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Inspire the Next¹



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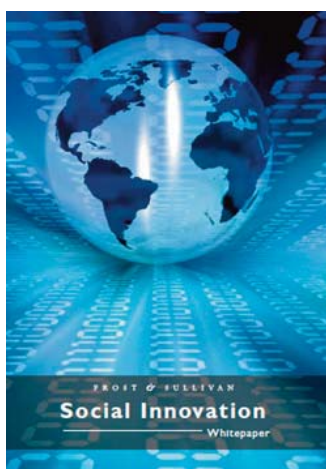
Social Innovation in Action

Whitepaper

In Partnership with Hitachi, Ltd.

Table of Contents

Introduction	3
A. Achieving Social Innovation in Business	3
B. Hitachi as a Global Social Innovation Visionary	4
Taking Social Innovation Forward	5
A. Collaboration across Regions and Value Chains	5
B. Growth Opportunities within Industries	7
Hitachi: Introducing Social Innovation in Action.....	11
1. Hitachi Infrastructure Systems Saving Water for Hilton Istanbul.....	14
2. Hitachi, Ltd. Kashiwa-no-ha Smart City.....	16
3. Hitachi, Ltd. National Health Service, England, Greater Manchester	17
4. Hitachi, Ltd. Transportation Systems Division Eco Friendly Locomotive for Korea.....	18
5. Big Data Solutions for Energy Saving (North America)	20
6. Hitachi, Ltd. Dahej Desalination	21
7. Hitachi Medical, Brazil Santa Casa de Misericórdia de Avaré	22
8. Hitachi Construction Machinery (Europe) NV Land & Water Group Plant Hire.....	23
Looking to the Future	24



Social Innovation Whitepaper

Hitachi partnered with global research company Frost & Sullivan to produce a new research study on Social Innovation.

Frost & Sullivan's 'Social Innovation Whitepaper' defines what Social Innovation is and the key Mega Trends globally which define our future societies.

Access our Website at

http://www.hitachi.eu/social_innovation/

to read the research summary and download the whitepaper in full.

Introduction

A. Achieving Social Innovation in Business

Achieving positive and sustainable transformational change for communities and societies requires us all to think differently. To innovate for society, companies need to balance complex challenges such as climate change, traffic congestion, healthcare inequality, resource demands, water stress, urban development and industrial growth. And all this while also delivering comfort, happiness, convenience, choice, better quality of life, a cleaner environment, more time, less stress, and more safety to the end-user.

But how will companies react to the growing human and society challenges, and who will take the lead by innovating with new business models, products and services to deliver future value for corporations and benefit each global citizen?

In our previous Whitepaper – Social Innovation to Answer Society's Challenges – we identified five critical global mega trends that are creating both challenges and opportunities for Social Innovation: Urbanisation; Smart is the New Green; Future of Energy; Future of Mobility; and Health, Wellness & Wellbeing. We identified the key element of convergence as absolutely critical to the delivery of Social Innovation. That means convergence of technologies, industries, products and business models, including finance.

Frost & Sullivan has defined Social Innovation as “the deployment of technology and new business models to bring about real positive change to the lives of individuals and societies, creating shared value.”

We also identified that, through the model of creating shared value for multiple stakeholders, Social Innovation will represent a market opportunity of \$2 trillion by 2020. This cannot be ignored, be it from the perspective of investment required to drive society forward, or from the perspective of corporations looking for profitable and sustainable growth through collaboration to provide solutions and innovations around processes, analytics and operations.

In this Whitepaper we will explore the future of Social Innovation to the next level by looking at where it is really happening, incorporating how true collaboration reaches across regions and into value chains. We will take an in-depth look at where the need for Social Innovation is greatest and also incorporate detailed case studies to demonstrate concretely how Social Innovation is driving an enriched and exciting future for individuals, cities, countries, continents and our connected world.

Hitachi delivers
innovations that
answer society's
challenges and has
Social Innovation
Business at the centre
of its mission, values
and vision

B. Hitachi as a Global Social Innovation Visionary

We will also introduce Hitachi and its Social Innovation Business and show how the company has become a visionary global player with a thought leading position in the sphere of Social Innovation, as well as sharing some examples of ground-breaking projects being delivered around the world and across industrial sectors.

Hitachi was founded as a mining machinery repair shop in Japan in 1910. At this point in history, Japan was heavily reliant on imported products and technology, but the Hitachi founder Namihei Odaira formed a team that chose to rely on a different resource – themselves. Ever since then, Hitachi's corporate credo has been "contributing to society through the development of superior, original technology and products", which in today's world involves a focus on enhancing social infrastructure through integrating sophisticated IT, including IoT, cloud computing, Big Data and information analytics.

Today, the Hitachi Group operates a wide range of businesses including Infrastructure Systems, Information & Telecommunications Systems, Power Systems, Construction Machinery, High Functional Materials & Components, Automotive Systems and Financial Services, with \$93.4 billion revenues and more than 320,000 staff in the Group. The company is now in the process of developing each of these businesses with integrated solutions globally.

In the company's own words, "Hitachi delivers innovations that answer society's challenges. With our talented team and proven experience in global markets, we can inspire the world".

Hitachi – a global pioneer of Social Innovation as a value proposition for over 100 years – has Social Innovation Business at the centre of its mission, values and vision. With a clear focus on sustainability, society and growth, Hitachi's vision is about promoting a transition into a new phase of growth following recent years where recovery from the 2008 global financial crisis had been a priority.

Moving from a strong financial base, the new vision is all about spurring new growth and innovative solutions for Social Innovation, alongside its customers. This next phase of transformation for Hitachi is all about becoming a truly global player, in growth mode, with deepening connections to the world economy and achieving added value for society.

Social Innovation is about creating shared value every step along the value chain and sharing the principles of Social Innovation with all suppliers and partners

Taking Social Innovation Forward

With a heavy focus on the expansion of services to deliver integrated solutions and leverage of advanced IT capabilities, Hitachi is positioning itself as both a thought leader and a market leader in the field of Social Innovation. It is well positioned to thrive as the global mega trends mentioned earlier continue to create a climate that encourages the need for Social Innovation.

Hitachi also focuses strongly on the process of collaborative creation; a crucial element in bringing Social Innovation Business to life. That means not just working collaboratively with all stakeholders – as we will discuss below – but also integrating technology innovation with new business models to bring about the convergence of IT with social and industrial infrastructure.

In the sections below, we will explore in more detail the importance of collaboration in bringing Social Innovation into action.

A. Collaboration across Regions and Value Chains

Frost & Sullivan believes that collaboration – in all its many forms – lies at the very heart of Social Innovation and business-to-society (B2S) business models. Projects are often large and complex, meaning that smooth delivery of innovative integrated solutions will always require high levels of collaboration.

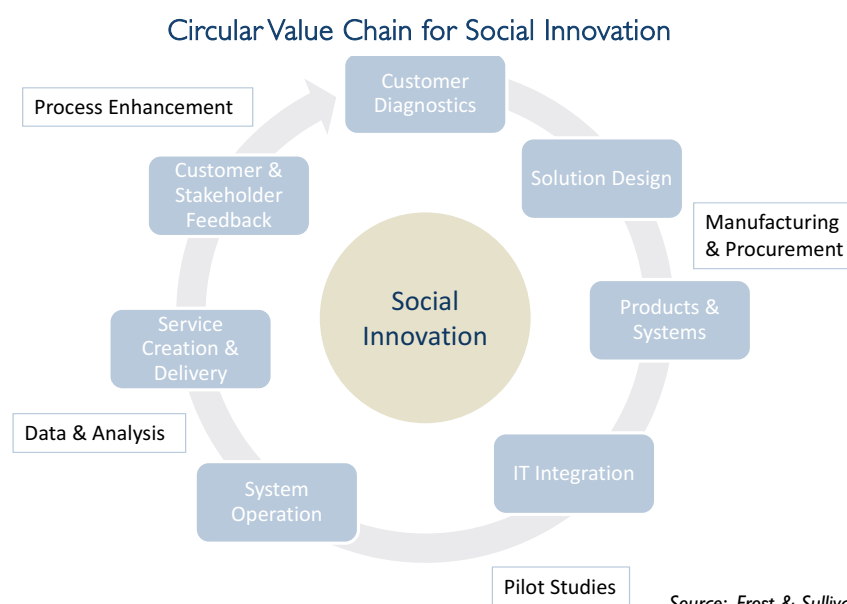
In our first Social Innovation Whitepaper, we stated that “Ensuring the successful implementation of Social Innovation activities in different countries requires the coordination and integration of these activities in national and regional socio-economic planning. It also requires collaborative working between the multiple stakeholders.”

We identified the criticality of collaboration between corporations, people, communities, business disciplines, cities and countries in order for innovation to thrive. We also identified the criticality of collaboration to directly address the regional and global impact of the converging mega trends.

However, at the next level, collaboration for Social Innovation reaches much further. It reaches deep into industries and across supply chains as well as between suppliers and across regions. It is not just about collaboration to reach customers, but is about creating shared value every step along the value chain and sharing the principles of Social Innovation with all suppliers and partners.

This depth of collaboration is inspired by the fact that Social Innovation is:

- Multi-functional and multi-disciplinary and aligned to solving problems across multiple departments, stakeholders and often even countries. Smart city projects for example can involve bringing together IT integration and change management across several city departments to tackle functions as diverse as energy, water, mobility, education, healthcare and buildings. Solutions for industrial customers can involve integrating solutions for multiple sites and corporate functions, often spanning different countries
- Driven by demand (ie the imperative to address society's challenges) rather than supply meaning that all solutions and services must be developed from the perspective of the customer. Examples can be seen in mass transportation where the simple goal of the citizen is to see timely, comfortable, affordable, safe, reliable and convenient transport solutions
- Based on tailored solutions and services due to the unique issues facing each and every customer. In healthcare for example, where the health concerns of local citizens can vary drastically across regions and borders, there is a need for innovative diagnostic solutions tailored to local circumstances to deliver convenient, rapid, accurate, user-friendly and cost effective solutions
- The result of high levels of innovation and often involving novel solutions, meaning a high degree of learning and iteration for all stakeholders resulting in circular value chains with feedback loops and continuous improvement. In manufacturing for example, where smarter factories are becoming a reality and complex value chains are being constantly optimised through collaboration and feedback



Source: Frost & Sullivan

Open innovation accommodates the inventiveness of citizens, communities, businesses, civil organisations, and local and central government in both the design of solutions and also in the feedback loops for collaborative improvement

Service innovation and B2S business models open up improved ways of delivering solutions and services for society. However, to be truly successful the companies delivering Social Innovation need to develop, deliver and manage innovation processes across value chains. This includes:

- Delivering solutions and services through partnerships, either with multiple private sector players or through PPP
- Innovating with suppliers throughout the value chain
- Facilitating collaboration across business areas such as IT and infrastructure
- Bringing the end-users directly into the design and delivery processes through the encouragement of co-production and co-creation
- Encouraging open innovation to accommodate the inventiveness of citizens, communities, businesses, civil organisations, and local and central government in both the design of solutions and also in the feedback loops for collaborative improvement
- Developing pilot studies, incorporating all stakeholder groups, ahead of full deployment of solutions

A great example can be seen in Hitachi's JUMPSmartMaui initiative to create smart communities in Hawaii. The project set out to address Hawaii's high dependence on oil and fossil fuels and - through the collaboration of multiple stakeholders - the initiative focuses on energy and transportation infrastructure and the application of autonomous, decentralised IT systems for energy control.

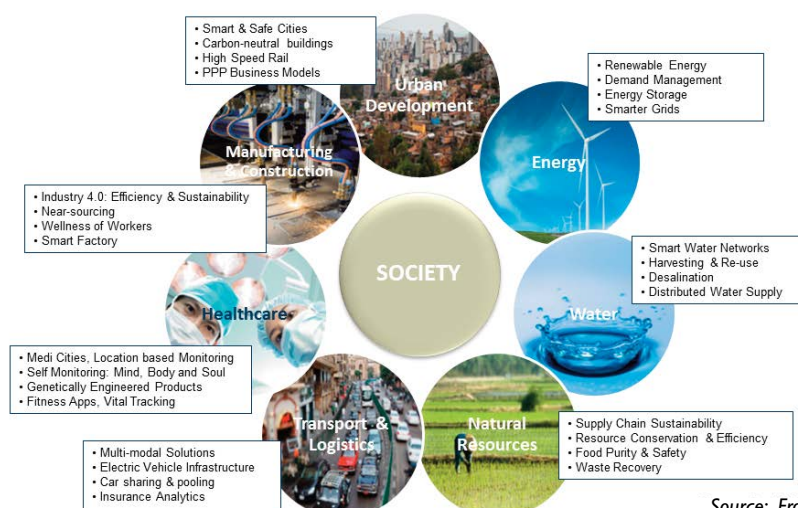
The collaboration has also been truly international, while focusing on optimising a local solution. For the delivery of the project Hitachi has partnered with NEDO, Mizuho and Cyber Defence from Japan to provide innovation across all elements of the project and value chain. In the USA, the collaboration has spanned local utilities, development boards, universities, research laboratories, energy institutes and local municipal authorities.

B. Growth Opportunities within Industries

So what are the industrial sectors where Social Innovation can have the highest impact and create the largest opportunities, and where are we seeing it happening? Or to put it another way, where is the need for Social Innovation at its most compelling?

The answer comes in the industries where society's challenges are converging and new technologies, business models and financing solutions can be deployed to provide better outcomes for all stakeholders.

High Opportunity Industries for Social Innovation



Source: Frost & Sullivan

That means sectors such as:

- Energy, where global electricity demand will keep growing at over 2.2% per year to 2020 and at the same time we have a critical need to reduce carbon emissions and manage energy more smartly at the point of use
- Water, where energy efficiency and water stress are driving innovation in desalination, wastewater recycling and smart water networks and 30% of the global water network will be smart enabled by 2020
- Natural Resources, where growing demand for food and fuel puts pressure on supply chain sustainability and create opportunity for resource efficiency and waste recovery
- Transport and Logistics, where global high speed rail networks will increase from 45,000 km today to 70,000 km in 2020 and multi-modal urban mobility will see 26.2 million car sharing members and nearly 1 million parking spaces delivering real-time parking information with the help of sensors by 2020
- Healthcare, where investment in prevention, diagnosis and monitoring will increase from 30% of total spending in 2014 to reach almost 45% by 2020 to signal a paradigm shift from focusing on cure to prevention and diagnostics
- Manufacturing and Construction, where the IoT, data analytics and cloud computing are enabling smarter manufacturing and process digitisation and the emergence of Industry 4.0 is driving resource efficiency and sustainability
- Urban Development, where cities need to increase the level of intelligence and integration of infrastructure that connects the healthcare, energy, building, transportation, and governance sectors in a world where over 55% of our population will live in urban environments by 2020

Furthermore, industries and supply chains rarely operate in isolation these days. By linking the industrial sectors to the five key mega trends, this becomes even more apparent and the Social Innovation opportunities by industrial sector become even more obvious.

Mega Trend Led Innovation Areas by Industry



Urbanization

Smart is the
New GreenHealth, Wellness
& WellbeingFuture of
MobilityFuture of
Energy

Energy	<ul style="list-style-type: none"> • Renewables • Nuclear power • New age of gas • Demand-side management 	<ul style="list-style-type: none"> • Smart grids, demand response • Smart homes • Flow & regenerative technologies • Renewables integration 	<ul style="list-style-type: none"> • CO2 reduction • Renewables • Energy harvesting 	<ul style="list-style-type: none"> • Batteries • Alternative fuels • EV Infrastructure 	<ul style="list-style-type: none"> • Storage • Integration • Energy efficiency • Distributed energy
Water	<ul style="list-style-type: none"> • Water harvesting • Water re-use • Greywater recycling • Stormwater 	<ul style="list-style-type: none"> • Smart water grids • Smart meters • Leakage detection 	<ul style="list-style-type: none"> • Water quality • Sanitation • Water availability • Drought relief 	<ul style="list-style-type: none"> • Mobile water treatment • Flood management 	<ul style="list-style-type: none"> • Energy efficiency • Desalination plants • Water-energy nexus
Natural Resources	<ul style="list-style-type: none"> • Food supply • Sustainable supply • Local sourcing • Fuel supply 	<ul style="list-style-type: none"> • Consulting • Forecasting & modelling 	<ul style="list-style-type: none"> • Food purity • Food safety • Alternative fuels 	<ul style="list-style-type: none"> • Supply chain sustainability 	<ul style="list-style-type: none"> • Waste-to-energy • Resource conservation efficiency
Transport	<ul style="list-style-type: none"> • Intracity & Intercity • Public transport • Urban mobility • High speed rail 	<ul style="list-style-type: none"> • Smart mobility • TMS 	<ul style="list-style-type: none"> • Wellness in cars • Ergonomic design • Passenger wellness • Driver diagnostics 	<ul style="list-style-type: none"> • Integrated mobility • Journey Planning • Car sharing & pooling • Autonomous driving • Dynamic Parking 	<ul style="list-style-type: none"> • EV charging software & services • Alliances / One bill
Logistics	<ul style="list-style-type: none"> • Consolidation centres • Last mile delivery • Off-peak deliveries • Supply chain management: LBS tracking and tracing 	<ul style="list-style-type: none"> • Asset tracking and management • Safety/security of assets • Real-time tracking 	<ul style="list-style-type: none"> • Supply chain sustainability • Flexible time delivery 	<ul style="list-style-type: none"> • Intelligent robots • Delivery drones • Shared fleets • Hybrid vehicles • Polarising fleet 	<ul style="list-style-type: none"> • Energy efficiency • Alternative fuels
Energy efficiency Alternative fuels	<ul style="list-style-type: none"> • Hub & spoke healthcare delivery • Self-monitoring • Healthcare data exchanges 	<ul style="list-style-type: none"> • Integrated records • E-health & m-health • Data and business analytics • Wearable devices, • Implantable devices 	<ul style="list-style-type: none"> • Self monitoring - mind, body and soul • Genetically engineered products • Fitness Apps • Vital Tracking 	<ul style="list-style-type: none"> • Mobile monitoring • Predictive Analytics • Wellness promoting transport • Hospital campus mobility 	<ul style="list-style-type: none"> • UPS • Backup for pace makers • Batteries for medical devices • Off grid hospitals
Manufacturing & Construction	<ul style="list-style-type: none"> • Near sourcing • Sustainable manufacturing • Internet of industries 	<ul style="list-style-type: none"> • Industry 4.0 • Smart factory • Cloud computing • Asset tracking • Process digitalization 	<ul style="list-style-type: none"> • Wellness of workers • Emission reduction 	<ul style="list-style-type: none"> • Advanced robotics • Factory mobility 	<ul style="list-style-type: none"> • Remote condition monitoring • Integration • Energy efficiency & FEMS
Urban Development	<ul style="list-style-type: none"> • Transport hubs (eg airports) • Mega projects • Project finance • PPP 	<ul style="list-style-type: none"> • Smart cities & City 3.0 • Safe cities 	<ul style="list-style-type: none"> • Medi cities • Location based monitoring • Patient portals • Home health & retail tele-health 	<ul style="list-style-type: none"> • EV charging infrastructure 	<ul style="list-style-type: none"> • Zero energy homes

Source: Frost & Sullivan

The vision of City 3.0
– where the IoT
enables cities to
become connected hubs
of innovation - will
require corporations to
deliver complex change
management programs
and IT integration

A clear example of critical elements converging is in the transportation and logistics industries. With the premise that transport makes up more than 60% of oil consumption and 30% of all global CO2 emissions, a key growth area for Social Innovation will be focused on bringing more automated, smarter, cleaner, more comfortable, quieter and safer vehicles, trains, aircraft and vessels. The focus will also be on reducing traffic and congestion in urban areas, improving intelligent mobility and enhancing the passenger experience through the deployment of innovative traffic management and information systems, advanced traveller services, efficient logistics and construction and maintenance technologies.

In rail transportation for example, Hitachi has developed a service based train concept to deliver rolling stock and maintenance services to the Intercity Express Programme (IEP) in the UK. The 27.5 year contract is a pay for use scheme where the client pays for on-time delivery of passengers for the life of the contract, thereby changing traditional fixed costs to a variable cost model and massively diminishing upfront investment. This is a truly innovative B2S business model to address the current and future mobility needs of local citizens.

Social Innovation is also high on the agenda to support urban development needs, not only in the smart city context, but also with new models and methods needed to attract investment, business, societies and to establish new ways of cooperation across city departments. The vision of City 3.0 – where the IoT enables cities to become connected hubs of innovation - will require corporations to deliver complex change management programs and IT integration.

Innovation in electric vehicle (EV) charging infrastructure is becoming extremely interesting, for example the UK Power Networks' trial explores the potential to use EV charging points as a load management resource via a new smart control system. The pilot is part of the Low Carbon London project and uses active network management software to gather real-time data from the bottlenecks in the electricity grid to calculate and deliver constraint actions required to relieve grid congestion.

New types of healthcare delivery service models are emerging because traditional places of care are under financial constraints and often suffer from a lack of space. We have seen the emergence of "medical cities", in the Middle East, India and many parts of Asia. Several countries, including Poland and Brazil, have seen the development of specialised facilities as a result of medical tourism. In addition, high value services are also being created for patients who are seeking convenience as they have limited time and are willing to pay out of pocket.

Huge opportunities are
emerging for
sustainable and
efficient manufacturing
by 2020 and beyond

There are also huge needs for the creation of products, processes and services that contribute to the broad field of sustainable development (energy, water, waste recovery and natural resource usage). Innovation areas include renewable energy which is currently going through its fastest ever period of global growth, as well as materials recycling, wastewater treatment, environmental food processing and eco-friendly packaging.

In the field of sustainability and renewable energy, Hitachi has been developing offshore wind power capabilities, initially in Japan but now also globally. Hitachi has developed – initially in collaboration with Fuji Heavy Industries on the wind turbine side on a technology that Hitachi subsequently acquired – a robust and modular 2 MW offshore wind power generation solution, with work already underway on developing a 5 MW solution. Its Wind Power Kamisu 1st Offshore Wind Farm in Japan is currently generating 14 MW of electric power. Hitachi is also leveraging its IT capabilities and has integrated advanced IT into the wind farm's power control technology and interconnection stabilization system.

Meanwhile, the manufacturing industry is poised to experience the fourth industrial revolution – Industry 4.0 – where huge opportunities are emerging for sustainable and efficient manufacturing by 2020 and beyond. Underpinned by product innovation, increased collaboration, operational process enhancement and cyber-physical production, and enabled by IoT and data analytics, the associated opportunities for Social Innovation are enormous.

In the rest of this Whitepaper, we will explore examples of Social Innovation in action across industries and regions. We will look at ground-breaking projects being delivered by Hitachi – already introduced earlier as a visionary global company with a thought leading position in the sphere of Social Innovation – to show how corporations can innovate to meet the manifold challenges of modern society.

Hitachi: Introducing Social Innovation in Action

With convergence inevitably accelerating, Frost & Sullivan believes the future opportunities will be greatest for the companies that can bring together total solutions – aligned with the global mega trends and enabled by technology and B2S business models – to address these multiple needs in a coherent, integrated manner.

Based on a self-stated goal of improving the quality of life for the global community, Hitachi's Social Innovation Business is based on collaboration, blending technology innovation with new business models and driving the development, improvement and enhancement of social infrastructure.

Having evolved its Social Innovation strategy and vision over many years, the Hitachi Social Innovation Business today is built on 6 key technology areas:

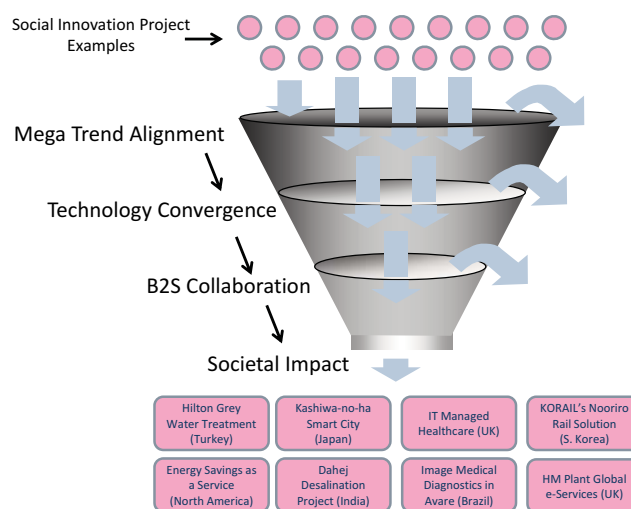
- **Water**, where Hitachi offers a sophisticated range of intelligent water and wastewater treatment solutions, including systems and technologies for their control and operation. The company has delivered several thousand systems, including monitoring and control solutions in Japan, as well as winning desalination projects in Iraq and India, an advanced water treatment project in Sri Lanka, and wastewater recycling projects in Turkey
- **Healthcare**, where Hitachi deploys a huge range of technologies, systems and data management solutions to support a healthier and safer society. Innovations can be seen from proton beam cancer treatment solutions to automated analysis systems and nursing care business solutions. Social Innovation examples range from diagnostic imaging in Brazil and Egypt to using microscopy to advance STEM¹ education in the USA and IT solutions to increase hospital efficiency in Denmark.
- **Energy**, where Hitachi focuses on technologies and solutions to increase the efficiency, stability and security of both conventional and renewable energy generation, as well as smart grids where Hitachi deploys its IT expertise for the balancing of electricity supply and demand. Examples include supplying solar power generation systems in Japan, equipment and support services for nuclear power, reducing emissions from fossil-fuel power plants in North America and voltage control for wind power integration in the UK and the innovative 'Smart Community Project' in Manchester, UK
- **Transportation**, where Hitachi utilises electronic and electro-mechanical technologies for next generation vehicles and operates as a full systems integrator across rail (train design and manufacture, operations management, monitoring and control, information service, and maintenance), road (EV technologies, traffic management) and airport management and control. Mobility examples include commuter rail systems in Brazil, lightweight electric trains in Korea, a service based train concept in the UK and providing EV charging management solutions in Okinawa, Japan. The focus in Automotive is on products and solutions for environmental efficiency, safety and information in the fields of electric powertrain, engine management systems, drive control and car information systems

1 Science, Technology, Engineering and Mathematics

- **IT**, where Hitachi develops national, social and industrial infrastructure based on advanced IT. This can be seen in a diverse range of projects from data storage solutions for the German Space Operations Center to the use of IT to support the sustainability and efficiency of agriculture in Japan
- **Security**, where Hitachi delivers solutions for both physical and cyber security to maintain the safety and security of public facilities, companies, critical infrastructure and cities. This includes biometric identification, advanced monitoring and disaster response support systems and data protection systems to detect and prevent cyber attacks and keep data secure. Examples include state of the art ATMs in India and finger vein technology for secure banking solutions in Poland

At Frost & Sullivan, we've been observing and analysing Hitachi's Social Innovation Business in detail. We've been looking at examples of Social Innovation in action, specifically in terms of the core pillars that define Social Innovation: mega trend alignment; societal impact; technology convergence; local and global dynamics; collaboration; and relevance to industry sectors that we defined earlier in this Whitepaper as having the most compelling need for Social Innovation.

Identifying High Impact Examples of Social Innovation in Action



Source: Frost & Sullivan

By 2050, the global population will grow to 9 billion, increasing the existing pressure on a fixed water supply

We've found that Hitachi has many exciting examples of Social Innovation in action around the world, but after a rigorous review we have also found that eight projects emerge to give a particularly powerful representation of living examples of Hitachi's Social Innovation Business across regions, industries and mega trends. We've analysed and highlighted these eight projects by looking particularly closely at:

- Mega Trend Alignment, where we have evaluated the level to which each project is responding to the critical global mega trends: Urbanisation; Smart is the New Green; Future of Energy; Future of Mobility; and Health, Wellness & Wellbeing
- Technology Convergence, where we have looked closely at the delivery of integrated, converged and connected solutions
- B2S Collaboration, where we have evaluated the collaboration across stakeholder groups and looked for critical elements of partnership, innovating with suppliers, co-production and co-creation, open innovation with feedback loops, and collaborative pilot studies
- Societal Impact, where we have looked at the level to which each project has a definable impact to benefit local and/or global citizens and/or addresses a specific government policy or requirement

Based on these criteria, we believe these eight projects are excellent examples of just some of the diverse range of technologies, solutions, services, collaborations and business models that Hitachi has deployed in its Social Innovation Business. In the sections below, we have presented these examples as case studies that show the business and societal impacts that Social Innovation is having on the world.

1. Hitachi Infrastructure Systems | Saving Water for Hilton Istanbul

Water is a critical resource in danger. Global availability of accessible water resources is projected to fall short of demand by 35% in 2025 because of the increase in population growth. Most regions worldwide face water and sanitation infrastructure challenges to renovate or replace aging pipelines, increase system capacity, and improve operational efficiency. Six billion people already use 54% of the estimated total water available. By 2050, the global population will grow to 9 billion, increasing the existing pressure on a fixed water supply.

New innovations are required to find ways of sustaining our water usage and addressing a key societal mega challenge. This is particularly critical in highly populated mega cities, like Istanbul. Hitachi is finding smart approaches to locally address such an acute global societal challenge - as demonstrated by this case study of its work with Hilton Hotel.

Hitachi is delivering systems to enable the Hilton Hotel in Istanbul to reduce water consumption by 10% over 5 years. The move is one towards sustainability – ensuring Hilton is a contributor to the local society and taking responsibility towards resource management infrastructure.

Hitachi had to work with Hilton and co-create a re-use system that could manage the variable demands of a hotel environment, where grey water flow varies throughout the day. Therefore Hitachi installed flow valves, linked to a balancing tank which could store excess grey water ready for processing.

Hitachi Infrastructure Systems' solution keeps Hilton at the cutting edge in terms of technology whilst having a positive environmental impact. The unit is now processing between 75 and 85 cubic meters of grey water each day. This grey water, from wash basins and showers, is processed and used to flush toilets and to irrigate the Hilton's 15 acres of gardens.

The return on investment for Hilton Istanbul as well as the benefit to the local society has been realised. The practical demand for sustainable water management in a mega city such as Istanbul is driving the need for Hitachi's innovation here and the co-creation of a solution based on customer demand.



"We constantly measure the performance of the unit and over a two year period it has successfully processed over 60,000 cubic metres of water and has the capacity to process even more.

The savings we have made over this period, with only 240 rooms connected mean that we have already recovered our initial investment".

Hamit Yalazer, *Chief Engineer, Hilton Istanbul*

Hitachi's energy
management system
realises the
consolidated
management of,
prediction of demand
for, and provision of
supply-and-demand
information about
energy

2. Hitachi, Ltd. | Kashiwa-no-ha Smart City

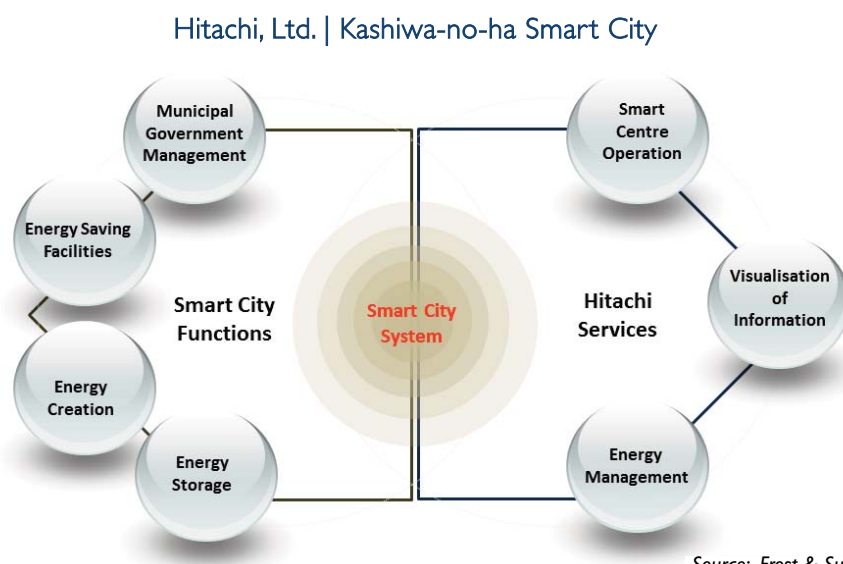
A smart city is a symbiotic one with key players delivering solutions through partnerships. The pace of smart city market development depends on how quickly companies converge and tap into each other's value chains. Concerns about climate change, combined with the trend of urbanisation, inevitably mean that cities have a key role in improving energy efficiency and reducing carbon emissions, while promoting energy resilience in terms of security of supply and price. By 2025, Frost & Sullivan have projected that 35 Mega Cities will exist worldwide, representing a huge opportunity for urban solutions.

Kashiwa-no-ha shows a unique process of collaborative improvement. Hitachi's central role at the point of convergence in the development and existence of Kashiwa-no-ha is one that is built on partnership and harnessing the power of collective skills; creating a city that doesn't just live together but also works together through open innovation. This project addresses a number of mega trends (especially Smart is the new Green and Urbanisation) impacting cities and is a model for the future.

Japan has experienced a large number of issues in a short time: rapid urbanisation, energy and environmental challenges related to the increased use of motor vehicles, and a series of natural disasters. Hitachi has had experience with these issues in many cities in Japan and therefore believes that an approach focused on solving societal issues, with extensive input from all stakeholders, is critical for the sustainable development of cities in the future. Tokyo will be the largest Mega City in 2025, with a population of 38.7 million and an example to the rest of the world. Hitachi's focus on bringing a smart approach to these cities – as in Kashiwa-no-ha – will be a critical lifeblood for future society.

In Kashiwa-no-ha Hitachi's energy management system realises the consolidated management of, prediction of demand for, and provision of supply-and-demand information about energy. It does so by enabling the full and clear visualisation of energy through its smart centre. To accomplish this, the system gathers data from other local and central-management systems that are installed in offices, shopping centres, residences and other public facilities. Moreover, the distributed power facilities that have storage-battery systems as their core are vital facilities for ensuring stable operation when the electrical grid is linked with renewable energy sources, such as solar power or wind power. By managing and linking these, the flexible interchange of electrical energy within the region becomes possible and a truly smart and efficient solution for the city is realised.

Hitachi, through its value chain partnerships, has been a catalyst for the necessary collaboration that enables cities like Kashiwa-no-ha to become smart and their citizens to benefit from advanced energy management solutions.



3. Hitachi, Ltd. | National Health Service, England, Greater Manchester

Increasing focus on Health, Wellness and Wellbeing is one of the most powerful global mega trends. Harnessing data and informatics to introduce knowledge based and predictive healthcare can begin to alleviate some of the strain felt by demographic and societal trends; aging population, progressive long term condition development and rising healthcare costs. This case study demonstrates how technology can be used across stakeholders in a B2S collaboration to effectively address global challenges.

In the UK long-term conditions such as diabetes are more prevalent in older people (58% of people over 60 compared to 14% under 40) and in more deprived groups (people in the poorest social class have a 60% higher prevalence than those in the richest social class and 30% more severity of disease). People with long-term conditions now account for about 50% of all GP appointments, 64% of all outpatient appointments and over 70% of all inpatient bed days. Treatment and care for people with long-term conditions is estimated to take up around £7 in every £10 of total health and social care expenditure.

Projections for the future of long-term conditions are not straightforward. Analysis of individual conditions suggests that the numbers are growing, and the number of people with multiple long-term conditions appears to be rising. Hitachi is able to bring new IT driven solutions to existing healthcare challenges and leverage smart solutions to utilise data to prevent rather than react to healthcare challenges.

Hitachi and the NHS Greater Manchester are undertaking two projects in Manchester, UK. The first is around developing a federated data platform to facilitate the collaboration of medical information in order to enable the provision of any number of new services that leverage the highest levels of privacy and security. The second is around diabetes care in the form of a lifestyle improvement programme.

The IT system in this scenario is able to directly and immediately improve the healthcare provision for the local community. Data gives critical visibility on the health ecosystem informing the providers in Manchester of their challenges and facilitating pre-emptive planning to avoid widespread societal damage in the form of unaddressed demographic trends. The informatics platform pioneered by Hitachi enables security and analytics technologies to deliver several new high quality healthcare services and lifestyle improving programmes targeted towards tackling Diabetes. These healthcare needs are society driven and Government acknowledged but are clearly technology and IT enabled.

The health challenges in Greater Manchester UK are not unique but rather a local example of a global phenomenon. Bringing intelligence, in the form of IT managed data into the process of healthcare is a global need. Furthermore the development of a pilot study like this enables all the relevant stakeholders from the Council, public health authority and the people of Greater Manchester to experience and co-develop the solution before deployment to a wider geographical area.

4. Hitachi, Ltd. Transportation Systems Division| Eco Friendly Locomotive for Korea

In the next ten years, a tremendous modal shift is likely from highways to rail. Railways are the lifeblood of countries connecting cities and in the future will connect continents representing a further leap forward in globalisation. Frost & Sullivan's Mega Trend analysis has highlighted that more than 65% of this future rail transport investment will be made in APAC and the Americas from 2010 to 2025. For example by 2025, the first steps to connect APAC and Europe by high speed rail services are expected to commence.

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Hitachi plays a critical role in meeting mobility demand through bringing collaborative solutions to local railways such as the Nooriro project in South Korea. 'Nooriro' is a compound of two Korean words, 'World (Noori)' and 'Road (Ro)', meaning 'a train that travels the whole world'. Mobility is a core right of the community and a critical area of innovation harnessing technology to open new ways in which people can travel from A to B.

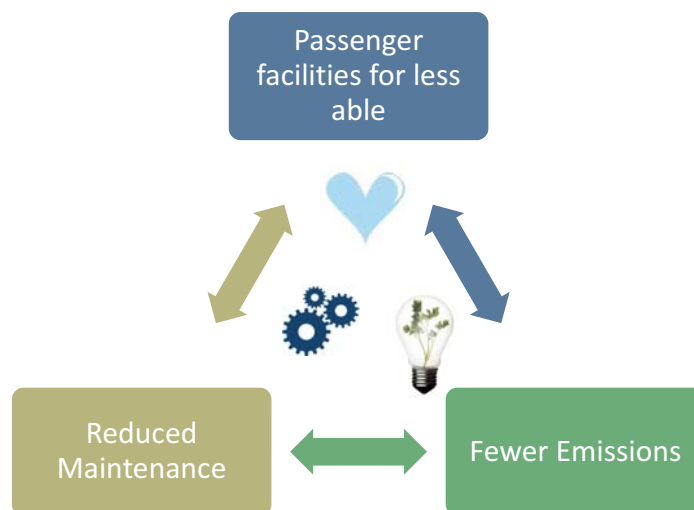
In this case Hitachi worked collaboratively with Korea Rail on Nooriro bringing about the establishment of a connecting transport system between base cities and the era of entry into short distance transportation markets. The result shows the advantages that can be gained in a public private partnership (PPP) financing model – particularly the collaboration and societal impact leading to the redistribution of skills where customer and provider are learning from one another. A critical offshoot of the partnership between Hitachi and Korea Rail is the upskilling of the Korea Rail team through Hitachi engineers. The partnership has enabled the exchange of advanced skills as well as improved mobility for the South Korean community.



“When a problem occurs, Hitachi will thoroughly investigate the problem, identify the cause and present measures and solutions to deal with the problem. Through such an organised system, the efforts of Hitachi to prevent the recurrence of problems are very encouraging changes welcomed by KORAIL employees”

- Mr. Jang, Tae-Joo, Technical Support
Department Manager, KORAIL
Byeongjeom Train Service Center

Nooriro has not only had a positive impact on the environmental emissions expected from electrification but has increased the comfort level of the commute whilst providing greater facilities for the elderly, the disabled and families travelling with infants. The advanced technology has also decreased the average maintenance work by 1.3 persons per train and is projected to sustain or improve that position over the next 30 years of operation.

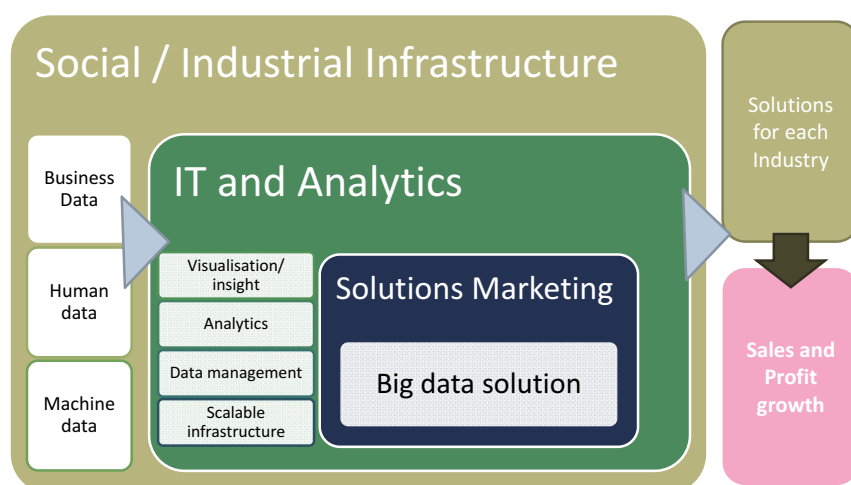


Source: Frost & Sullivan

5. Big Data Solutions for Energy Saving (North America)

Managing energy costs and sustainability goals are key challenges to both businesses and the public sector alike. But despite the work of responsive technology providers, energy managers and executives, growth in energy management systems has not always lived up to expectations, suggesting business model innovation is required to stimulate markets. Meanwhile energy efficiency targets are stiffening (for example, the EU is proposing 40% energy efficiency targets for 2030) and service markets such as energy performance contracting are growing at above 10% per year².

Hitachi has addressed this social need and market opportunity by developing an 'energy savings as a service' proposition that enables industrial customers in North America to buy energy savings like they would buy electricity from a utility but allowing for huge savings without a prohibitive initial capital outlay. Bringing together the consulting, solution design and outsourcing skills of Hitachi Consulting, and the Big Data skills of Hitachi Data Systems, the solution is highly collaborative and can be easily tailored to individual customers and industry sectors by also integrating products and systems from the many other divisions of Hitachi.



Source: Frost & Sullivan

² Source: Frost & Sullivan market analysis.

Hitachi has managed
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Hitachi Consulting also provides a value based service model where service fees are based on savings achieved. Through careful monitoring and metering both the client and Hitachi will be able to track avoided kilowatt hours; the actual energy saved. The client can pay for these avoided kilowatt hours out of their existing utility budgets and achieve cost savings immediately. Clients do not need to deal with a capital or financing lease, rentals or capital purchases and can typically expect to achieve between 20 and 30% energy savings.

As a true example of Social Innovation, Hitachi has managed to benefit multiple stakeholders by finding a way businesses can lower their negative impact on the environment and reduce energy costs with a financing solution and delivery model that make return on investment more attractive and the environmental impact more visible.

6. Hitachi, Ltd. | Dahej Desalination

The growing global demand for water reveals the urgent need for effective management and development of water resources using methods such as desalination. Currently, 16,000 desalination plants worldwide are producing billions of litres of clean water every day and this will need to increase. Growing demand for efficient water management is driving new business models in the water industry that can help overcome the water scarcity problem in the future.

Hitachi's Dahej desalination project is along the Delhi Mumbai corridor which is classic example of a mega corridor. Frost & Sullivan defines mega corridors as strips connecting 2 major cities or mega regions - 60 km or more apart, and with a combined population of 25 million or more. There will be 21 mega corridors in 2025 and the Delhi Mumbai corridor will be one of the biggest and fastest growing.

Where population is dense and water stress is high, resource efficient approaches like Hitachi provides here are critical and are completely aligned with the unfolding of critical and high impact mega trends.

The goal of this Project is to resolve shortages of industrial water to be supplied to companies setting up operations in the coastal industrial region of Dahej through a seawater desalination process. The project is being promoted jointly by the Japanese and Indian governments, involving the construction of industrial parks between Delhi and Mumbai utilising a PPP model agreement and enabling collaboration between public entities. Hitachi is playing a critical role in bringing together the stakeholders and providing the technical expertise and solutions.

This project shows a powerful example of B2S collaboration – a critical model for healthcare challenges

Upon completion, the Project will be the largest seawater desalination project in Asia and the Dahej district will avoid a projected shortfall of 310,000 tonnes of industrial water daily by 2015.

Where urbanisation is driven by government desire to grow trade areas and peoples' desire to move to cities, the more acute need for resources must be addressed by the relevant governments. Where there is a mega corridor, there is a mega need and the collaborative efforts here mean technology can meet that need.

7. Hitachi Medical, Brazil | Santa Casa de Misericórdia de Avaré

Frost & Sullivan project that healthcare expenditure as a percentage of global GDP is expected to grow from 10% in 2012 to 12% in 2020. The health and wellness of a community is a collective social responsibility and a cause for which medical technology and B2S business models have a huge role to play. A key element of the mega trend 'Health, Wellness and Wellbeing' is bringing sustainable healthcare to the total population of the planet. A key sub trend is the facilitation of 'Hub-and-Spoke hospital care', with the hospital as a hub and clinics and residential care as spokes.

In this case, Hitachi has equipped a critical health spoke in Avaré, Brazil, with the technology needed to provide critical services to a large area. This project shows a powerful example of B2S collaboration – a critical model for healthcare challenges.

Despite all the services offered, the Santa Casa of Avaré did not have an Image Diagnosis Unit (IDU). As the population of the city and its neighbouring towns grew, the demand for such exams has increased. The hospital was intended to supply the healthcare shortage not only for the inhabitants of Avaré but also the populations of its 16 neighbouring districts. By partnering with Hitachi to create an IDU solution, the hospital is preventing many patients having to travel up to 120km to take magnetic resonance exams elsewhere.

The result has exceeded the expectation of 66 exams per month, and the hospital delivered 200 exams in only 2 months.

The critical element to the project's success was the fit of the IDU technology as it was agile as well as easy to use and install. Despite being a low magnetic field device, AIRIS II had high amplitude gradients, enabling it to perform exams within 30 to 40 minutes. This offered a huge advantage to the hospital and enabled more patients to be seen overall.

AIRIS II is easy-to-handle, adding to the operator's agility and a rapid exam completion. The space required for its installation was no larger than 30m² and it did not require a cooling room once its magnet is permanent allowing for a significantly reduced maintenance cost.

Santa Casa can now continue to offer critical health services to its growing urban population.

8. Hitachi Construction Machinery (Europe) NV | Land & Water Group Plant Hire

Bringing smart systems into everyday processes to achieve a higher level of efficiency, over and above environmental efficiency, is the very essence of Frost & Sullivan's mega trend 'Smart is the New Green'. Why rest at the ability to reduce environmental impact when a smart system can do that but also make savings in terms of time, stress and cost by showing how better usage can improve input to output ratio, reduce reactive maintenance and costly downtime?

The next example we want to highlight shows Hitachi offering a product that pays benefit forward in terms of optimising machine performance, resource efficiency and environmental sustainability. Hitachi's technology benefits its customers who in turn benefit theirs. The Global e-service provided by Hitachi uses IT integration to help monitor and collect data from plant equipment, thereby enabling advanced resource efficiency through data analytics into an industrial process.

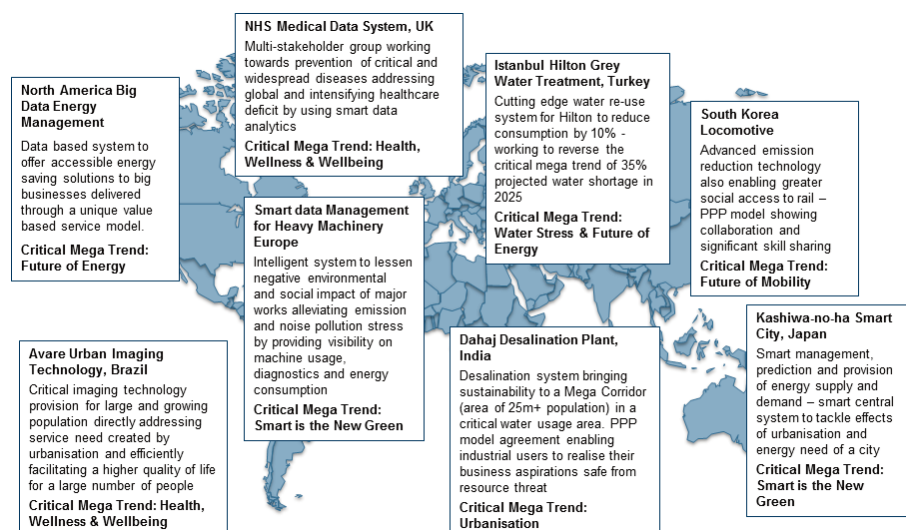
Land and Water Group Plant Hire is using Hitachi's Global e-Service to enable its customers to reduce their negative impact on the environment and reduce cost for the operators – a critical need for small and local businesses.

Works on land based projects such as those facilitated by the Land and Water Group Plant Hire can be intrusive to the local community. The adoption of a smarter system will prevent unnecessary inefficiencies and enable businesses to take their savings and grow.

Global e-service is a future proofed solution and one that benefits from a continual feedback loop created through the partnership between Hitachi and Land & Water Group Plant Hire. Usage of the system provides ongoing data encouraging incremental and innovative improvements over time so that the performance – in terms of cost, efficiency and sustainability – continues to improve.

Hitachi can bring technological improvement to established processes and as in this case, benefit all parties. By making the approach smart – gathering data and learning from it – all stakeholders can utilise the data to their advantage.

Hitachi Social Innovation Projects: Mega Trend Alignment, Convergence, Collaboration and Societal Impact



Source: Frost & Sullivan

Looking to the Future

At the beginning of this Whitepaper, we asked how companies will react to the growing human and societal challenges of our future, and who will lead the way? We have gone forward to look closely at how a major global player – Hitachi – is doing exactly that.

Over a period of several months, Frost & Sullivan has conducted a detailed review of Hitachi's Social Innovation Business to find powerful examples of Social Innovation in action. We have evaluated Hitachi's many projects in terms of mega trend alignment; societal impact; technology convergence; local and global dynamics; collaboration; and relevance to critical industry sectors.

Hitachi is leveraging
advanced technology
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profitable Social
Innovation Business

The eight case studies we have presented show how Hitachi – a visionary global company and Social Innovation thought leader with a long history of addressing the challenges of society – has embraced local and global challenges and is driving a successful proposition based on Social Innovation. We have shown how Hitachi has targeted the industries where the need for Social Innovation is the most compelling, has responded to the challenges and opportunities of the global mega trends, is a leader in collaboration, and has innovated with technology integration, information analytics, B2S business models and integrated service-oriented solutions.

In summary, Frost & Sullivan has shown that Hitachi is leveraging advanced technology and systems, bringing new business models to reality and driving a strong, sustainable and profitable Social Innovation business that is ready to answer society's challenges across multiple functions and disciplines, both now and in the future.

Looking forward, in a world where the mega trend impact will grow ever stronger, technology convergence will continue to accelerate and true success will be defined by those companies that can bring collaborative production of solutions. Hitachi already has its eyes set firmly on that future opportunity for answering the challenges of society and Frost & Sullivan believes it is this which clearly differentiates Hitachi from its other competitors.

The services and solutions of tomorrow will witness the continuous convergence of IT with social and industrial infrastructure to achieve total optimisation in all infrastructure-related systems. The emergence of the 'internet of everything' and 'systems of systems' will drive the coming together of systems that have historically needed to operate separately, meaning fully integrated solutions based on service business models will become tomorrow's reality.

Hitachi believes that this approach, coupled with its focus on collaboration with customers and partners to achieve the best solution, is key to the future evolution of its Social Innovation Business and is calling this "Symbiotic Autonomous Decentralization". In fact this is already beginning to happen and Hitachi has collaborated with JR East in Japan to create an Autonomous Decentralized Transport Operation Control System - or ATOS – to manage 19 train lines and around 300 stations. It is the "Autonomous Decentralized" aspect that makes it a unique and future-looking solution.

With a total commitment to Social Innovation as its main driver of growth in the coming years and with over a century of driving this agenda, Hitachi is focused on profitable and sustainable growth coming from resolving societal issues and improving people's quality of life.

ABOUT FROST & SULLIVAN

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best-practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages over 50 years of experience in partnering with Global 1,000 companies, emerging businesses and the investment community from more than 40 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.

ABOUT HITACHI, LTD.

Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, delivers innovations that answer society's challenges with our talented team and proven experience in global markets. The company's consolidated revenues for fiscal 2013 (ended March 31, 2014) totaled 9,616 billion yen (\$93.4 billion). Hitachi is focusing more than ever on the Social Innovation Business, which includes infrastructure systems, information & telecommunication systems, power systems, construction machinery, high functional materials & components, automotive systems, healthcare and others. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.

Social Innovation microsite:

social-innovation.hitachi

Social Innovation blog:

www.hitachi.eu/social_innovation

Twitter: Global - [@Hitachi_SocInn](https://twitter.com/Hitachi_SocInn) Europe - [@HitachiEurope](https://twitter.com/HitachiEurope)

Hitachi Brand Channel:

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331 E. Evelyn Ave. Suite 100 Mountain View, CA 94041