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Editorial

We would like to wholeheartedly thank our honourable Chairman, Secretary, Executive Director and Principal for their continuous encouragement and constant support for bringing out the magazine. We profoundly thank our Heads of the Departments for encouraging and motivating us to lead the magazine a successful one right from the beginning. Ishare serves as a platform for updating and enhancing upcoming technologies in Information and Communication. We are grateful to all the contributors to this magazine so far. The magazine has been sent to almost 60 Institutions in and around Tamilnadu. So far we have received feedbacks and appreciations from various Institutions.

We would be very pleased to receive your feedbacks. Please send your feedbacks to ishare@ksrcas.edu

By,

Editorial Board

CONTENT

1. NEW INNOVATIONS THAT COULD CHANGE THE WORLD

V.ABINAYA
III B.SC CS "D"

Since 2001, the MIT Technology Review has released their list of the 10 most important technological innovations that emerged each year. Previous years' lists included Agricultural Drones, ultra private Smart Phones, Brain Mapping, Neuron Orphic Chips, Genome Editing, Mobile Collaboration, and Micro 3-D Printing. The list in 2015 included the following:

1. Magic Leap

Inventors have tried to develop realistic three-dimensional (3D) depictions of images for many years. Traditional 3D images fool your eyes by presenting multiple images at different angles. This approach works, but the downside is that it makes some users feel dizzy or ill. Magic Leap's technology uses a very small projector to reflect light off a clear lens directly into the user's retina. The result is an incomparably realistic image that appears in the real world. Beyond the implications for entertainment industry, the technology could provide incredibly realistic training for medical professionals or Engineers.

2. Nano-Architecture

Conventional wisdom dictates that heavy materials are strong and light materials are more flexible. Nano-architectures prove that it's possible to turn those rules on their head. Engineers can fabricate materials with a complex web of

metal trusses. In the future, super strong and light materials could improve a variety of products. Currently researchers at MIT, Caltech, and Lawrence Livermore National Laboratory are examining how to use these materials in high-density batteries and insulation.

3. Car-to-Car Communication

Many people are uncomfortable with the idea of "driverless cars". General Motors is working with the University of Michigan and the National Highway Traffic Safety Administration to develop new software for cars that enhance safety without relinquishing control. Car-to-car communication systems transmit their position, speed, break engagement, and other data to all vehicles that are nearby. Algorithms sift through data that is collected many times each second and alert the driver in case of danger. These systems have the potential to make driving much safer and greatly reduce the number of accidents.

4. Project Loon

Google whimsically named Project Loon aims to ensure that every person has Internet access. The effort relies on balloons that float in the stratosphere. Google plans to lease the Project Loon platform to wireless carriers around the world. This allows Internet service providers to use wireless spectrum they currently own and connect it to the balloon network. Google has recently developed an innovative system that makes it possible to pilot the balloons without an on board fuel source. This new development means that it could possibly provide Internet access to the every corner of the planet.

5. Liquid Biopsy

Early detection is a potent weapon in medicine's fight against disease. Many maladies including cancer cause noticeable symptoms when the disease is in an advanced stage. Labs at the Chinese University of Hong Kong and at Johns Hopkins University are developing blood tests that could reveal early stage cancers. When cancerous cells die they release DNA into the bloodstream, typically in very small quantities. A simple blood test could detect these strands of DNA and allow doctors to begin early treatment. The ability to find cancer early could revolutionize treatment of the disease and save countless lives.

6. Mega Scale Desalination

Human civilization relies on the availability of drinkable water. Today 700 million people live in areas without access to sufficient amounts of clean drinking water. Many nations have experimented with desalination plants to meet their water demands. Desalination takes salty ocean water and makes it potable. Israel's Sorek desalination plant is now operating at peak capacity. Several advances in reverse-osmosis technology allow Sorek to sell their water to the Israeli Water Authority for 58 cents for 1,000 litres. The plant's technology uses less energy than traditional desalination procedures which could make it a viable alternative for water starved communities.

7. Apple Pay

Apple Pay allows any person with an iPhone to make payments quickly and securely. Many companies have tried to develop their own mobile payment platforms but Apple's is likely different. The success of the iPhone means that Apple Pay already has a broad potential user base. New phones have built in finger

print sensors which increase security. Apple Pay could make checking out at the grocery store a frictionless and more enjoyable process.

8. Brain or Ganoids

For an organ that is essential to human civilization, little is known about the brain. Researchers at the Institute of Molecular Biotechnology and Massachusetts General Hospital have developed a new procedure for building brain or ganoids. Using a specialized procedure they can transform skin cells into stem cells, which can turn into clumps of neurons. Observing the clumps of neurons develop could help unlock many questions about how the brain works. This new research path could potentially help to fight numerous neurological disorders including mental illness and Alzheimer's.

9. Supercharged Photosynthesis

The world's population continues to grow at a steady clip. As the planet grows more crowded it presents a challenge to the Earth's farmers. To address rising demand, scientists are trying to genetically modify plants like rice to boost their growth. The International Rice Research Institute is leading a consortium of scientists to insert a gene from corn and sugarcane into rice plants. This gene supercharges the photosynthesis process allowing the plant to grow larger in less time. The research is in its early stages but could play a critical role in feeding future generations.

10. Internet of DNA

DNA plays a powerful role in shaping the lives of people everywhere. Doctors are often ill equipped to treat rare medical conditions. If researchers were able to easily compare genes from people all over the world it could revolutionize

the treatment of disease. Currently, digital records that include DNA sequences are very large making them difficult to share. In addition, privacy is a serious concern. The Global Alliance for Genomics and Health is trying to solve both of these issues with a peer-to-peer based query system that would protect privacy and make it easier to study genomic sequences.

2. GRAPHICS TABLET

V.BAPPITHA
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FIG: Wacom Bamboo Capture tablet and pen

A **graphics tablet** or **digitizer** is a computer input device that enables a user to hand-draw images, animations and graphics, similar to the way a person draws images with a pencil and paper. These tablets may also be used to capture data or handwritten signatures. It can also be used to trace an image from a piece of paper which is taped or otherwise secured to the surface. Capturing data in this way, by tracing or entering the corners of linear poly-lines or shapes, is called digitizing.

The device consists of a flat surface upon which the user may "draw" or trace an image using an attached stylus, a pen-like drawing apparatus. The image is displayed on the computer monitor, although some graphics tablets also have a screen.

Some tablets are intended as a replacement for the mouse as the primary pointing and navigation device for desktop computers.

History

The first electronic handwriting device was the Telautograph, patented by Elisha Gray in 1888. Elisha Gray is best known as a contemporaneous inventor of the telephone to Alexander Graham Bell.

The first graphics tablet resembling contemporary tablets and used for handwriting recognition by a computer was the *Stylator* in 1957. Better known (and often misstated as the first digitizer tablet) is the RAND Tablet also known as the *Grafacon* (for Graphic Converter), introduced in 1964. The RAND Tablet employed a grid of wires under the surface of the pad that encoded horizontal and vertical coordinates in a small magnetic signal. The stylus would receive the magnetic signal, which could then be decoded back as coordinate information.

The acoustic tablet, or *spark tablet*, used a stylus that generated clicks with a spark plug. The clicks were then triangulated by a series of microphones to locate the pen in space. The system was fairly complex and expensive, and the sensors were susceptible to interference by external noise.

Digitizers were popularized in the mid-1970s and early 1980s by the commercial success of the ID (Intelligent Digitizer) and BitPad manufactured by the Summagraphics Corp. These digitizers were used as the input device for many high-end CAD (Computer Aided Design) systems as well as bundled with PCs and PC-based CAD software like AutoCAD.

Summagraphics also made an OEM version of its BitPad which was sold by Apple Computer as the *Apple Graphics Tablet* accessory to their Apple II. These tablets used a magnetostriction technology which used wires made of a special alloy stretched over a solid substrate to accurately locate the tip of a stylus or the center of a digitizer cursor on the surface of the tablet. This technology also allowed Proximity or "Z" axis measurement.

The first home computer graphics tablet was the KoalaPad. Though originally designed for the Apple II, the Koala eventually broadened its applicability to practically all home computers with graphics support, examples of which include the TRS-80 Color Computer, Commodore 64, and Atari 8-bit family. Competing tablets were eventually produced; the tablets produced by Atari were generally considered to be of high quality.

In 1981, musician Todd Rundgren created the first color graphics tablet software for personal computers, which was licensed to Apple as the Utopia Graphics Tablet System.

In the 1980s, several vendors of graphics tablets began to include additional functions, such as handwriting recognition and on-tablet menus.

Operation

There have been many attempts to categorize the technologies that have been used for graphics tablets:

- ✓ **Passive tablets**

Passive tablets, most notably those by Wacom, make use of electromagnetic induction technology, where the horizontal and vertical wires of the tablet operate as both transmitting and receiving coils (as opposed to the wires of the RAND Tablet which only transmit). The tablet generates an electromagnetic signal, which is received by the LC circuit in the stylus. The wires in the tablet then change to a receiving mode and read the signal generated by the stylus. Modern arrangements also provide pressure sensitivity and one or more buttons, with the electronics for this information present in the stylus. On older tablets, changing the pressure on the stylus nib or pressing a button changed the properties of the LC circuit, affecting the signal generated by the pen, which modern ones often encode into the signal as a digital data stream. By using electromagnetic signals, the tablet is able to sense the stylus position without the stylus having to even touch the surface, and powering the pen with this signal means that devices used with the tablet

never need batteries. Activslate 50, the model used with Promethean Ltd white boards, also uses a hybrid of this technology.

✓ **Active tablets**

Active tablets differ in that the stylus used contains self-powered electronics that generate and transmit a signal to the tablet. These styluses rely on an internal battery rather than the tablet for their power, resulting in a bulkier stylus. Eliminating the need to power the pen means that such tablets may listen for pen signals constantly, as they do not have to alternate between transmit and receive modes, which can result in less jitter.

✓ **Optical tablets**

Optical tablets operate by a very small digital camera in the stylus, and then doing pattern matching on the image of the paper. The most successful example is the technology developed by Anoto.

✓ **Acoustic tablets**

Early models were described as spark tablets—a small sound generator was mounted in the stylus, and the acoustic signal picked up by two microphones placed near the writing surface. Some modern designs are able to read positions in three dimensions.

✓ **Capacitive tablets**

These tablets have also been designed to use an electrostatic or capacitive signal. Scriptel's designs are one example of a high-performance tablet detecting an electrostatic signal. Unlike the type of

capacitive design used for touchscreens, the Scriptel design is able to detect the position of the pen while it is in proximity to, or hovering above, the tablet. Many multi-touch tablets use capacitive sensing.

For all these technologies, the tablet can use the received signal to also determine the distance of the stylus from the surface of the tablet, the tilt (angle from vertical) of the stylus, and other information in addition to the horizontal and vertical positions, such as clicking buttons of the stylus or the rotation of the stylus.

Compared to touchscreens, a graphics tablet generally offers much higher precision, the ability to track an object which is not touching the tablet, and can gather much more information about the stylus, but is typically more expensive, and can only be used with the special stylus or other accessories.

Some tablets, especially inexpensive ones aimed at young children, come with a corded stylus, using technology similar to older RAND tablets.

Styluses

✓ **Puck**

After styluses, pucks are the most commonly used tablet accessory. A puck is a mouse-like device that can detect its absolute position and rotation. This is opposed to mice, which can only sense their relative velocity on a surface (most tablet drivers are capable of allowing a puck to emulate a mouse in operation, and many pucks are marketed as

"mice".) Pucks range in size and shape; some are externally indistinguishable from a mouse, while others are fairly large device with dozens of buttons and controls. Professional pucks often have a reticle or loupe which allows the user to see the exact point on the tablet's surface targeted by the puck, for detailed tracing and computer aided design (CAD) work.

Embedded LCD tablets

Some graphics tablets incorporate an LCD into the tablet itself, allowing the user to draw directly on the display surface.

Graphics tablet/screen hybrids offer advantages over both touch screens and ordinary tablets. Unlike touch screens, they offer pressure sensitivity, and their resolution is generally higher. While their pressure sensitivity and resolution are typically no better than those of ordinary tablets, they offer the additional advantage of directly seeing the location of the physical pen device relatively to the image on the screen. This often allows for increased accuracy and a more tactile, "real" feeling to the use of the device.

Wacom holds many patents on the key technologies for graphic tablets, which forces competitors to use other technologies or license Wacom's. The displays are often sold for thousands of dollars. For instance, the Wacom Cintiq series ranges from just below US$1,000 to over US$2,000.

Some commercially available graphics tablet-screen hybrids include:

- Cintiq from Wacom
- PenTool from Huion
- Hitachi Starboard
- Monoprice 19-Inch Interactive Display
- Bosto Kingtee
- Yiynova's MVP10U, MSP19U and MVP22U products
- USync's PenStar products
- SenTIP from Hanvon
- The GD Itronix "Duo Touch" tablet PC products
- The p-active XPC-1710a and XPC-1910a
- Improv Electronics' Boogie Boards

Uses

Graphics tablets, because of their stylus-based interface and ability to detect some or all of pressure, tilt, and other attributes of the stylus and its interaction with the tablet, are widely considered to offer a very natural way to create computer graphics, especially two-dimensional computer graphics. Indeed, many graphics packages can make use of the pressure (and, sometimes, stylus tilt or rotation) information generated by a tablet, by modifying the brush size, shape, opacity, color, or other attributes based on data received from the graphics tablet.

In East Asia, graphics tablets, known as "pen tablets", are widely used in conjunction with input-method editor software (IMEs) to write Chinese, Japanese, Korean characters (CJK). The technology is popular

and inexpensive and offers a method for interacting with the computer in a more natural way than typing on the keyboard, with the pen tablet supplanting the role of the computer mouse. Uptake of handwriting recognition among users who use alphabetic scripts has been slower.

Graphics tablets are also very commonly found in the artistic world. Using a pen on a graphics tablet combined with a graphics-editing program, such as Adobe Photoshop, gives artists a lot of precision while creating digital drawings. Photographers can also find working with a graphics tablet during their post processing can really speed up tasks like creating a detailed layer mask or dodging and burning.

Educators make use of tablets in classrooms to project handwritten notes or lessons and to allow students to do the same, as well as providing feedback on student work submitted electronically. Online teachers may also use a tablet for marking student work, or for live tutorials or lessons, especially where complex visual information or mathematical equations are required. Students are also increasingly using them as note-taking devices, especially during university lectures while following along with the lecturer.

Tablets are also popular for technical drawings and CAD, as one can typically put a piece of paper on them without interfering with their function.

Finally, tablets are gaining popularity as a replacement for the computer mouse as a pointing device. They can feel more intuitive to some users than a mouse, as the position of a pen on a tablet typically corresponds to the location of the pointer on the GUI shown on the computer screen. Those artists using a pen for graphics work will as a matter of convenience use a tablet and pen for standard computer operations rather than put down the pen and find a mouse.

Graphics tablets are available in various sizes and price ranges; A6-sized tablets being relatively inexpensive and A3-sized tablets far more expensive. Modern tablets usually connect to the computer via a USB interface.

Similar devices

Interactive whiteboards offer high resolution wall size graphic tablets up to 95" along with options for pressure and multiple input. These are becoming commonplace in schools and meeting rooms around the world.

Touch screens like those found on some tablet computers, iPads, and the Nintendo DS are operated in similar ways, but they usually use either optical grids or a pressure-sensitive film instead, and therefore they do not need a special pointing device.

The graphics tablet are also used for Audio Haptic products where blind or visually impaired people touch swelled graphics on a graphic

tablet and get audio feedback from that. The product that is using this technology is called Tactile Talking Tablet or T3.

3. HOW TO GET MEANINGFUL INFORMATION OUT OF BIG DATA

Ms. R. SANGEETHA
ASST. PROFESSOR IN CS

Every second trillions of data bits are accumulated and stored. All these data bits make no sense if you don´t know how to sort them. Now University of Southern Denmark (SDU) researchers present a tool that helps researchers sort data and retrieve meaningful knowledge from the data jungle, presenting their work in the journal *Nature Methods*.

Pretend for a second that you work with obesity research and that you have a trillion bits of obesity related data stored on a server: What do overweight people eat? How do they sleep? What time of day do they eat?

You suspect that the patients' lifestyle may influence their weight, and you can ask your computer to compare weight change and the number of consumed cheese sandwiches to see if there is a link. Then you can ask for another comparison and yet another. And so you can continue for a very long time and collect a wide range of comparisons for your research or you can approach your data in a way that is not only much faster, but also will discover links, you might not even have

considered. Then you will not only be able to put your own suspicions about weight and lifestyle to the test -- perhaps you will discover completely unexpected links, for instance that patients who are losing weight, more often eat gouda than cheddar sandwiches.

- ✓ **Looking for the hidden patterns**

This is what clustering is about: To look for hidden patterns that we are unable to see ourselves; to ask a computer to group objects which share common traits together into groups.

In principle, it could be any kind of data: patients, proteins or maybe planets in distant galaxies.

At SDU Assistant Professor and head of the research group Practical Computer Science & Bioinformatics, Richard Rottger, and his colleagues from the Department of Mathematics and Computer Science use clustering for example to find regulatory networks in pathogenic organisms allowing for a fundamental understanding of these organisms without the dangerous and expensive need for wet-lab studies.

But clustering is a complicated way to work -- even for a computer scientist and regardless of the fact that clustering is a long standing problem in computer science and one of the most fundamental data analysis procedures:

- ✓ **Clustering should be easy for all scientists, not just computer scientists**

"Today there are hundreds of comparable but different clustering tools out there; but each of them requires very specific settings and often a deep understanding of the underlying algorithm. There is no overview of what is out there, what should be used when and there is no objective comparison of the available possibilities," explains Richard Rottger.

Therefore, he and his colleagues, Ph.D. student Christian Wiwie and Associate Professor Jan Baumbach, have now created a tool that can provide an objective overview of all available cluster tools, so that researchers get an unbiased, objective overview and suggestions to what tool to use with what parameters in which setting. "The entire process is speed-up tremendously and made more objective now," says Rottger.

The tool is called ClustEval.

4. 3D PRINTING REVOLUTIONIZE FASHION

D.MYTHILI,
III-B.Sc CS-"D",

Will 3D Printing Revolutionize Fashion?

If successful, 3D printing will cause the fashion industry to undergo a profound transformation: shorter lead time, production in smaller quantities, easy customization, obsolescence of many jobs, legal issues concerning copyright, says leading consultant from the inkjet industry, Aditya Chandavarkar.

We live in an age that is witness to what many are calling

***the Third Industrial Revolution**:*

3D printing, more professionally called additive manufacturing. It has the potential to move us away from the era of mass production and bring us to a new reality of Customizable, one-off production. 3D printing or additive manufacturing is the broader term

For tool-less manufacturing methods which enables manufacturing of components from 3D model data, usually layer upon layer, as opposed to conventional manufacturing methodologies. This term is also used generically as a synonym for rapid prototyping. The scope of 3D printing is endless - from instruments and toys to robots and mechanical parts, there's almost no limit to what a 3D printer can create. Architects and scientists have been using 3D printing to create models for decades, but it's beginning to show even more potential. From 3D printed buildings to 3D printed hearing aids, this technology could be revolutionary for a variety of industries.

Fashion is no exception, and designers started to experiment with 3D printing around 2010. It is already being used to create new types of art and fashion. It enables designers to produce designs that are complicated, even impossible, to manufacture and this inevitably fuels creativity and innovation. It allows innovation in technique and material and ideas can materialize within minutes, contrary to the traditional manufacturing process. If designers fail with 3D printing, they can easily try again.

Recent successful examples, which have got considerably media coverage, have been the work showcased by Francis Bitonti/Michael Schmidt and Iris van Herpen at Paris Fashion Week.

Architect Francis Bitonti and fashion designer Michael Schmidt collaborated to make a dress for burlesque diva Dita Von Teese. She wore the garment to the Ace Hotel in March for a convention hosted by online 3D printing marketplace, Shape ways. The dress consisted of 2,500 intersecting joint pieces that were linked together by hand. The finishing touches included a black lacquer coating and 12,000 hand-placed Swarovski crystals reflecting Schmidt's iconic glam that attracts a clientele including Madonna, Rihanna and Lady Gaga...

5. GARTNER HIGHLIGHTS TOP 10 STRATEGIC TECHNOLOGY TRENDS FOR GOVERNMENT

G.NIVETHA
III B.SC CS″D″

Technologies that enable new service models for digital government must be at the top of the list for government organizations as they prioritize technology investments, according to Gartner, Inc.

Gartner has identified the 10 most important technology trends for government in 2015 in order to help CIOs and IT leaders assess critical

strategic technologies and plan their enterprises' or agencies' IT roadmaps.

Gartner Research Director Rick Howard said organizational culture, legacy IT systems and business processes, stretched IT budgets, and the lack of critical IT skills are among the inhibitors for government CIOs when evaluating and selecting new technology or sourcing.

"These strategic technology trends have substantial disruptive potential that is just beginning to materialize and will reach an inflection point within the next three to five years," said Mr. Howard. "Public sector CIOs can capitalize on the value of these trends by first determining how they will impact government program operations or service delivery models, and then by building the organizational capabilities and capacity needed to support them."

1) Digital Workplace

The government workforce of the future will be populated with digitally literate employees, from frontline workers to top-level executives. The digital workplace is open, flat and democratic. It is the organizational manifestation of open government. CIOs and IT leaders must take a leadership role in building a more social, mobile, accessible and information-driven work environment.

2) Multichannel Citizen Engagement

Government jurisdictions with multiple channels (municipal offices, physical mail correspondence, contact centres, e-government websites and mobile apps) are struggling to provide their citizens with one coherent view of the enterprise. A multichannel strategy, in the context of digital government, means more than delivering a seamless experience to stakeholders. It also is about delivering interactions that are connected, consistent, convenient, collaborative, customized, clear and transparent. To produce those outcomes, policymakers and CIOs must radically redesign service models by combining traditional marketing tools (such as focus groups, user experience labs, surveys and stakeholder analysis) with new approaches (such as citizen co-creation initiatives, agile development and design thinking).

3) Open Any Data

The number and variety of public-facing open datasets and Web APIs published by all tiers of governments worldwide continue to increase. Gartner's view is that government open data is here to stay, but it will take a decade or more before its maximum utility is realized.

The rapid growth of open datasets among early mover organizations and flat or declining budgets create sustainability challenges to government open data programs. Open data is not free. For most government agencies, open data programs are an unfunded or underfunded cost center. The "value" of open data must become tangible

to government in terms of how its availability can quantifiably contribute to operational efficiency or effectiveness, let alone how it supports economic development, national productivity or commercial ventures. Gartner predicts that by 2018, more than 30 percent of digital government projects will treat any data as open data.

4) Citizen e-ID

Citizen electronic identification (e-ID) refers to an orchestrated set of processes and technologies managed by governments to provide a trusted domain for how public services will be accessed by citizens on any device or through any online channel (Web, mobile devices or applications) — and, in some cases, using smart card readers attached to PCs or kiosks. It has been a long-standing yet elusive goal of many government planners to provide citizens with integrated and seamless access to all government services.

To be successful, citizen e-ID programs require a trusted relationship between government and commercial vendors, with a focus on business value, interoperability and user experience. Regardless of whether a government agency serves as the primary citizen e-ID identity broker or contracts with a commercial identity and access management as a service (IDaaS) provider, CIOs must ensure that personal privacy and data confidentiality requirements are met.

5) Edge Analytics

Analytics is rapidly evolving from a separate and distinct business function into a fluid aspect of system operations and user experiences. The capabilities of edge analytics are particularly relevant as government CIOs and agency program leaders design new mobile services that are augmented by situational context and real-time interactions.

Edge analytics possess three distinct characteristics. Primarily, they are advanced — they apply predictive and prescriptive algorithms and cognitive computing to make real-time assessments about what will happen or what should happen. Second, edge analytics are pervasive. They are embedded into business processes and applications to deliver responsive and agile organizational performance. Finally, edge analytics are invisible. They operate continuously in the background, tracking user activity, processing sensor and environmental data, dynamically adjusting workflows to enhance the user experience, or managing activities during events as they unfold.

6) Scalable Interoperability

Government agencies are starting to increasingly rely on data exchange with external partners in order to optimize their service delivery networks and business functions, such as cross-boundary

collaboration and service coordination, monitoring and outcome reporting.

Scalable interoperability offers government CIOs, enterprise architects and business process analysts an incremental, "just enough" approach to architecture and standards to deliver "soon enough" value. By narrowing the scope of interoperability initiatives, a motivated community of interest — that is, stakeholders who receive tangible benefits from improved data exchange — can agree to use application-neutral and source-neutral extensible identifiers, formats and protocols to achieve mutual goals.

7) Digital Government Platforms

In digital business, citizens should no longer have to navigate among various agencies and programs through vertical, first generation e-government Web portals in order to locate the services they seek. A digital government platform incorporates Service-Oriented Architecture (SOA) design patterns for the provision and use of enterprise services across multiple domains, systems and processes.

Vendor offerings are still at an early stage, and they focus primarily on supporting smart cities; examples include IBM Smarter Cities, Microsoft City Next, Cisco Smart +Connected Communities, SAP Urban Matters, Oracle's Solutions for Smart Cities and Capgemini's

Global Cities. Despite their focus on operational technologies and the Internet of Things (IoT), these platforms address many of the issues pertaining to the data exchange and event triggering that are typical of digital government.

8) Internet of Things

The IoT is the network of physical objects (fixed or mobile) that contains embedded technology to communicate, monitor, sense or interact with multiple environments. For government, the IoT enables the digital transformation of service strategies. Government agencies can expect IoT-driven changes in several different areas, including environmental or public infrastructure monitoring, emergency response, supply chain inspection, asset and fleet management, and traffic safety.

Government CIOs will need to approach the IoT strategically to evaluate how a growing base of intelligent objects and equipment can be combined with traditional Internet and IT systems to support breakthrough innovations in operational performance or public service delivery.

9) Web-Scale IT

Web-scale IT is a system-oriented architectural pattern of global-class computing that delivers the capabilities of large cloud service providers within an enterprise IT organization. Web-scale IT enables the

rapid and scalable development and delivery of Web-based IT services that leverage agile, lean and continuous delivery principles.

For government, the shift to Web-scale IT is a long-term trend with significant IT process, cultural and technology implications. Organizations adopting a Web-scale IT philosophy will largely eschew the acquisition of expensive, scalable computing, storage and networking resources in favour of lower-cost, open-source-derived hardware that bypasses the traditional infrastructure "middlemen." Consequently, traditional IT suppliers and delivery modes will become less relevant to government IT.

10) Hybrid Cloud (and IT)

Hybrid IT offers government CIOs a new operating model that supports their IT departments' ability to combine and manage on-premises infrastructure or internal private cloud with external cloud-based environments (community, public or hybrid) simultaneously. Hybrid IT is how IT departments are organized to secure, delivers, manage and govern these environments.

In government, where consolidation is high on many agendas, a hybrid IT model requires very different competencies to support various public cloud deployments. Government CIOs will need to reposition IT organizations from being full-service providers of IT services to being

their agencies' preferred brokers and managers of services offered predominantly through the cloud.

IEEE Technology News (#IEEECTN) is closely watching the top 10 communications technology trends that made headlines in 2015. Here is a topic thumbnail of how these trends are shaping our industry, and what is in 2015 and beyond.

1. 5G

As the next step in the continuous innovation and evolution of the mobile industry, 5G will not only be about a new air interface with faster speeds, but it will also address network congestion, energy efficiency, cost, reliability, and connection to billions of people and devices. In 2014 we heard of new antenna/RF technologies (Massive MIMO, wider bandwidths), proposed deployment of small cells in frequencies, shorter transmission time intervals, reduced latency, and possibly new modulation methods beyond OFDM. With a 2020 commercialization horizon, 2015 be the year when we move from these concepts to technology trials and standards development.

2. FIBER EVERYWHERE

2014 was the year of “fibber everywhere” propelled by efforts to improve connectivity and address demand increases from the use of high definition video, 3G/4G, streaming, podcast and other broadband services. This increased demand exposed existing bottlenecks in the communications infrastructure, and the solution that the doctor prescribed was a fresh new round of investments and activity in fibber. In developed markets, FTTH/FTTC dominated deployments in 2015. In the backbone network, Carrier Ethernet is well underway and it will continue to make inroads towards 100/400G switching hardware deployments, and around Tb/s of bandwidth.

3. VIRTUALIZATION, SDN & NFV

In 2015, the adoption of Open Stack , Open Daylight, OpNFV for software and services, and Open Compute for hardware supported more virtualized, more open source network computing platforms and architecture.

4. EVERYWHERE CONNECTIVITY FOR IoT & IoE

Over the last year we have seen heightened interest in the Internet of Things (IoT) and of Everything (IoE) including several acquisitions by major players such as Google’s purchase of Nest Labs for $3.2 billion. Bob Metcalfe, inventor of the Ethernet, said that the power of a

network increases proportionally by the square of the number of users (Metcalfe's Law) which puts IoT –forecasted to be 50 billion connections by 2020- in a powerful and strategic position. The challenge that IoT faces is that everything sits in isolation thus an IoT standard is a must.

5. COGNITIVE NETWORKS, BIG DATA

Communication systems handle volumes of data generated by embedded devices, mobile users, enterprises, contextual information, network protocols, location information and such. It is a vast amount of information: A global IP backbone generates over 20 billion records per day, amounting to over 1 TB per day! Processing and analyzing this "big data" and presenting insights in a timely fashion are becoming a reality with advanced analytics to understand the environment, to interpret events, and to act on them. This is a positive development that helps unleash the intelligence in communication systems where networks are no longer labelled "dumb pipes" but as smart cognitive networks.

6. CYBERSECURITY

On daily basis we heard of retailers (Target, Home Depot, Neiman Marcus), financial institutions (Chase), technology companies (Snap chat, eBay, Sony) being hacked. No one is cyber-safe, and the road to the future leads through new cyber security technologies beyond current

perimeter firewall-like defences. The coming year will bring significant changes in the industry as it responds to recent increases and sophistication of cyber attacks. We will see better solutions to protect devices and endpoints, advances in the default use of encryption, in authentication schemes, and in BYOD solutions.

7. GREEN COMMUNICATIONS

It is being reported that communications technologies are responsible for about 2-4% of all of carbon footprint generated by human activity. This highlights the need to focus on managing these numbers, and Green communications is doing just that. The trend is tackling first mobile networks because of their high energy use. Base stations and switching centers could count for between 60% and 85% of the energy used by an entire communication system. Environmentally friendly batteries, renewable energy sources, and intelligent management of the power systems are some of the proposed solutions. Besides this mobile network focus, there is a 2016 and beyond trend to manage total energy usage, compute-to-consumption ratios and performance KPIs for best in class green operations.

8. SMARTER SMARTPHONES, CONNECTED SENSORS

The indisputable rock-start of devices is the smart phone, and its future can’t be brighter. In 2014 we saw that only a few days after the iPhone 6 was released, there are already articles being written about the

next-generation iPhone 7. Size, shape, and capabilities of these ubiquitous communication devices continue evolving, and so are prices which, driven by cost and performance improvements in digital technologies, are falling rapidly.

Beyond smart phones, tablets, connected sensors and body-worn wear ables will also make headlines. Connected sensors will find their way into vehicles (smartcards), into urban areas (smart cies) and into our infrastructure (smart grid).

9. NETWORK NEUTRALITY, INTERNET GOVERNANCE

The Internet has been operating since its inception under “open” principles, i.e. an open standards-based network that treats all traffic in roughly the same way, i.e. no connection blocking, bandwidth transparency, universal connectivity, and best effort service. Can these principles be sustained in a new word of data-hungry applications and services? Is regulation needed to prevent traffic throttling, unfair raise of fees, and construction of preferential high-speed Internet lanes? In 2014, Network Neutrality (Net Neutrality) discussions covered these questions in the context of ISPs transit and peering, and CDNs. Governments and institutions around the world continued working on it during 2015.

10. MOLECULAR COMMUNICATIONS

Molecular communication is an emerging paradigm where bio-

nano machines (e.g., artificial cells, genetically engineered cells) communicate to perform coordinated actions. Unlike traditional communication systems which utilize electromagnetic waves, molecular communications utilize biological molecules both as carriers and as information. The advantages provided by this "molecular" approach to communications are size, biocompatibility, and bio stability. Examples of applications are drug delivery system (DDS), bio-hybrid implants, and lab-on-a-chip (LoC) systems. This trend is not ready for mass market but with an approach so radically different to Today's communications, following its developments is a must.

Textile takes a step towards the future with IT:

The infrastructure of any industry is based as much on technical support system as it is on human resource.

The expanding world of flawless machines and superior software program has made it mandatory for industries to adapt to technology to communicate with customers, find prospective consumers, understand market requirements, and keep an inventory and many other aspects.

What was once a Herculean task, either ignored or done manually,

was prone to error.

No, it is easily done with information technology. This has brought with it operational efficiency, stronger customer loyalty, better security and higher profitability in the technologically advanced textile and apparel industry.

IT leads the way:

Information technology (IT) has touched every aspect of the textile and apparel sector. It is required at every step from yarn production to finished product. One of the reasons of increased dependency on IT is the changing demographics and pace of growth in the fast-paced market environment in the Asian subcontinent. The average age of the population likely to splurge on clothes has decreased considerably. Earlier, teenagers and office goers conveniently ignored attire or spent very little on the same. Today, there is increased awareness among teenagers and professionals that apart from style statements, clothes also symbolize purchasing power.

The young and working population relies on social media to look out for best deals and latest fads. Most textile and apparel brands have their own websites and profile pages on popular networking sites. The role of IT is important here, as creating impressive web portals and checking online hits are crucial. The trend of online shopping is also catching up all over the world. One recent example of IT failure was when online shopping site Flip kart hosted a sale in 2014 and the site crashed

following heavy traffic. Many customers were dissatisfied with the service, as some did not get the order confirmation after making payment and some did not see items they had added to their shopping cart. On the other hand, Amazon's online sale garnered rave reviews for its faultless operation.

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