The technologies and principles of IoT will have a very broad impact on organizations, affecting business strategy, risk management and a wide range of technical areas such as architecture and network design.

The top 10 emerging IoT technologies are:

****1. IoT Security.**** Security technologies will be required to protect IoT devices and platforms from both information attacks and physical tampering, to encrypt their communications, and to address new challenges such as impersonating "things" or denial-of-sleep attacks that drain batteries. IoT security will be complicated by the fact that many "things" use simple processors and operating systems that may not support sophisticated security approaches.

****2. IoT Analytics.**** IoT business models will exploit the information collected by "things" in many ways, which will demand new analytic tools and algorithms. As data volumes increase over the next five years, the needs of the IoT may diverge further from traditional analytics.

****3. IoT Device (Thing) Management.**** Long-lived nontrivial "things" will require management and monitoring, including device monitoring, firmware and software updates, diagnostics, crash analysis and reporting, physical management, and security management. Tools must be capable of managing and monitoring thousands and perhaps even millions of devices.

****4. Low-Power, Short-Range IoT Networks.**** Low-power, short-range networks will dominate wireless IoT connectivity through 2025, far outnumbering connections using wide-area IoT networks. However, commercial and technical trade-offs mean that many solutions will coexist, with no single dominant winner.

****5. Low-Power, Wide-Area Networks.**** Traditional cellular networks don't deliver a good combination of technical features and operational cost for those IoT applications that need wide-area coverage combined with relatively low bandwidth, good battery life, low hardware and operating cost, and high connection density. Emerging standards such as narrowband IoT will likely dominate this space.

****6. IoT Processors.**** The processors and architectures used by IoT devices define many of their capabilities, such as whether they are capable of strong security and encryption, power consumption, whether they are sophisticated enough to support an operating system, updatable firmware, and embedded device management agents. Understanding the implications of processor choices will demand deep technical skills.

****7. IoT Operating Systems.**** Traditional operating systems such as Windows and iOS were not designed for IoT applications. They consume too much power, need fast processors, and in some cases, lack features such as guaranteed real-time response. They also have too large a memory footprint for small devices and may not support the chips that IoT developers use. Consequently, a wide range of IoT-specific operating systems has been developed to suit many different hardware footprints and feature needs.

****8. Event Stream Processing.**** Some IoT applications will generate extremely high data rates that must be analyzed in real time. Systems creating tens of thousands of events per second are common, and millions of events per second can occur in some situations. To address such requirements, distributed stream computing platforms have emerged that can process very high-rate data streams and perform tasks such as real-time analytics and pattern identification.

****9. IoT Platforms.**** IoT platforms bundle many of the infrastructure components of an IoT system into a single product. The services provided by such platforms fall into three main categories:

* Low-level device control and operations such as communications, device monitoring and management, security, and firmware updates;
* IoT data acquisition, transformation and management;
* IoT application development, including event-driven logic, application programming, visualization, analytics and adapters to connect to enterprise systems.

****10. IoT Standards and Ecosystems.**** Standards and their associated application programming interfaces (APIs) will be essential because IoT devices will need to interoperate and communicate, and many IoT business models will rely on sharing data between multiple devices and organizations. Many IoT ecosystems will emerge, and organizations creating products may have to develop variants to support multiple standards or ecosystems and be prepared to update products during their life span as the standards evolve and new standards and APIs emerge.