

Unraveling The Internet of Anything (IoA)

January 2016





As you are well aware, the **Internet of Things (IoT)** is the next big thing. But when people say “the next big thing” they don’t think big enough. The bigger thing is that the IoT is morphing into the Internet of Anything (IoA) which is much more than just machine to machine (m2m) communication.

The **IoA** brings anything and everything “online” in a connectedness that generates an explosion of connected devices, from fridges, cars and drones, to smart swarms, smart grids and intelligent buildings.

This slideshow unravels the mystery behind the Internet of Anything (IoA) and will shed light on the latest products, security threats and opportunities. Content has been adapted from reputable sources including academic research and press releases. All sources are linked in the “source” button on each slide.



Caroline Bakker
Bachelor of Business
Productions Manager



“

I have over three years hands on experience in web development, from initial hand drawn concept to launch and ongoing development. I have a strong understanding of digital marketing, SEO, social media, cross browser compatibility, web accessibility and general web functions and standards. I have created several informative slideshows on digital and technology trends and I hope this one will be helpful to you.


I love learning new things and thrive on discovering more about ever emerging technologies.

”

Gartner Says 6.4 Billion Connected "Things"
Will Be in Use in 2016.

SOURCE





In 2016, 5.5 million new things will get connected every day.

SOURCE

Up to 50 billion things will be connected on the Internet by the year 2020.

SOURCE

Sensors and smartwatches, smart meters and smartphones, washing machines, fridges, wearable devices, and much more.

SOURCE

The IoA subsumes drones, smart swarms, the smart grid, intelligent buildings, and autonomous cyber-physical and cyber-biological systems, each of which has achieved or is about to achieve mega-cliché status on its own merit.

SOURCE



Internet of Anything (IoA) has three foundational pillars: computing, sensing, and communicating.

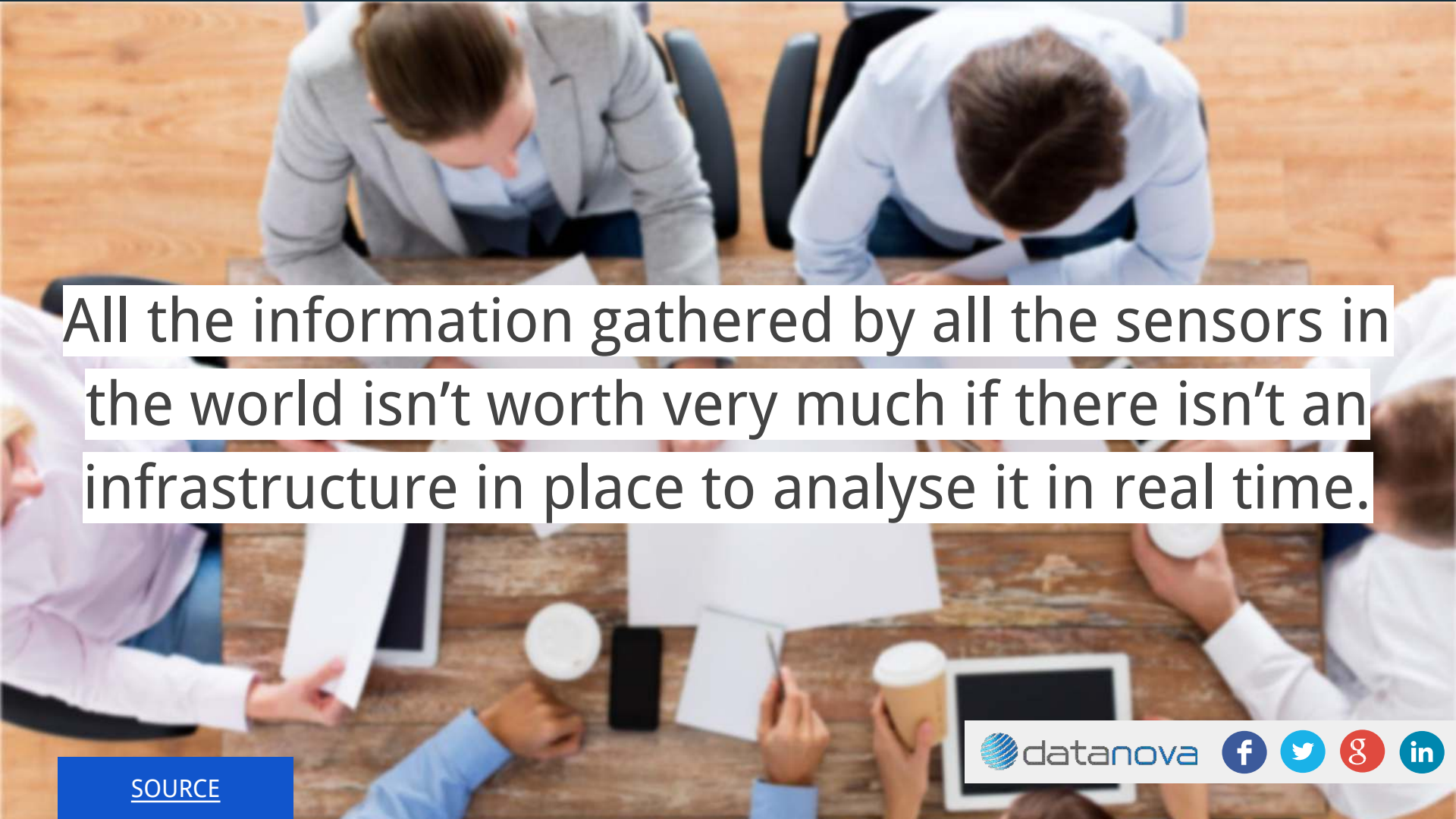
SOURCE

The Internet of Things, Industrial Internet, and Internet of Everything in 2015 will morph into the Internet of Anything.

SOURCE

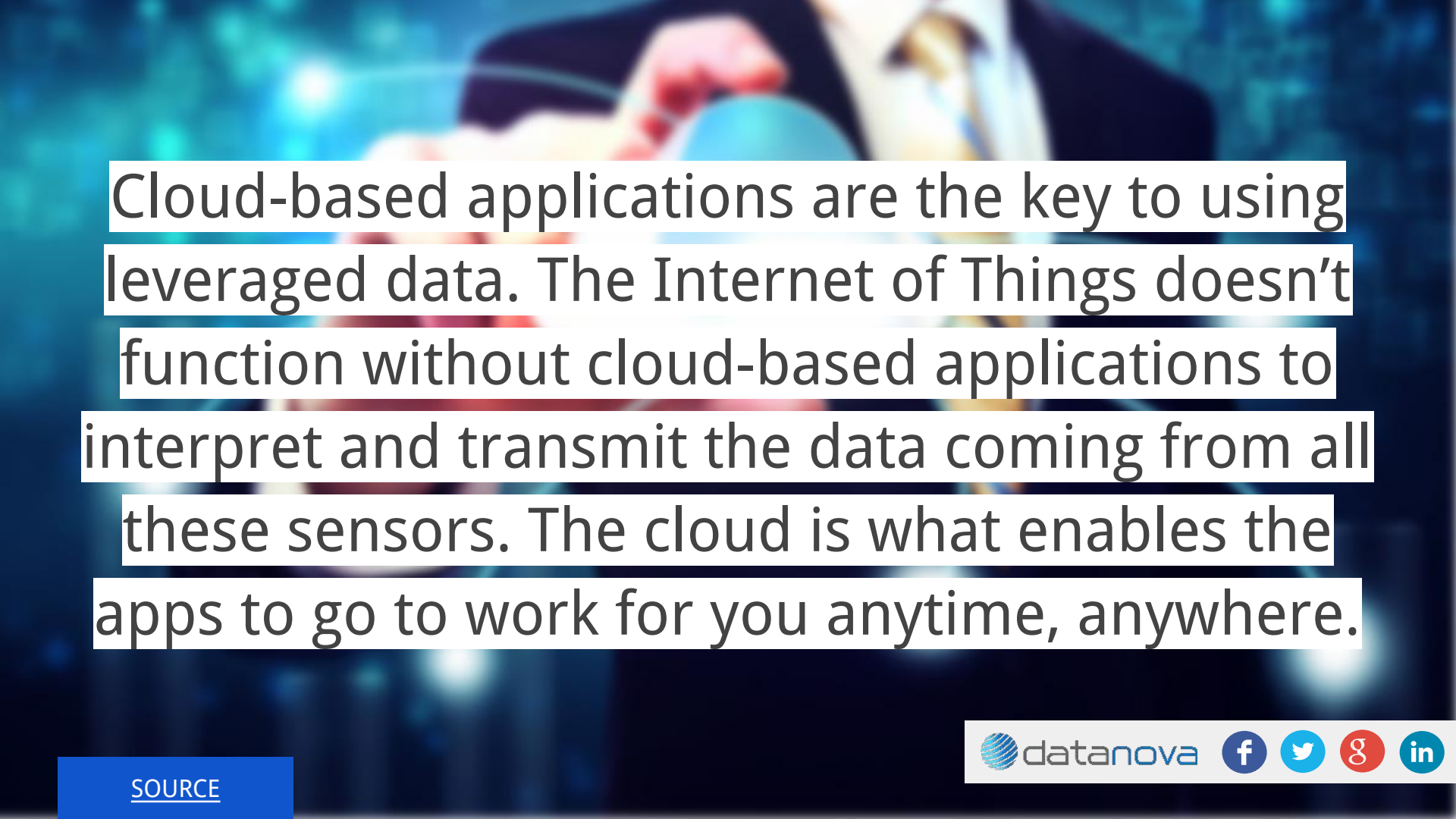
The Internet of Things really comes together with the connection of sensors and machines. That is to say, the real value that the Internet of Things creates is at the intersection of gathering data and leveraging it.

SOURCE

An overhead view of a business meeting around a wooden table. Several people in professional attire are seated, looking at documents and tablets. There are coffee cups and a smartphone on the table.

All the information gathered by all the sensors in the world isn't worth very much if there isn't an infrastructure in place to analyse it in real time.

SOURCE

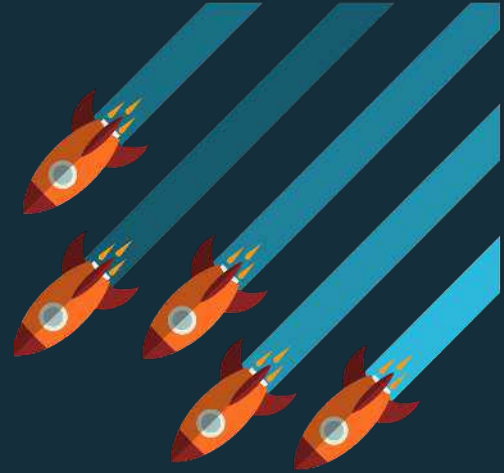


Cloud-based applications are the key to using leveraged data. The Internet of Things doesn't function without cloud-based applications to interpret and transmit the data coming from all these sensors. The cloud is what enables the apps to go to work for you anytime, anywhere.

SOURCE

WHAT IS ALREADY CONNECTED?

SMART FRIDGE





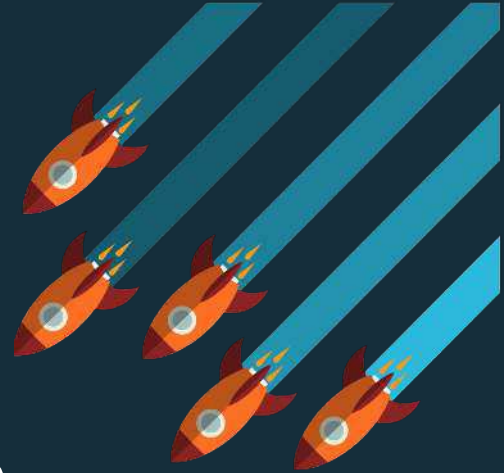
Samsung fridge with touch screen

- The fridge is meant to bring more than a little convenience to the kitchen.
- The Family Hub can display your phone's pics or a memo
- It can mirror your Samsung TV, so you can keep watching the game if it comes back on while you're still making your snack.
- If you walk out of the kitchen, the screen will go to sleep, and will then turn back on when you come back in, thanks to proximity sensors.
- a lot of features are controlled through the appliance's app



SOURCE

SMART SHOWER

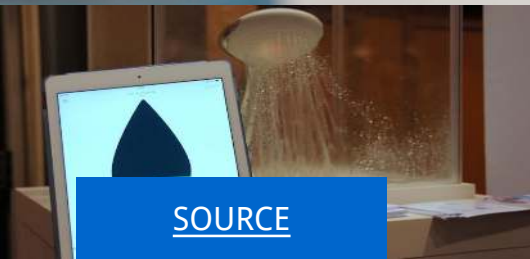


HYDRAO.

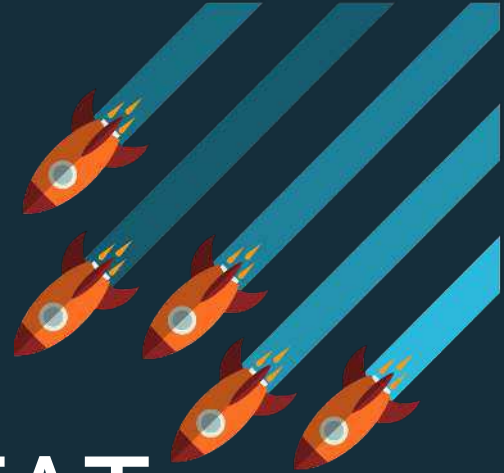
The Smart Shower

Learn how to save water thanks to coloured lights.

That's simple and intuitive.



SMART THERMOSTAT





Flair allows users to revamp your heating and cooling system.

The Puck smart room controller and Flair Smart Vent work together to give each occupant the ability to set preferences that follow the user through the home.

The system uses Puck, a wireless sensor, to connect with thermostats to learn preferences, monitor each room, and make adjustments through the Smart Vent depending on the conditions.



SOURCE





FLAIR

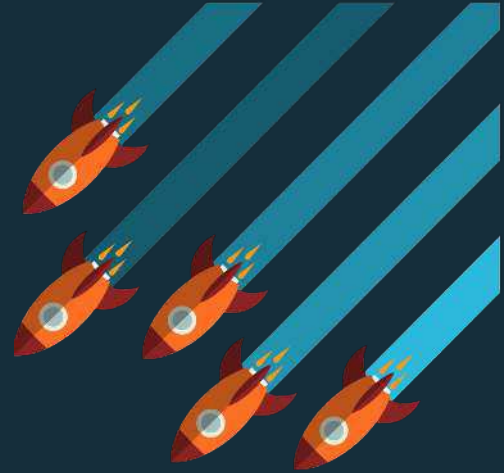



One Thermostat Can Only Do So Much

SOURCE



SMART HOME



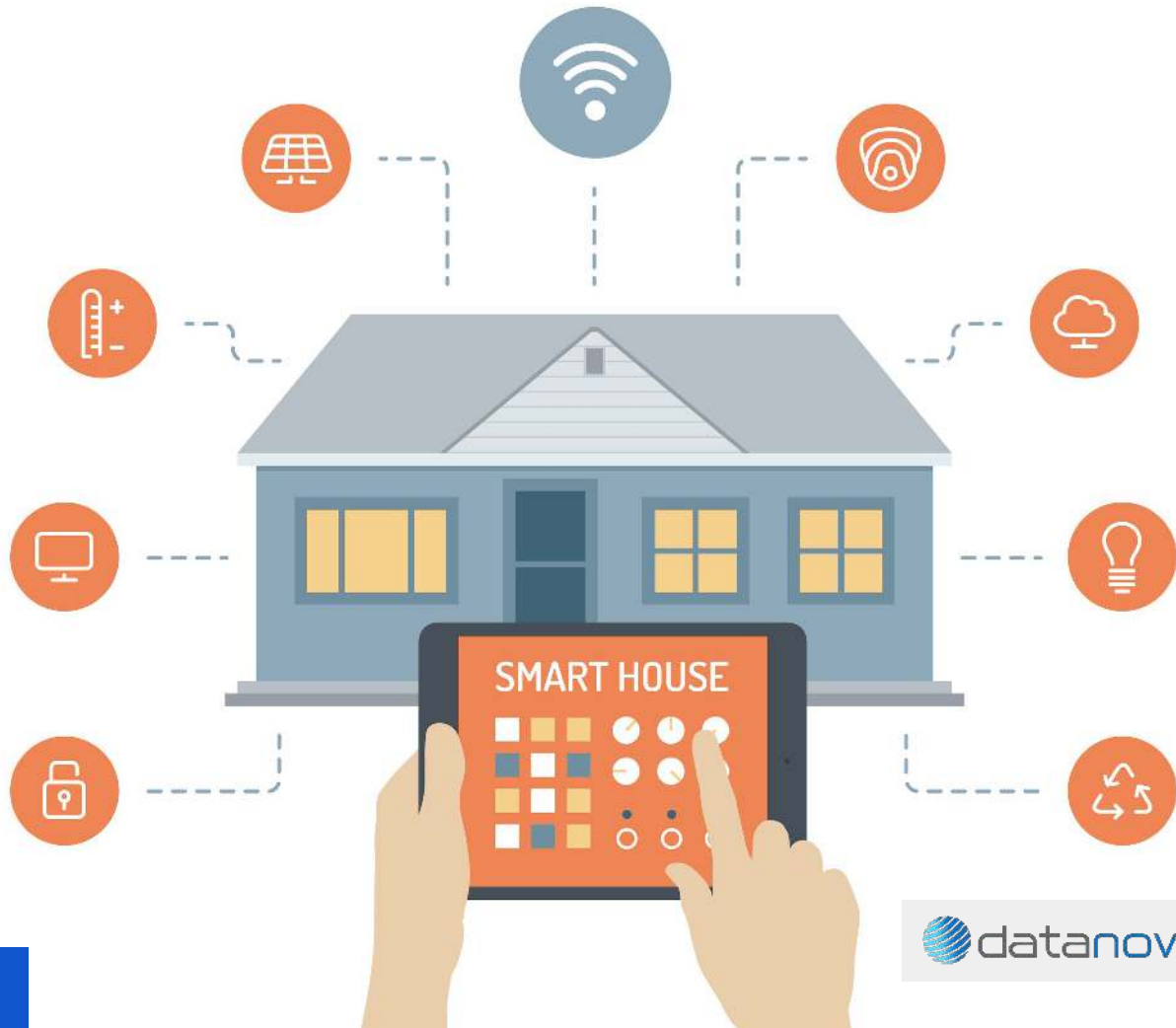


A Smart home is one that provides its homeowners comfort, security, energy efficiency (low operating costs) and convenience at all times, regardless of whether anyone is home.

SOURCE



SOURCE



How smart is a smart home?

1

Set lights to a certain brightness if there's unwanted entry or movement.

2

Get notifications when another family member, pet, or car comes and goes.

3

Monitor motion in another area of your home and trigger lights to automatically turn on or off.

4

Get early warnings to help protect a leak from turning into a flood in a second area of your home

5

Set your lights to dim in the morning when you want to wake up.

[SOURCE](#)

How smart is a smart home?

6

Get instant alerts if there's unexpected entry or movement.

7

Lock and unlock your doors from anywhere.

8

Trigger a loud, flashing siren to scare off any unwanted intruder.

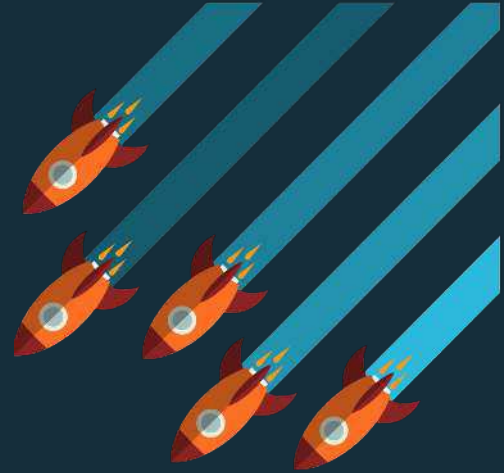
9

Get notifications when family members arrive and leave home.

10

Monitor and control temperature throughout your home.

SMART GRID



Electricity generated in power stations reaches to us through the power grid. A smart grid is a generic label for the application of computer intelligence and networking abilities to a dumb electricity distribution system.

SOURCE

Smart grid means “computerising” the electric utility grid. It includes adding two-way digital communication technology to devices associated with the grid.

SOURCE



1

Power station
Generates electricity



2

Substation transformer
Raises the voltage of the electricity for efficient transportation



3

Transmission networks
Transports electricity over long distances



4

Substation transformer
Lowers the voltage of the electricity ready to deliver for everyday use



5

Distribution lines
Transports electricity to it's final destination



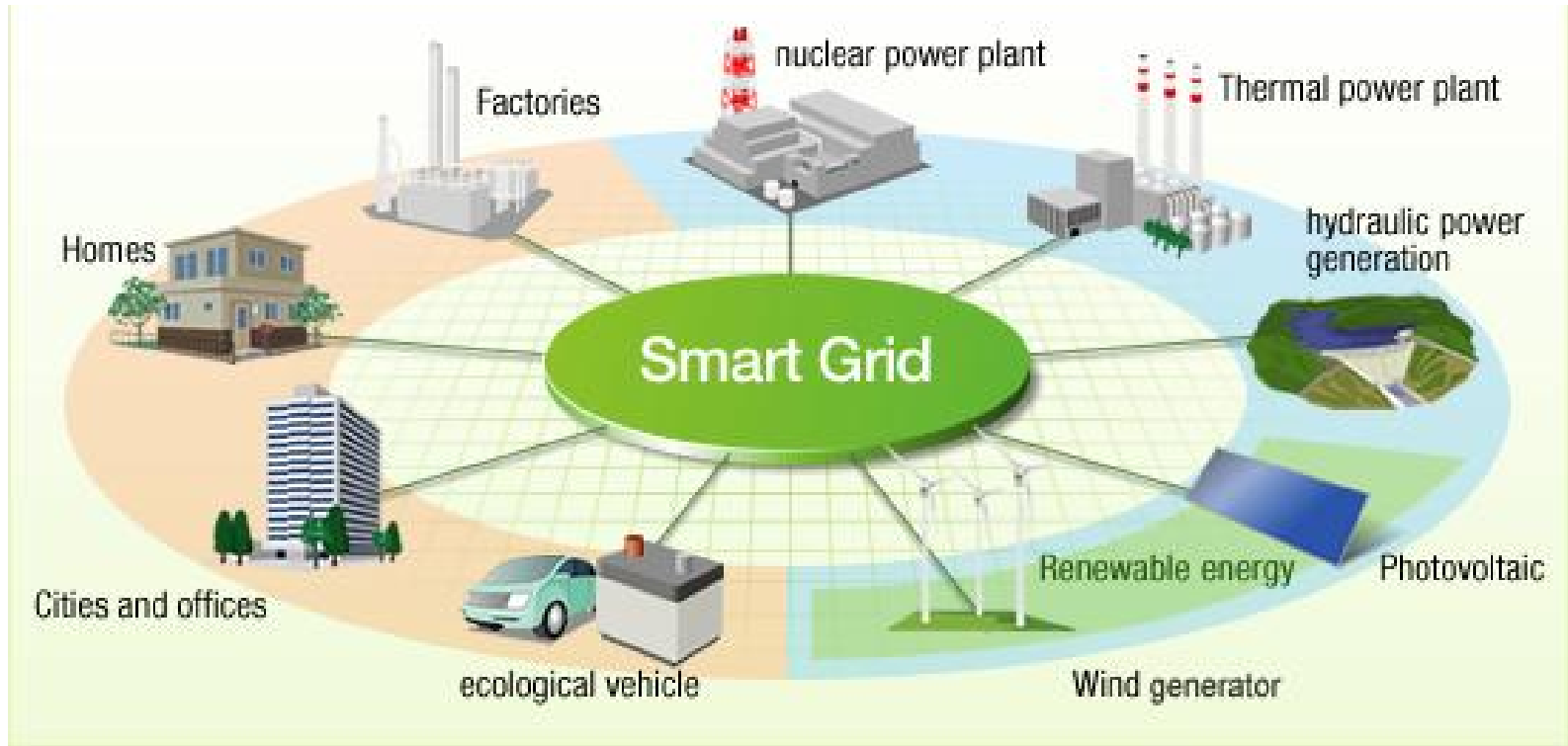
6

Home and businesses
Electricity is used to power everyday life included appliances, lighting and heating

Each device on the network can be given sensors to gather data (power meters, voltage sensors, fault detectors, etc.), plus two-way digital communication between the device in the field and the utility's network operations center.

SOURCE

What a smart grid can look like...



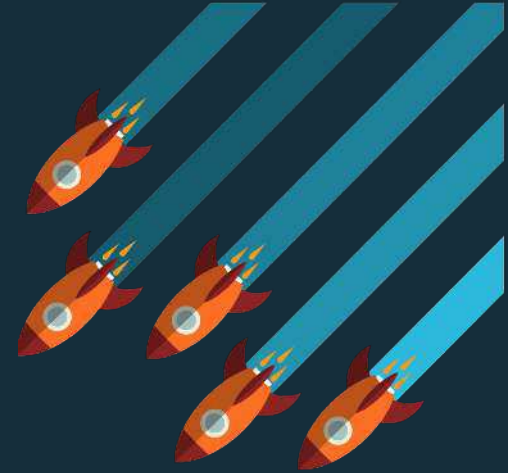
A key feature of the smart grid is automation technology that lets the utility adjust and control each individual device or millions of devices from a central location.

SOURCE

The benefits of a smart grid

- 1 More efficient transmission of electricity.
- 2 Quicker restoration of electricity after power disturbances.
- 3 Reduced operations and management costs for utilities, and ultimately lower power costs for consumers.
- 4 Reduced peak demand, which will also help lower electricity rates.
- 5 Increased integration of large-scale renewable energy systems.

SMART CITIES

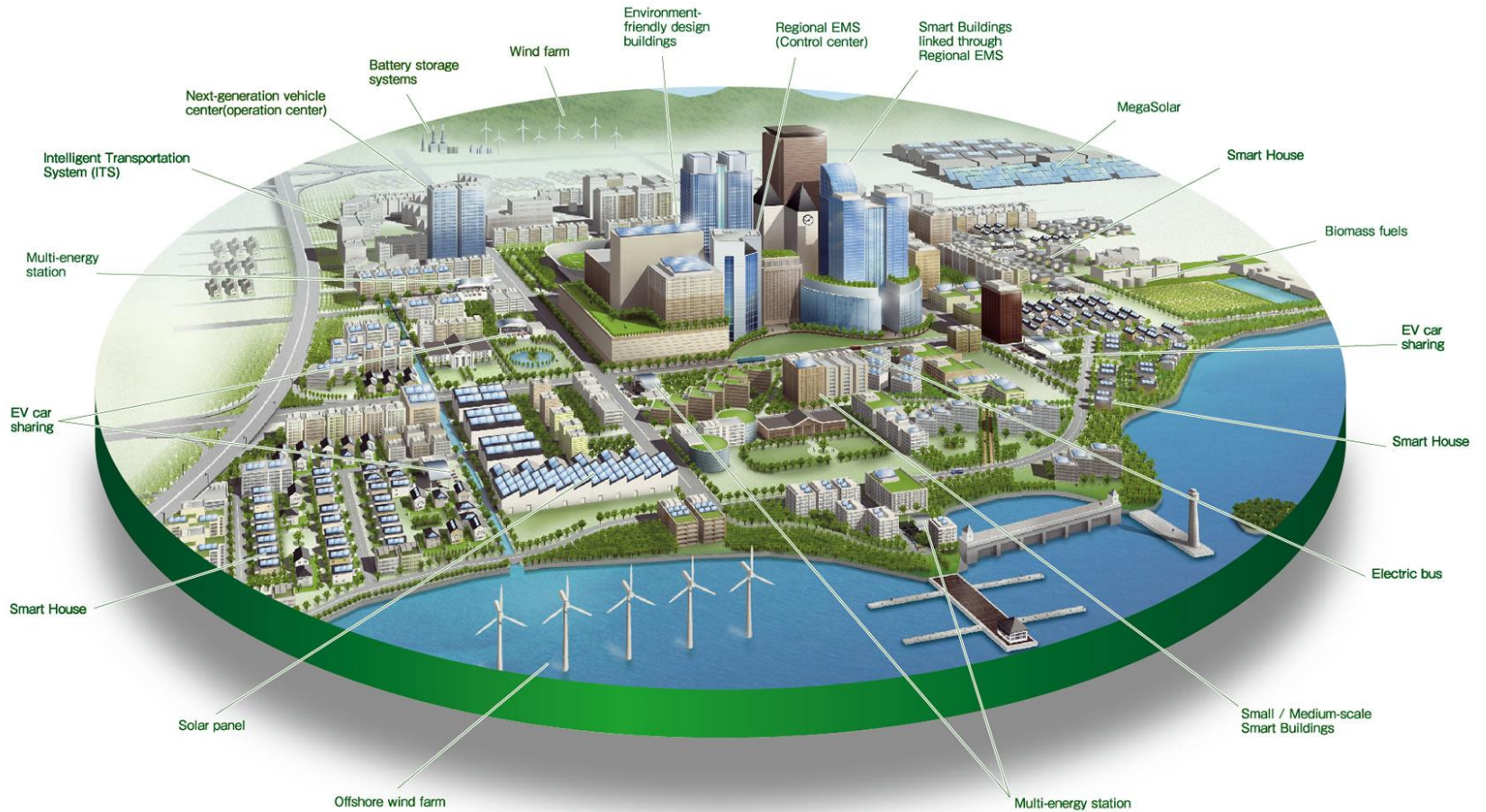


A Smart City is more than a digital city. A Smart City is one that is able to link physical capital with social one, and to develop better services and infrastructures. It is able to bring together technology, information, and political vision, into a coherent program of urban and service improvements.

SOURCE

Smart Cities emanated from the need to live a good, healthy, happy, safe, secure, easy, productive life, Intelligently, by solving most of our problems that we face today and fulfilling our needs, which has been proven abundantly in many parts of the world.

SOURCE



SOURCE

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Is Songdo the smartest city in the world?

[IMAGE SOURCE](#)




Songdo is located in an optimal location in Northeast Asia, within a 3½ hour flight to 1/3 of the world's population.

[IMAGE SOURCE](#)


A master-planned city, home to thousands of residents and workers, and host to both global organizations and multinational corporations.

SOURCE

An aerial photograph of a modern city at dusk. The sky is a mix of deep blue and orange, with scattered white clouds. In the foreground, several tall, modern skyscrapers with glass facades are visible, some with lights on. A river or canal winds through the city, reflecting the sky. The overall scene is a vibrant, high-angle view of a developed urban area.


A city built in just 10 years, atop 1,500 acres of former wetland, or as developers claim, “wasteland.” The city of Songdo has cost developers more than \$40 billion.

SOURCE



For South Korea, Songdo is more than a hi-tech business district, but a template for future developments. It is the prototype for the green investment the government wants to build the economy on in the future.

SOURCE

An aerial photograph of a modern city skyline at dusk. The sky is a mix of deep blue and orange, with scattered white clouds. In the foreground, a tall, dark skyscraper with a grid-like facade stands prominently. Below it, other buildings and a road with traffic are visible. The overall scene is a vibrant, futuristic urban landscape.

Songdo is designed to appeal to foreign investors, but its manicured gardens and glassy towers also give it an unmistakable air of luxury. Songdo is the city of the future; all that is missing are the residents.

SOURCE

1

Every inch of the city has been wired up by Cisco with fibre optic broadband keeping people connected and sending a constant data stream to computer processors that keep Songdo operating.

2

TelePresence screens are being installed in all homes, offices, hospitals and shopping centres so people can make video calls whenever they want.

3

Sensors embedded in streets and buildings monitor everything from temperature to road conditions to help the city run efficiently and react to problems at lightning speed.

[SOURCE](#)

4

To deal with traffic, RFID (radio frequency identification) tags on cars send location data to a central hub identifying black spots and tweaking signals to ease congestion.

5


Even the small touches have been taken care of: traffic light bulbs are replaced by light-emitting diodes (LEDs) using a fraction of the power.

6

Power companies monitor the use of electrical appliances such as microwaves to better understand how residents use energy and set the grid to adapt.

[SOURCE](#)

Learn more about Songdo



Songdo and Sejong: master-planned cities in South Korea
Alexandra Lichá

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Where the *future of cities* is taking shape... and residents, businesses, and visitors are contributing to the growing ecosystem.



About

A master-planned city, home to thousands of residents and workers, and host to both global organizations and multinational corporations. Songdo is located in an optimal location in Northwest Asia, within a 3½ hour flight to 1/3 of the world's population.

Discover Songdo's unique history, setting standards for urban development along with



Greg Lindsay

HOME BLOG ARTICLES MY BOOK ABOUT EVENTS

ARTICLE

The New New Urbanism: New Songdo & Creating Cities From Scratch

The world is bracing for an influx of billions of new urbanites in the coming decades, and tech companies are rushing to build new green cities to house them. Are these companies creating a smarter metropolis — or just making money?



About

Greg Lindsay is a journalist, author, futurist, and speaker. He is a contributing editor to the New York Times, author of the forthcoming book: *Big City: How Technology, Science and the Quest for a Better World Will Shape the Future of Our Cities*. He is also a senior advisor to the New York Times, author of the book *The New New Urbanism: How the World's Most Innovative Cities are Creating a New Future*. He is also a senior advisor to the New York Times, author of the book *The New New Urbanism: How the World's Most Innovative Cities are Creating a New Future*.

Articles

THE NEW NEW URBANISM: HOW THE WORLD'S MOST INNOVATIVE CITIES ARE CREATING A NEW FUTURE
Making The City

PROFESSOR | SEPTEMBER 22, 2015
We Spent Two Weeks Interviewing Employees of Twitter Here's What We Learned
POST-DOMONY | SEPTEMBER 11, 2015



What can you achieve when a smart car and a smart city grid start talking to each other? We're going to have traffic flow optimisation, because instead of just having stoplights on fixed timers, we'll have smart stoplights that can respond to changes in traffic flow.

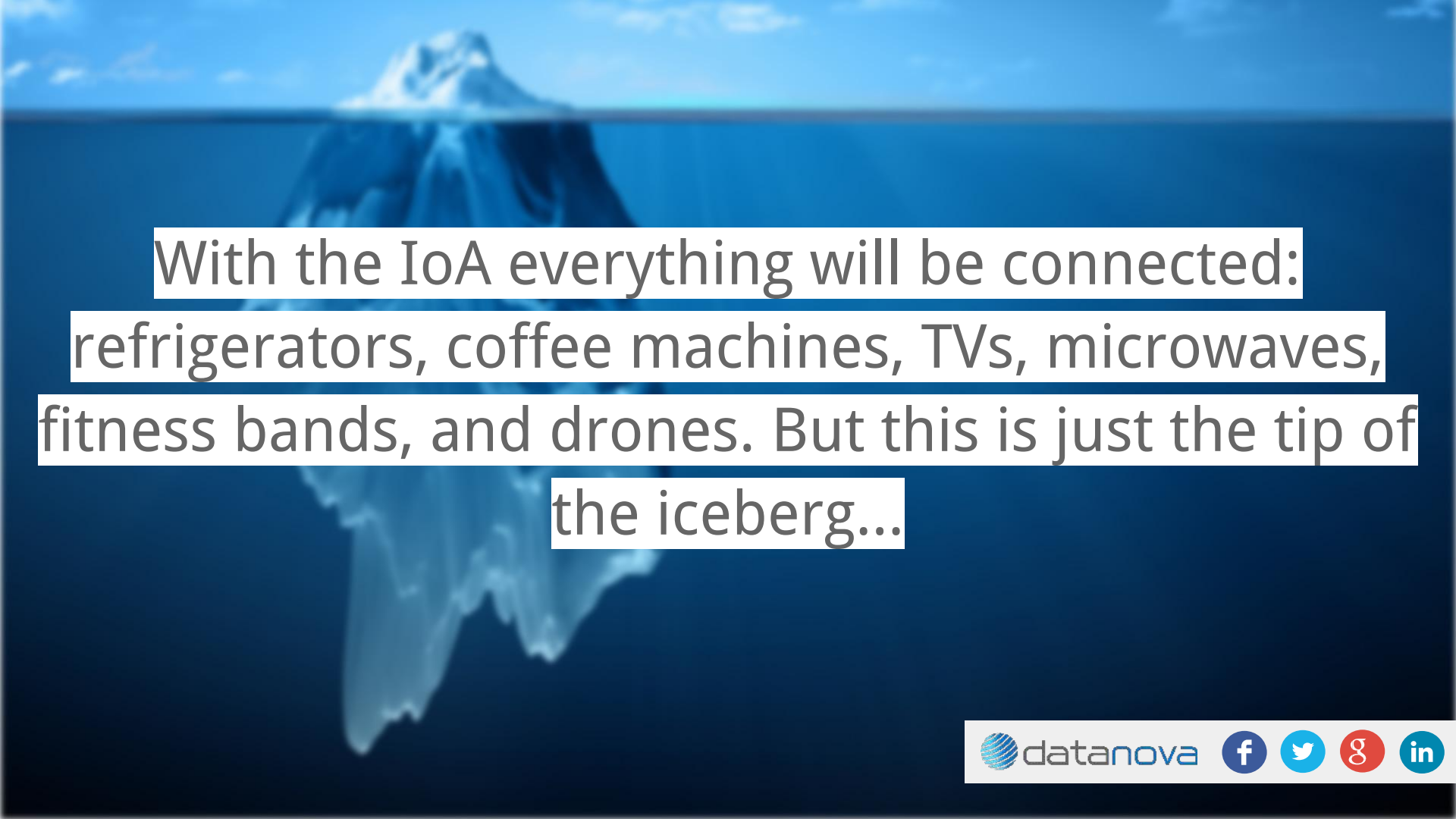
SOURCE

Traffic and street conditions will be communicated to drivers, rerouting them around areas that are congested, snowed-in, or tied up in construction.

SOURCE

SECURITY THREATS



A blue-tinted image of an iceberg floating in the ocean. The tip of the iceberg is visible above the water line, while the much larger, jagged base is submerged below. The background is a clear blue sky and a dark blue sea.

With the IoA everything will be connected:
refrigerators, coffee machines, TVs, microwaves,
fitness bands, and drones. But this is just the tip of
the iceberg...

Wind River published a white paper on IoT security in January 2015 titled [Searching For The Silver Bullet](#), it summarises the problem in just three paragraphs, summarised as:

- Security must be the foundational enabler for IoT.
- There is currently no consensus on how to implement security in IoT on the device.
- A prevalent, and unrealistic, expectation is that it is somehow possible to compress 25 years of security evolution into novel IoT devices.
- There is no silver bullet that can effectively mitigate the threats.

Ramirez outlined three key challenges for the future of IoT:

- Ubiquitous data collection.
- Potential for unexpected uses of consumer data.
- Heightened security risks.

Security experts Chris Valasek and Charlie Miller grabbed headlines with their research on the vulnerability of connected cars when they hacked into a Toyota Prius and a Ford Escape using a laptop plugged into the vehicle's diagnostic port. This allowed the team to manipulate the cars headlights, steering, and braking.

SOURCE

Threats to Medical Devices

In April 2014, Scott Erven and his team of security researchers released the results of a two-year study on the vulnerability of medical devices. The study revealed major security flaws that could pose serious threats to the health and safety of patients. They found that they could remotely manipulate devices, including those that controlled dosage levels for drug infusion pumps and connected defibrillators.

The Dangers of the Smart Grid

In 2012, the Department of Homeland Security discovered a flaw in hardened grid and router provider RuggedCom's devices. By decrypting the traffic between an end user and the RuggedCom device, an attacker could launch attacks to compromise the energy grid.

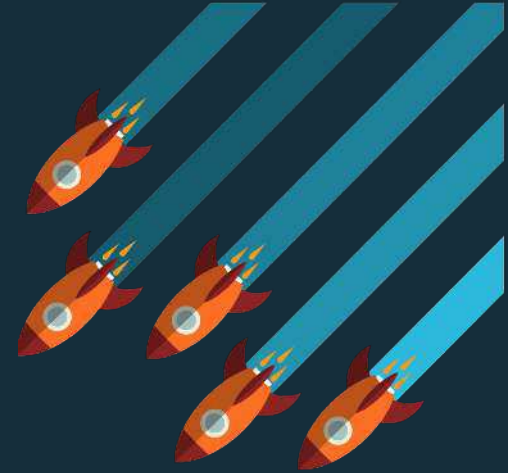
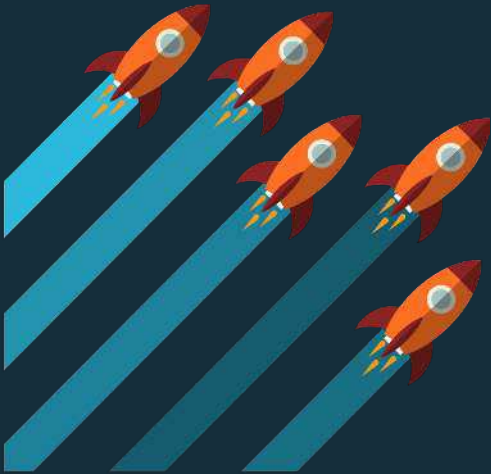
Attacks Against IoT Devices

To a potential attacker, a device presents an interesting target for several reasons. First, many of the devices will have an inherent value by the simple nature of their function. A connected security camera, for example, could provide valuable information about the security posture of a given location when compromised.

Attacks Against the Master of Devices

For every device or service in the Internet of Things, there must be a master. The master's role is to issue and manage devices, as well as facilitate data analysis. Attacks against the masters – including manufacturers, cloud service providers, and IoT solution providers – have the potential to inflict the most amount of harm. These parties will be entrusted with large amounts of data, some of it highly sensitive in nature. This data also has value to the IoT providers because of the analytics, which represent a core, strategic business asset—and a significant competitive vulnerability if exposed.

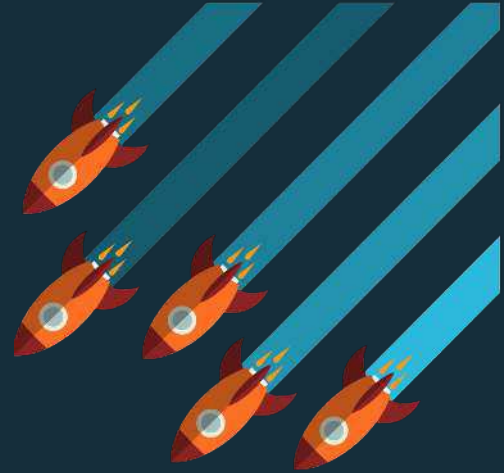
CONCLUSION



The IoA has incredible potential to change our current world. However, to succeed the IoA must provide mechanisms for securely managing a range of new technologies and addressing the related security and privacy requirements.

SOURCE

WHAT'S NEXT?





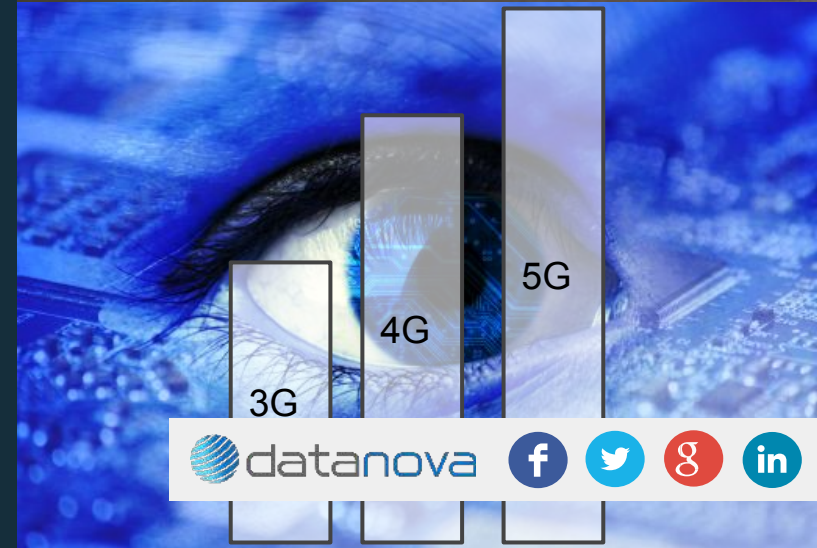
How Do We Get to 5G and the 'Tactile Internet?'

SOURCE

Fifth Generation (5G) cellular technology will enable the "tactile Internet"--when humans will wirelessly control real and virtual objects--but not before we overcome enormous system design challenges.

That was the assessment from Gerhard Fettweis (*pictured right*), the Vodafone Chair of Mobile Communications Systems, Dresden University of Technology, who spoke Sept. 3 to Cadence employees at the company's San Jose headquarters.

"Up to now, wireless communication--cellular communication--was about moving content, voice, video data, whatever it was," Fettweis said. "Tomorrow we can start to control virtual and real objects. That is really the cool thing: the tactile Internet--revolutionizing our whole life."



[SOURCE](#)

The Tactile Internet & 5G

The next wave of innovation will create the Tactile Internet, introducing numerous new opportunities for emerging technology markets and the delivery of essential public services. In principle, all of our human senses can interact with machines, and technology's potential in this respect is growing.

The Tactile Internet will enable haptic interaction with visual feedback, with technical systems supporting not just audiovisual interaction, but also that involving robotic systems to be controlled with an imperceptible time-lag.



The Tactile Internet

ITU-T Technology Watch Report
August 2014

Extremely low latency in combination with high availability, reliability and security will define the character of the *Tactile Internet*. It will have a marked impact on technology markets and the delivery of essential public services. The report explores the *Tactile Internet*, exploring its potential in healthcare, education and government services, and its expected impact on society, concluding with a brief discussion of the role to be played by the ITU framework.



SOURCE

Learn more about the tactile internet

Copyrighted presentation of ITU-T Technology Watch Report 2012-12-15

The Tactile Internet – Applications & Challenges

Gerhard P. Fettweis, Chair Professor, TU Dresden, Germany

The tactile internet is a new concept, which is based on the idea of extending the tactile sense to the internet. This is achieved by using haptic feedback to provide information about the state of the system. This is done by using haptic feedback to provide information about the state of the system. This is done by using haptic feedback to provide information about the state of the system.

Background and Introduction

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TECHNISCHE UNIVERSITÄT DRESDEN

Vodafone Chair Mobile Communications Systems, Prof. Dr.-Ing. Dr. h.c. G. Fettweis

5G - What Will it Be: The Tactile Internet

Gerhard P. Fettweis – Vodafone Chair Professor

ICC 2013 – Budapest

G. Fettweis
A 5G Wireless Communications Vision, 2012-12-15, Microwave Journal
www.microwavesjournal.com/articles/view/16751-A-5G-wireless-communications-vision



The Tactile Internet

ITU-T Technology Watch Report
August 2014

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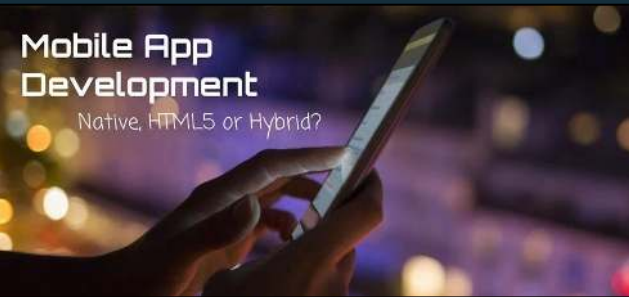


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Mobile App Development

Native, HTML5 or Hybrid?



10 things you didn't know about the internet.



WEBSITE ACCESSIBILITY

What it is and how to implement inclusive practices



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Social Media in Business



MOBILE MALWARE SECURITY THREATS & MOBILE APPS AND SOCIAL NETWORKING



CLOUD COMPUTING IN A NUTSHELL

Cloud Computing Service Delivery, Deployment Models & Cloud Infographics



Web 1.0, 2.0 and 3.0 For Dummies



Mobile Cloud Computing

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WHAT IS DATA

- Deconstruct Data
- Understand Representation
- Understand Data Access
- Understand Data Integration

OPENLINK
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Digital Marketing Explained

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WHAT IS THE SEMANTIC WEB

THE ULTIMATE BUSINESS IDEA FOR THE AUSTRALIAN COMMUNITY SERVICE INDUSTRY

GO DIGITAL, OR DIE!

INTRODUCING A DIGITAL ENGAGEMENT SOLUTION

BUSINESS COMMUNICATION SOLUTION CENTRE

Information Technology Solutions for

Mobile Marketing

Deliver value to make customers' lives better

Get Started

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How the IoT is changing the way we live

Connecting trillions of smart things

Will the Internet of Things (IoT) change everything—including ourselves?

Database Development

Database, DBMS Management Systems and Development Process

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Change Management Process

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