach, authentic engagement and accessibility to niche consumers. Collaborating with a micro-influencer whose audience interests align with your brand may result in a more intentional marketing

The Final Word

Consumers want a marketing message that's "unfiltered" and less scripted. Unlike sales-driven posts,

influencer content uses a conversational tone and human narrative to catch customers' attention and engage audiences. Their reputation adds a layer of trust that converts followers into sales.

For a seamless experience, integrate ecommerce platforms like Big Commerce into your influencer marketing workflow. You can easily offer your latest products and build a genuine relationship that boosts your brand.

Start driving revenue from partnerships today and get the most out of your influencer marketing strategy.

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7. Data Integration Using Python

Introduction

It is needed to remove the impurities in data and make it clean. Now, the next step is to combine data from different sources to get a unified structure with more meaningful and valuable information. This is mostly used if the data is segregated into different sources. To make it simple, let's assume we have data in CSV format in different places, all talking about the same scenario. Say we have some data about an employee in a database.

We can't expect all the data about the employee to reside in the same table. It's possible that the employee's personal data will be located in one table, the employee's project history will be in a second table, the employee's time-in and time-out details will be in another table, and so on. So, if we want to do some analysis about the employee, we need to get all the employee data in one common place. This process of bringing data together in one place is called data integration. To do data integration, we can merge multiple pandas Data Frames using the merge function.

Let's see how to integrate data using python

Example of Integrating Data

In this example we will merge the details of students from two datasets,

namely student.csv and marks.csv. The student dataset contains columns such as Age, Gender, Grade, and Employed. The marks.csv dataset contains columns such as Mark and City.

The Student_id column is common between the two datasets. Follow these steps to complete this exercise:

The student.csv dataset can be found at this location: https://github.com/TrainingByPackt/Data-Science-with-Python/blob/master/Chapter01/Data/student.csv.

The marks.csv dataset can be found at this location: https://github.com/TrainingByPackt/Data-Science-with-Python/blob/master/Chapter01/Data/mark.csv.

1. Open a Jupiter notebook and add a new cell. Write the following code to import pandas and load the student.csv and marks.csv datasets into the df1 and df2 pandas Data Frames:

   import pandas as pd

   dataset1="https://github.com/TrainingByPackt/Data-Science-with-Python/blob/master/Chapter01/Data/student.csv"

   dataset2="https://github.com/TrainingByPackt/Data-Science-with-Python/blob/master/Chapter01/Data/mark.csv"

   df1 = pd.read_csv(dataset1, header = 0)

   df2 = pd.read_csv(dataset2, header = 0)

   To print the first five rows of the first DataFrame, add the following code:

   df1.head()

   The preceding code generates the following output:

	Student_id	Mark	City
0	1	95	Chennai
1	2	70	Delhi
2	3	98	Mumbai
3	4	75	Pune
4	5	89	Kochi

Figure 1 The first five rows of the first DataFrame

2. To print the first five rows of the second DataFrame, add the following code:

   df2.head()

   The preceding code generates the following output:

	Student_id	Age	Gender	Grade	Employed
0	1	19	Male	1st Class	yes
1	2	20	Female	2nd Class	no
2	3	18	Male	1st Class	no
3	4	21	Female	2nd Class	no
4	5	19	Male	1st Class	no

Figure2 The first five rows of the second DataFrame

3. Student_id is common to both datasets. Perform data integration on both the DataFrames with respect to the Student_id column using the pd.merge() function, and then print the first 10 values of the new DataFrame:

   df = pd.merge(df1, df2, on = 'Student_id')

   df.head(10)

   Here, the data of the df1 DataFrame is merged with the data of the df2 DataFrame. The merged data is stored inside a new DataFrame called df.

	Student_id	Mark	City	Age	Gender	Grade	Employed
0	1	95	Chennai	19	Male	1st Class	yes
1	2	70	Delhi	20	Female	2nd Class	no
2	3	98	Mumbai	18	Male	1st Class	no
3	4	75	Pune	21	Female	2nd Class	no
4	5	89	Kochi	19	Male	1st Class	no
5	6	69	Gwalior	20	Male	2nd Class	yes
6	7	52	Bhopal	19	Female	3rd Class	yes
7	8	54	Chennai	21	Male	3rd Class	yes
8	9	55	Delhi	22	Female	3rd Class	yes
9	10	94	Mumbai	21	Male	1st Class	no

Figure 3 First 10 rows of the merged DataFrame

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8. Human Augmentation

What is Human Augmentation?

Human augmentation is the term for technologies that improve human capabilities. They primarily work to elevate human performance, health or quality of life. Popular examples of human augmentation technology are devices such as cochlear implants or robotic limbs. However, human augmentation also applies to how humans and machines can work together, which we can see in the growing applications and capabilities of artificial intelligence (AI).

By combining the strengths of automation and artificial intelligence with expert human guidance, human workers, care givers, students, public servants and professionals in virtually any kind of work can work faster and smarter.

How Does Human Augmentation Work?

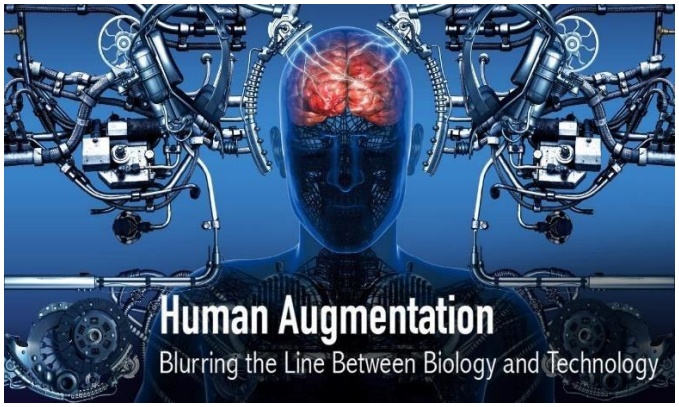
Human Augmentation works by enhancing human abilities through technology. Not only is human augmentation able to improve existing skills, but humans can also access new skills using technology.

There are three different types of human augmentation:

- **Sensory.** This technology is used mostly to restore abilities or compensate for impairments. Sensory augmentation is the enhancement of human senses by interpreting multisensory information.
- **Action.** Augmented actions focus on improving human's physical abilities.

Technology advancements have allowed people to have more precise functions from their artificial limbs, with robotics playing a large role. Augmented action technology can also improve human capabilities.

- **Cognitive.** This looks at how computers and technology can assist the cognitive process. Augmented cognition technology aims to help improve decision-making, memory and attention.



What Technologies are Used in Human Augmentation?

AI and machine learning (ML) is used to help improve human capabilities in various ways:

- **What is AI analytics?** Predictive AI analytics can predict trends and events that humans alone may not be able to. Virtual assistants also work to aid human workers by scheduling and setting reminders, offering insightful recommendations, and collecting and presenting relevant information. An example of this is agent assist in contact centers.
- **What is agent assist?** Agent assist technology provides live support for contact center agents, offering guidance, problem-solving pathways and presenting relevant information based on the issues and behaviors it detects.
- **What is a chatbot?** Chatbots can be used to help people find the information they need more quickly, and be presented with solutions and advice for queries and problems.

Pros of Human Augmentation

As the core aim is to improve the human experience, human augmentation has various benefits.

Enhanced Capabilities & Collaboration

Human augmentation allows humans to enhance their capabilities, whether helping to compensate for an impairment, improving existing human skills, or expanding human capabilities beyond what is currently possible. Human augmentation creates new possibilities for what it means to be human and can allow humans to excel beyond their natural limits.

Optimized Performance

Human augmentation enables us to achieve more. Whether through optimized senses, greater cognitive processes, or being physically more capable. Through the power of technology, humans can accomplish more and be stronger, smarter and healthier than ever before.

Range of Applications

Human augmentation can be used in a variety of industries – and looks differently in each.

- **Healthcare.** Human augmentation has obvious applications in the world of healthcare solutions, helping people to regain certain abilities. This includes cochlear implants, bionic eyes, or brain-computer interfaces (BCI) that allow people to control computers, prosthetics or robots using their minds.
- **Manufacturing.** AI and ML can help improve supply chains by predicting supply levels, automating reorders and scheduling maintenance.
- **Finance.** AI can work in data analysis to recognize and stop fraud, as well as ensure organizations are in compliance with regulations.
- **The Military.** The ability of human augmentation to improve human abilities, especially strength and decision-making, makes it desirable to militaries in order to develop a competitive edge. This can range from AI analytics improving decision-making to exoskeletons making people physically stronger.

Cons of Human Augmentation

Human augmentation technologies are still developing and can be viewed as controversial by some, and many of these technologies have yet to reach their full potential.

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9. Generative Adversarial Network (GAN)

Definition

A generative adversarial network (GAN) is a machine learning (ML) model in which two neural networks compete with each other by using deep learning methods to become more accurate in their predictions. GANs typically run unsupervised and use a cooperative zero-sum game framework to learn, where one person's gain equals another person's loss.

The two neural networks that make up a GAN are referred to as the *generator* and the *discriminator*. The generator is a convolutional neural network and the discriminator is a de convolutional neural network. The goal of the generator is to artificially manufacture outputs that could easily be mistaken for real data. The goal of the discriminator is to identify which of the outputs it receives have been artificially created.

Essentially, generative models create their own training data. While the generator is trained to produce false data, the discriminator network is taught to distinguish between the generator's manufactured data and true examples. If the discriminator rapidly recognizes the fake data that the generator produces -- such as an image that isn't a human face -- the generator suffers a penalty. As the feedback loop between the adversarial networks continues, the generator will begin to produce higher-quality and more believable output and the discriminator will become better at flagging data that has been artificially created. For instance, a generative adversarial network can be trained to create realistic-looking images of human faces that don't belong to any real person.

How GANs work

GANs are typically divided into the following three categories

- **Generative.** This describes how data is generated in terms of a probabilistic model.
- **Adversarial.** A model is trained in an adversarial setting.
- **Networks.** Deep neural networks can be used as artificial intelligence (AI) algorithms for training purposes.

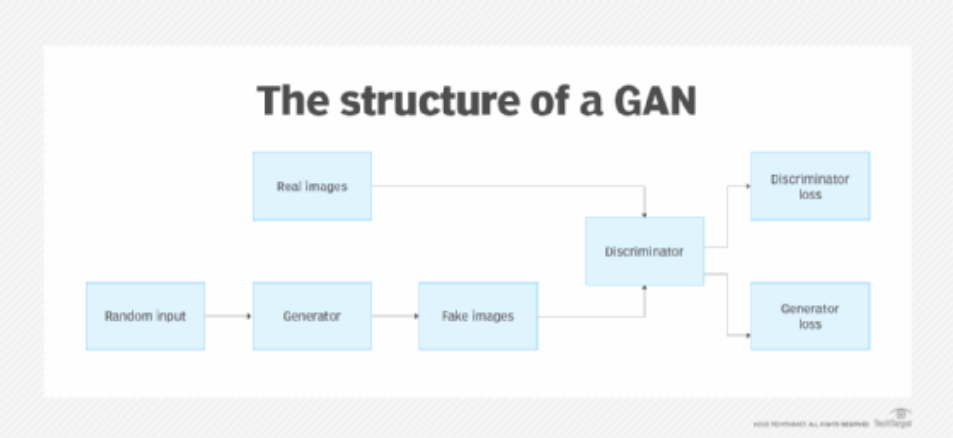
The first step in establishing a GAN is to identify the desired end output and gather an initial training data set based on those parameters. This data is then randomized and input into the generator until it acquires basic accuracy in producing outputs. Next, the generated samples or images are fed into the discriminator along with actual data points from the original concept.

After the generator and discriminator models have processed the data, optimization with backpropagation starts. The discriminator filters through the information and returns a probability between 0 and 1 to represent each image's authenticity -- 1 correlates with real images and 0 correlates with fake. These values are then manually checked for success and repeated until the desired outcome is reached.

A GAN typically takes the following steps:

1. The generator outputs an image after accepting random numbers.
2. The discriminator receives this created image in addition to a stream of photos from the real, ground-truth data set.
3. The discriminator inputs both real and fake images and outputs probabilities -- a value between 0 and 1 -- where 1 indicates a prediction of authenticity and 0 indicates a fake.

This creates a double feedback loop where the discriminator is in a feedback loop with the ground truth of the images and the generator is in a feedback loop with the discriminator.



An image showing how GAN works.

Types of GANs

GANs come in a variety of forms and can be used for various tasks. The following are the most common GAN types:

- **Vanilla GAN.** This is the simplest of all GANs and its algorithm tries to optimize the mathematical

equation using stochastic gradient descent, which is a method of learning an entire data set by going through one example at a time. It consists of a generator and a discriminator. The classification and creation of generated images is done using the generators and discriminators as straightforward multi-layer perceptrons. The discriminator seeks to determine the likelihood that the input belongs to a particular class while the generator collects the distribution of the data.

- **Conditional GAN.** By applying class labels, this kind of GAN enables the conditioning of the network with new and specific information. As a result, during GAN training, the network receives the images with their actual labels, such as "rose," "sunflower" or "tulip" to help it learn how to distinguish between them.
- **Deep convolutional GAN.** This GAN uses a deep convolutional neural network for producing high-resolution image generation that can be differentiated.
- Convolutions are a technique for drawing out important information from the generated data. They function particularly well with images, enabling the network to quickly absorb the essential details.
- **CycleGAN.** This is the most common GAN architecture and is generally used to learn how to transform between images of various styles. For instance, a network can be taught how to alter an image from winter to summer or from an image of a horse to a zebra. One of the most well-known applications of CycleGAN is FaceApp, which alters human faces into various age groups.
- **StyleGAN.** Researchers from Nvidia released StyleGAN in December 2018 and proposed significant improvements to the original generator architecture models. StyleGAN can produce photorealistic, high-quality photos of faces, but users can modify the model to alter the appearance of the images that are produced.
- **Super resolution GAN.** With this type of GAN, a low-resolution image can be changed into a more detailed one. Super-resolution GANs increase the image resolution by filling in blurry spots.

Popular use cases for GANs

GANs are becoming a popular ML model for online retail sales because of their ability to understand and recreate visual content with increasingly remarkable accuracy. They can be used for a variety of tasks, including anomaly detection, data augmentation, picture synthesis, and text-to-image and image-to-image translation.

Common use cases of GANs include the following:

- Filling in images from an outline.
- Generating a realistic image from text.
- Producing photorealistic depictions of product prototypes.
- Converting black and white imagery into color.

- Photo translations from image sketches or semantic images that are especially useful in the healthcare industry for diagnoses.

In video production, GANs can be used to perform the following:

- Model patterns of human behavior and movement within a frame.
- Predict subsequent video frames.
- Create a deep fake.

Other use cases of GANs include text-to-speech for the generation of realistic speech sounds. Furthermore, GAN-based generative AI models can generate text for blogs, articles and product descriptions.

These AI-generated texts can be used for a variety of purposes, including advertising, social media content, research and communication.

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10. Zero Trust Becomes the Norm

"Zero Trust" searches have increased by 642%. General awareness of this security concept started to take off in 2019.

Huge companies like Cisco are investing heavily to develop Zero Trust solutions.

Most information security frameworks used by organizations use traditional trust authentication methods (like passwords).

These frameworks focus on protecting network access.

And they assume that anyone that has access to the network should be able to access any data and resources they'd like.

There's a big downside to this approach: a bad actor who has got in via any entry point can then move around freely to access all data or delete it altogether.

Zero Trust information security models aim to prevent this potential vulnerability.

Zero Trust models replace the old assumption that every user within an organization's network can be trusted.

Instead, nobody is trusted, whether they're already inside or outside the network. Verification is required from everyone trying to gain access to **any** resource on the network.

This security architecture is quickly moving from just a computer science concept to industry best practice.

And it’s little wonder why: IBM reports that the average data breach costs a company $3.86 million damages. and that it takes an average of 280 days to fully recover.

We will see demand for this technology continue to skyrocket in 2024 and beyond as businesses adopt zero-trust security to mitigate this risk.

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11. Kotlin Overtakes Java

Kotlin is a general-purpose programming language that first appeared in 2011.

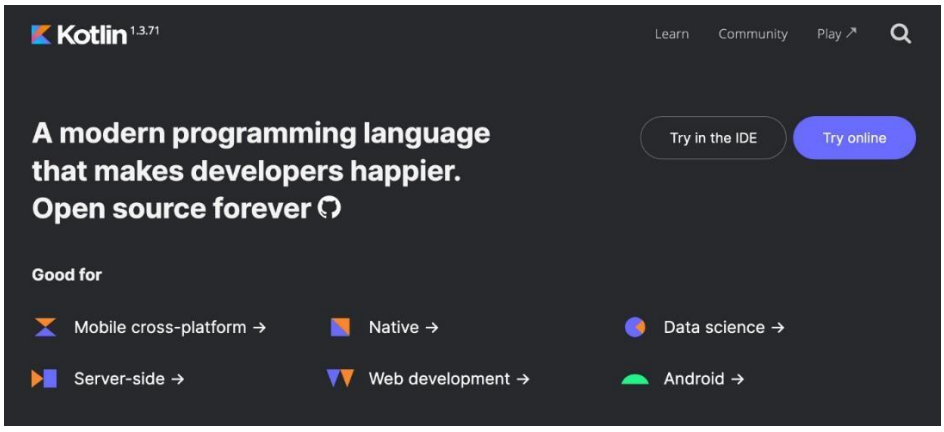
Kotlin” searches are up 95% in 5 years. Interest in this programming language rocketed in 2022.

It’s designed specifically to be a more concise and streamlined version of Java.

And so it works for both JVM (Java Virtual Machine) and Android development.

There are over 7 million Java programmers in the world right now. Since Kotlin offers big advantages over Java, we can expect more and more programmers to make the switch between 2023 and 2026.

Google even made the announcement in 2019 that Kotlin is now its preferred language for Android app developers.



Kotlin is billed as a modern programming language that makes developers happier.

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12. Demand For Cybersecurity Expertise Skyrockets

"Hack The Box" searches have increased by 285% over 5 years.

According to CNET, at least 7.9 billion records (including credit card numbers, home addresses and phone numbers) were exposed through data breaches in 2019 alone.

As a consequence, large numbers of companies seek cybersecurity expertise to protect themselves

Hack The Box is a hacker haven both in terms of content and design.

"Hack The Box is an online platform that has a wealth of educational information and hundreds of cybersecurity-themed challenges.

And they have 290,000 active users that test and improve their skills in penetration testing.

So they've become the go-to place for companies to recruit new talent for their cybersecurity teams. themselves.

And software that helps people to identify if they've had their credentials compromised by data breaches will also trend.

One of the most well-known tools currently is Have I Been Pawned.

It allows you to search across multiple data breaches to see if your email address has been compromised.

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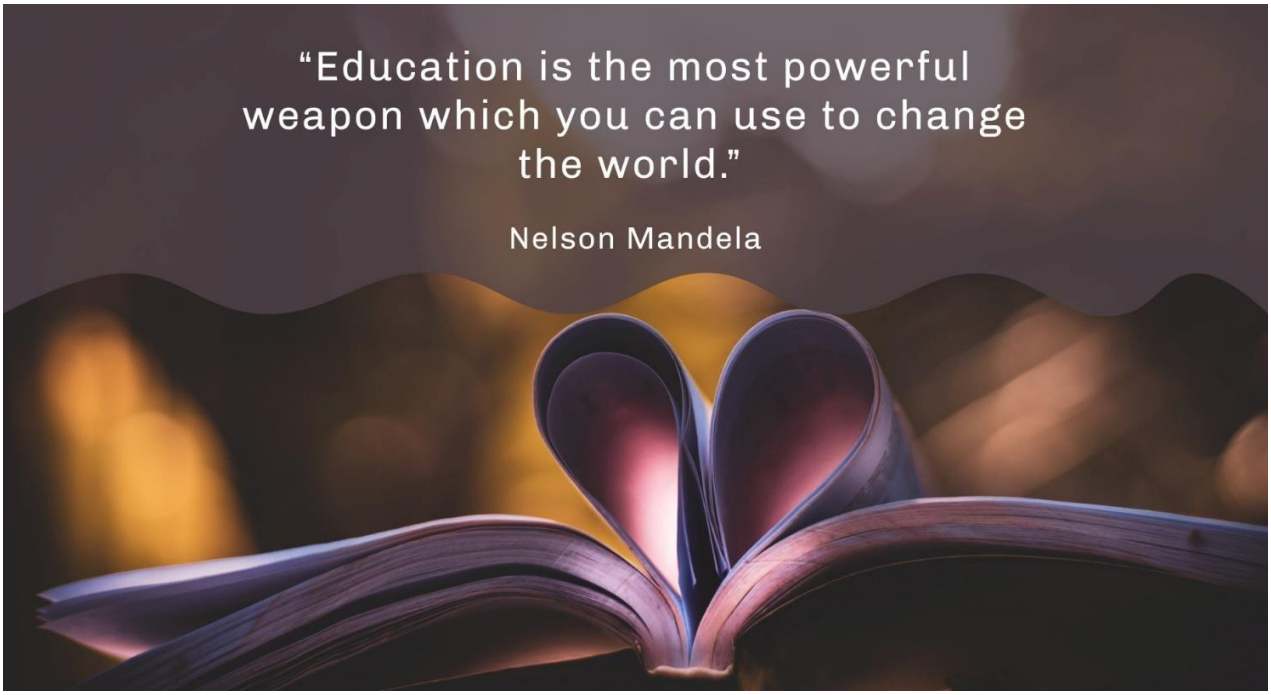
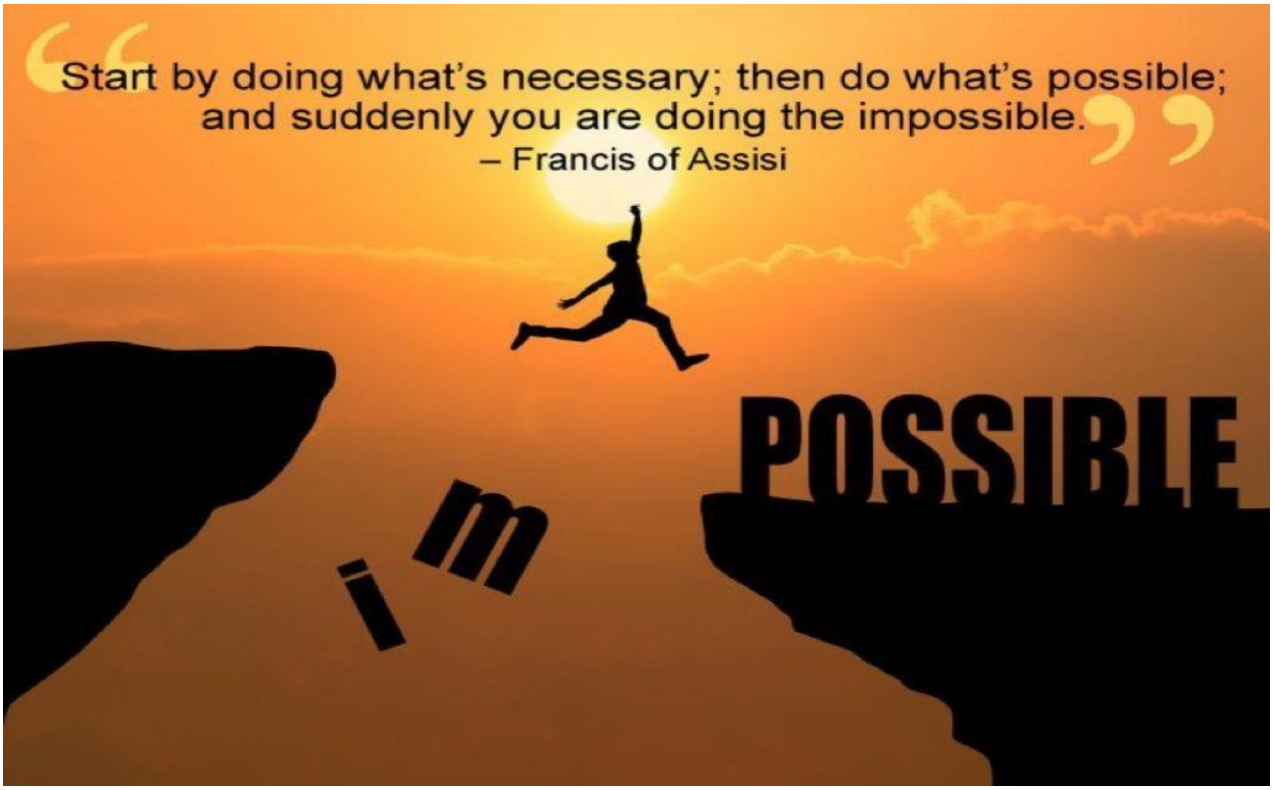

“Education is the most powerful weapon which you can use to change the world.”
Nelson Mandela


“Start by doing what’s necessary; then do what’s possible; and suddenly you are doing the impossible.”
– Francis of Assisi
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