ICED Evidence Library

Frontier Technology solutions for improved infrastructure services

Tags: Energy, Digital, Financial Services, Investment, Infrastructure, Energy

Using industry research along with professional experiences, ICED designed this toolkit to explore the application, benefits, use cases and foundational dependencies for the eight frontier technologies by sector . Creating a powerful snapshot of these technologies in a contextualized fashion so that DFID programme managers can understand and see the versatility of these frontier technologies. The tool should be used in conjunction with the ICED Digital Benchmarking tool, which containis indicators and qualitative questions exploring country's readiness for digital and frontier technology adoption. For more information on improving the use of digital solutions in programming please consult the ICED website or contact ICED programming.

Frontier Digital Technologies	**Internet of Things** *Internet of Things (IoT): Loosely defined as the ""infrastructure of the connected society"", IoT represents the networking of physical devices, vehicles, buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data*	**Blockchain** *A digital ledger in which transactions made in bitcoin or another cryptocurrency are recorded chronologically and publicly.*	**Big Data Analytics** *The process of examining large and varied (structured or unstructured) data sets -- i.e., big data -- to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful information that can help organizations make more-informed business decisions*	**Artificial Intelligence** *The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.*	**3D Printing** *The action or process of making a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.*	**Digital Financial Services** *Using digital technology to improve access to payments, savings, credit products and other financial services.*	**Online Marketplaces** *Establishing a virtual platform where users can transact goods and services digitally.*	**UAVs** *An aircraft piloted by remote control or onboard computers.*
Application & Benefits	· Smart metering of privately provided urban services / utilities (water, energy) · Monitoring of infrastructure assets, identifying O&M needs e.g. water leaks, or requirement to empty pit latrines · Real-time monitoring of public transporation and better information on waiting times · Real-time traffic analytics and smarter control of traffic lights to prevent congestion · Toll systems adapted to actual usage · Emergency services triggered automatically · Protection against car theft	· Asset management of large energy, water, transport or other infrastructure networks · Customer relationship, service and payments management for infrastructure services (energy, water, waste, transport)	· Analyze traffic patterns to improve the efficiency and qualiy of public transportation networks · Use big data to more efficiently manage infrastructure O&M, in budget-constrained situations · Use big data to manage efficiency of infrastructure networks and optimise customer services e.g. waste collection routes, water recycling systems, electrical grid · Understand, manage and optimise infrastructure dependancies to improve urban efficiency	· Next generation smart grids (water or energy) · Through big data analytics and AI, develop autonomous vehicles	· Design and produce new/ replacement parts through 3D printing	· Support revenue generation / collection for infrastructure services (energy, water, waste collection)	· Online marketplaces providing information on privately provided infrastructure services, quality and cost e.g. commercial waste collection · Develop sharing economy marketplaces by connecting consumers with producers digitally (i.e., taxi drivers to travelling passengers)	· Monitoring, data analysis and inspection of different type of infrastructure activity · Use of UAV mapping to inform priorisation and design of infrastructure · Use of unmanned aerial (or land) vehicles for infrastructure repairs (overhead cables, water and sewage pipes)
Rest of World Project Examples	Uber Movement project	N/A	Where is my transport	Tata testing autonomous vehicles in India	3D printing of construction materials in several OECD markets such as steel nodes, modular homes.	Use of Mpesa with Little Cabs in Kenya	Little Cabs in Kenya	Extensive use of drones in commercial construction including in planning, safety inspection, progress monitoring

Foundational Considerations