Making change happen together

We engage actively with a broad group of stakeholders to achieve a more sustainable, socially responsible world, and improve people’s lives with technology through social investments.
For Nokia, being part of the solutions to today’s global challenges is our duty. We engage actively with our stakeholders to contribute to global efforts to achieve a more sustainable, socially responsible world, and improve people’s lives with technology through social investments. We understand we cannot do this alone and are proud to work with a broad range of key stakeholders.

To achieve our sustainability goals, we collaborate closely with customers, suppliers, non-governmental organizations (NGOs), authorities, and industry peers, as well as universities. We work with our stakeholders not only to drive the sustainability of our products and solutions, but also to foster best practices, translate their expectations into business value, and supporting progress on sustainability goals.

Our approach

Our focus

Our activity

Suppliers

- Driving improvements in cooperation
- Building competencies around sustainability
- Ensuring high standards of ethics through audits and assessments
- Encouraging climate reporting through the CDP

Employees

- Raising eco awareness
- Involving our employees in charity
- Leveraging human capital

Customers

- Arranging corporate responsibility reviews
- Reporting through EcoVadis
- Providing energy efficiency analysis and recommendations
- Showcasing possible future solutions supporting sustainable development

We also engage with

Industry

In 2016, we focused on topics such as
- Freedom of expression and privacy
- Climate change
- Supply chain sustainability
- Connecting the unconnected
- The UN Sustainable Development Goals

NGOs

In 2016, we focused on topics such as
- Digital literacy
- Empowering women and girls
- Saving lives and providing access to better health

Investors

In 2016, we reviewed our sustainability activities regularly with investors and provided them with detailed information on our sustainability activities through for example CDP, RobecoSAM, Vigeo, and FTSE4GOOD.

Universities

In 2016, we focused on
- Research, training programs, and events that foster innovation
- Promoting scientific innovation, digital health, talent, and knowledge creation through the Nokia University Donations Program
Cooperating with others in our industry and beyond

Our cooperation and membership of major industry, government, and business organizations is also an important component that supports our sustainability agenda. We were a member of United Nations Global Compact, Global e-Sustainability Initiative, CDP supply chain program, The Telecommunications Industry Dialogue (ID), Climate Leadership Council, DIGITALEUROPE, Conflict-Free Sourcing Initiative, ITU-D, UN WEPs, GNI (Global Network Initiative), GSMA Humanitarian Connectivity Charter, ERT, International Chamber of Commerce, BIAC, OCDE, and several standardization bodies, as well as numerous university collaborations. We also have structured engagement with the World Economic Forum, the Broadband Commission, and B20.

United Nations Global Compact

Our sustainability report and company strategy conform to the United Nations Global Compact (UNGC) by incorporating information on our sustainability activities according to the 21 UNGC Advanced Level assessment criteria. For the second year in a row, our reporting is aligned with the UNGC Advanced Level criteria, ranking us in the top quadrant of companies reporting, according to the UNGC classification. In 2016 we renewed our membership to the UNGC as well as the UN Nordic regional network.

Carbon Disclosure

See our carbon disclosure work at CDP

Our work with the World Economic Forum

In 2016 we joined the World Economic Forum (WEF) as a partner. This international organization for public-private cooperation gathers those committed to improving the state of the world. We are proud to be among them. The Forum engages the foremost political, business, and other leaders of society to shape global, regional, and industry agendas, people from all walks of life who have the drive and the influence to make positive change. The Forum strives in all its efforts to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance. Moral and intellectual integrity is at the heart of everything it does.

Our CEO Rajeev Suri and other executives engage in discussions shaping the future of the digital economy and society. For example, through the Internet for All project, discussions include promoting the benefits of the Internet and connectivity to those currently unconnected. Rajeev Suri joined the stewardship board of the WEF’s initiative Shaping the Future of Health and Healthcare in order to promote digital advancement as a means to deliver healthier lives and better healthcare - to keep populations healthy and to treat patients more effectively, solutions need to come from outside traditional healthcare. We also work with WEF focusing on improving gender balance. CMO Barry French is on the Steering Committee of the Gender Parity initiative. Our chairman, Risto Siilasmaa also signed the Compact for Responsive and Responsible Leadership.

Working with the UN Broadband Commission for Sustainable Development

At the UN Broadband Commission, our President and CEO actively engages to discuss how to connect the unconnected and advance the Sustainable Development Goals through technology. In particular, in 2016, he co-chaired the Working Group on Digital Health. This working group prepared recommendations together with the Novartis Foundation on how to make digital healthcare a reality, providing policy recommendations on how to use technology to achieve the best quality medical care in all parts of the world. Read more here.

Currently, our President and CEO Rajeev Suri is chairing a Working Group on the Digitalization Scorecard – providing research on how to advance digital transformation in education, healthcare, e-government, agriculture, and transportation in order to make the benefits of digitalization more available to people.

Our participation in B20 Forum

We are proud to help drive discussions about digitalization in the B20 forum (business advisory body to the G20). At the end of September 2016, our President & CEO Rajeev Suri accepted an invitation to become a co-chair of the newly created B20 Germany task force "Digitalization", as well as the B20 Germany Business Advocacy Caucus. The B20 is an opportunity for Nokia to help shape the industry vision on digitalization and associated policy recommendations towards political leaders. B20 is
a grouping of global business leaders advising the G20 policy makers on key economic issues from an industry perspective.

**ITU-D**

We work with the ITU-D and in fact lead the ITU-D study on “ICT and Climate Change”. The drafting of the final report is available [here](#). Section three of this report on “Climate change mitigation” addresses the policies and technological efforts from ICT organizations that contribute by reducing their own GHG emissions. The report then recalls an estimation of the potential GHG reduction that can result from enabling the following economic sectors with ICT: mobility and logistics, manufacturing, food, buildings, energy, work and business, health, and learning. In this respect, particular attention is paid to urban areas where a growing proportion of the world population lives, and the benefits of innovative ICTs applied to “smart cities” are summarized and illustrated with references to some best practices.

**European Round Table (ERT)**

We are a key member of the European Round Table of Industrialists (ERT) forum. ERT advocates policies at both national and European levels, with the goal of improving European competitiveness, growth and employment. Our Chairman Risto Siilasmaa is personally involved in the work of the round table, leading Nokia engagements with this organization. We actively participate in the Energy and Climate Change (ECC) Working Group that seeks to create an holistic approach appropriate to the international context to address the significant challenges that Europe and the planet are facing. Issues that were addressed and discussed in 2016 focused on:

- European policy framework for energy and climate change, including energy costs, EU ETS, carbon pricing
- International climate discussions
- Company reporting: Climate-Related Financial Disclosures

The Energy and Climate Change Working Group seeks positive dialogue with multiple stakeholders to develop constructive positions on a wide variety of issues. Nokia also contributed to ERT’s initiatives: "Women in Leadership Positions" and "Key Initiatives to promote Women along the Talent Pipeline" - an annual report that contains voluntary targets for women in leadership positions set by 31 ERT member companies, together with figures on progress towards achieving these targets.

**DIGITALEUROPE**

We are a member of DIGITALEUROPE’s Digital Sustainability Policy Group (formerly Environmental Policy Group), serving as chair of its working group on chemicals and contributing to groups focused on eco-design, resource efficiency, (including conflict minerals), waste and substance-related restrictions. We have also contributed to the statements issued by DIGITALEUROPE regarding the contribution of the ICT sector to the digital and low-carbon economies. Nokia’s Markus Borchert, Senior Vice President Europe, is president of DIGITALEUROPE.

**Working together to save lives with GSMA**

In October 2016 Nokia became a member of the GSMA Humanitarian Connectivity Charter which aims to support improved access to communication and information for those affected by crisis in order to reduce the loss of life and positively contribute to humanitarian response. Nokia will continue such cooperation and will partner with operators and NGOs in its initiative to help rescue operations, providing a limited number of its Nokia Saving Lives initiative solutions with a not-for-profit approach. The initiative is currently being tested with operators and NGOs.
Supporting customers’ sustainability goals

We work with our customers in a number of key areas of sustainability. We have the greatest impact through the products we supply to our customers, both in terms of energy efficiency that helps reduce their carbon footprint and by providing solutions that drive efficiency as part of the services they offer to their consumer customers. We also work with our customers in supply chain management and ensuring responsible sourcing for example in supply chain assessments, where we cooperate with the Joint Audit Committee.

In 2016 we collaborated with customers on a number of other sustainability related areas including human rights through the Industry Dialogue, and going forward through the Global Network Initiative. For more information on our activities related to the Industry Dialogue and GNI, see pages 100–107 in the Integrity section of this report. Also for example we supported the UN HeForShe diversity program by encouraging our own employees to sign the pledge. For more information on our activities related to gender diversity, see pages 133-136 in the Respect section of this report.

It is essential to help operators meet the demands of data traffic growth in a sustainable way. Therefore, we continuously improve the energy efficiency of our products, develop software that helps manage energy consumption, support customers with energy optimization services, and create product and solution offerings that encourage the use of alternative energy sources and lower power consumption.

To enable massive improvements in energy efficiency, we are driving advanced power amplifier innovation, energy efficiency deployment studies for customer networks, industry initiatives, and standardization. Much of this energy is used to power cooling systems, for heating and lighting, consumed by uninterruptible and other power supplies, and in running idle resources. For example, analysis shows that cooling is responsible for up to 50% of the energy consumption of a base station site.

For more information on our activities related to the energy efficiency of our products visit page 79 in the Environment section of this report.
Corporate Community Investment (CCI) is based on business organizations recognizing that they have a responsibility both to their local communities and citizens as well as society in general. For Nokia, being socially responsible means using our resources, innovation, solutions, knowledge and influence to help improve people's lives, whether local or global. Through our products and solutions we can have the greatest impact.

Being part of the solutions to today’s global challenges is our duty, and we are doing so by connecting the unconnected, empowering women, and saving lives.

A renewed model – Nokia Corporate Community Investment

In 2016, as a combined company, we had to realign all activities around community investment. We took the best practices of each company model, and ensured they were an integral part of our business, closely aligning them to our business drivers, and therefore increasing our capacity to work more closely with our customers. As a result of the integration, and the creation of the new corporate community investment approach, we officially closed the former Alcatel-Lucent foundation. All programs run under the foundation were brought under the newly created Nokia Community Investment activity.

As part of our transformation, we have developed a new sustainability vision and group-wide corporate community investment program based on thematic and geographical approaches. Our collaboration and support focuses on the themes that are the most material and relevant with regards to our business drivers and are fully aligned with our most relevant SDGs targeted contributions.

Our collaboration and support focuses on how technology can improve access to better healthcare & well-being, improved access to education, information and opportunities for all, with an emphasis on encouraging greater diversity. Our aim is to build a best-in-class approach to community investment that has a real impact on people’s lives, engages our employees, and benefits from the strengths and innovations of our business and vision.

Our governance has also been renewed and realigned. A Donation Committee assesses and reviews submitted CCI projects for endorsement and project progress during quarterly meetings. The Board of Directors has an oversight on CCI activities and university donations twice a year. We apply the highest ethical standards in the way we are operating this activity through the recently published new Standard Operating Procedure on donations, other charitable contributions, and sponsorships. We have also developed the requisite training and communication to explain and promote the guideline internally.
Our contributions to NGOs in 2016

For the first time, in 2016, our CCI performance is measured using the London Benchmarking Group (LBG) standards to assess the overall impact of our philanthropic activities.

In 2016, through Nokia Corporate Community Investment and the Alcatel-Lucent Foundation, we contributed corporate-level resources totaling Euro 3 million, which supported 42 community programs in collaboration with 39 community organizations. This figure does not include regional and country level programs and spend, where for example India spent over EUR 1 million on corporate responsibility programs.

On corporate level programs, 695 employees volunteered a total of 8,080 hours.

How many beneficiaries did our programs reach?

Nokia’s community programs reached an estimated 868,346 direct beneficiaries. Children made up the largest proportion of the beneficiaries, with programs reaching 416,514 children. The majority (97%) of our CCI contributions align with our three thematic priority areas.

In addition to global corporate community investment programs, regional and business organizations can also run donation programs to increase reach and company impact in communities where we operate. For example, the India project with Save the Children will continue through 2017 based on specific agreement.

* Other includes local and regional spend, for which we have only partial information available for 2016.
What we did in 2016

Save the Children Finland

**Project:**
The Best Start: improved early learning opportunities for marginalized children in Myanmar

**Contribution:**
4 employees volunteering 84 hours of time

**Impact in 2016:**
25,000 children have been enrolled in the ECCD kindergarten and are benefitting from early education programmes.

Continuing our partnership with Save the Children, The Best Start program in Myanmar is improving learning outcomes for children in Myanmar by enhancing access to quality early education services. Around half of the children in Myanmar complete primary school education on time, and rural, poor, ethnic minority children, girls and children with disabilities are most likely to drop out of education. Only 23% of children have access to early childhood care and development centers – these centers provide physical, social and cognitive development to help prepare children for formal education.

The partnership enabled the construction of 60 Early Childhood Care and Development (ECCD) centers across Myanmar in 2015 to provide rural communities with health, nutrition, education, social science, economics, child protection, and social welfare services. In 2016, The Best Start launched a kindergarten programme to provide a year of basic education to children aged 5 before they start primary school. So far, 25,000 children, many of whom come from marginalized backgrounds, have enrolled in the foundation year and are benefitting from early childhood education services for the first time in their lives.

The centers will gradually be entrusted to local communities to ensure the sustainable continuation of early childhood education by establishing an ECCD Network Group comprised of local leaders and parents. Groups are responsible for coordinating center activities, center management and marketing to attract children to the program.

**Enabling information sharing with mobile technology**
Nokia expertise in mobile technology has been instrumental in creating a connected network of ECCD centers. Existing early education groups were having difficulties in organizing and sharing information between projects, often gathering information with paper and pencil without a central administration system. With Nokia’s support, Save the Children has been able to develop software to connect groups through a central hub which collates data from all centers. The software is available on smartphones and tablets, and any data input is automatically uploaded to the central database allowing for program analysis and impact measurement.
### Junior Achievement China

**Project:**  
Innovate for Future Program 2.0 in China

**Contribution:**  
131 employees volunteering 1782 hours

**Impact in 2016:**  
400 students took part in program aimed at equipping them with skills for future careers.

Our partnership with Junior Achievement brings the business community and education sector together to help student cities gain skills for the world of employment. This year, 130 employees provided mentoring support in four Chinese schools across two program that aimed to equip more than 400 students with skills required for future careers. In particular, the program was aimed at encouraging disadvantaged groups such as girls and children of migrant workers to pursue their dream careers.

During the Job Shadow Day, students were given the chance to shadow a Nokia mentor for the day to immerse them in the business world and see first-hand the skills required for different career paths. During the day, students were asked to design an innovative solution to a problem and given the chance to present back to the group on their learnings from the day. The Junior Achievement Innovation Workshop gave students the opportunity to develop their problem solving skills to design innovative solutions to a given problem.

### Fundación Adsis

**Project:**  
New technologies for training and employment in Spain

**Contribution:**  
41 employees volunteering 50 hours of time

**Impact in 2016:**  
100 young people at risk of social exclusion develop new IT and social skills.

We partnered with non-profit organisation Fundación Adsis to tackle the issues of education and employment inequalities for young people at risk of social exclusion in the Vicálvaro district of Madrid, Spain. The purpose of the project was to facilitate the social integration of those vulnerable to marginalization through the use of IT to improve their educational and social development.

The project focused on using IT as one tool for transformative change by raising young people's awareness of the benefits of using IT in everyday life and at work. Teachers were also encouraged to create new learning environments that were more engaging and relevant to young people using IT program.

As a result of this project, 100 people aged 16-25 at risk of social exclusion developed new IT skills and participated in personal and social development activities. Equipping these young people with pre-employment and job skills will help them to enter the labor market and reduce their risk of social exclusion.
**Children and Youth Foundation**

**Project:**
Dreams Project in Finland

**Contribution:**
61 employees volunteering 488 hours of time

**Impact in 2016:**
Dreamsters inspired 24,000 young people and 1,300 teachers to follow their dreams.

Launched in 2015 in collaboration with Children and Youth Foundation, the Dreams Project aims to strengthen young people’s future aspirations and help them take steps towards realizing them. The program draws on support from ‘Dreamsters’ who visit upper-elementary schools to share their own life experiences to highlight the importance of having dreams and their drive in following these dreams. Dreamsters show young people how to take a positive outlook on life, and challenge them to be bold in finding their own strengths, to dream, and to work toward fulfilling their dreams. Supporting young people to follow their dreams helps to build their self-esteem and increases their trust in their own talent and possibilities.

Dreamsters challenged the whole school community – as well as themselves – to take part in various 30-day challenges.

The Dreams project not only targets pupils, but also works with teachers and parents to support young people and strive to achieve their own ambitions. By 2018, the Dreams project aims to reach 80,000 aged 13 to 16 students in 300 Finnish upper-elementary schools. During the 2016 school year, Dreamsters visited 111 upper-elementary schools in Finland, inspiring nearly 24,000 young people and over 1,300 teachers to follow their dreams.

The Dreams Forum, held in May 2016, celebrated the work done in the first year of the program to raise aspirations of young Finns. The event was organized with the volunteered support of Nokia employees and brought together nearly 700 students and 91 teachers from 71 schools that the Dreamsters visited during the first year of the program to celebrate.

**Re-imagining education through the connected world**

Nokia has shown how rural education for children in Schlabendorf, Germany can be re-imagined through a cost-efficient technology and solution providing a small village with a myriad of opportunities through a high speed internet connection. Today, the test users of the village receive +50MB/s, which brings new possibilities for the community. One of the test users is Mrs. Brigit Kalz, who is running a science lab for children in the village. The science lab was sponsored by Nokia with refurbished equipment and volunteers helped build it a few years ago. Now, Mrs. Kalz has around 200 project days per year with schools nearby in her science lab. The classes come to visit the science lab and can choose from different activities to learn (e.g. how urbanization affects to nature in rural areas, or other topics related to geo-science). With internet access Mrs. Kalz can enlarge her portfolio of offering (e.g. geo-mapping exercises outdoors via internet connection with smart phones or preparation for the project day via video conferencing with the class).
Girls Day Germany

Every year technical enterprises, enterprises with technical departments and technical training facilities, universities, and research centers are invited to organise an open day for girls – Girls Day. Girls’ Day – ‘Future Prospects for Girls’ initiated a large campaign in which a wide range of professions and activities is presented to girls of 10 years upwards. On the same day as the global Girls in ICT event, this day is aimed at girls 5th grade upwards, and should give them a one-day glimpse into the world of craft, science, IT and technology. The main goal is to strengthen their interest in these areas. As part of our annual participation in 2016, we were honored to be chosen to present our ideas to a select group of young girls in the presence of Federal Chancellor, Angela Merkel, in an event prior to the official Girl’s Day. We were able to show how augmented and virtual reality using VR glasses can support field work. We have participated in the Girl’s Day for 10 years. Read more

Nokia Saving Lives

Our end-to-end Nokia Saving Lives initiative is truly unique in the industry. Getting re-connected is one of the first priorities of any rescue operation since networks often break down in disaster situations. With Nokia’s Ultra Compact Network, a highly portable base station, we can quickly re-establish connectivity with a standalone high-speed LTE network, so that rescue groups can communicate.

On top of this network solution, we deploy video camera-equipped drones managed over LTE to search for people and send footage from the disaster area – all guided from one control center. The drones stream video and other sensor data in real time from the disaster site back to the control center over LTE. They provide valuable inputs like the exact locations of people and how to reach them, can carry thermal cameras, hazardous chemical sensors, and other applications.

The control center analyzes the collected information with Nokia Video Analytics technology and provides insights to responders to help them make decisions and prioritize tasks, making their work more efficient and safer. We plan to upgrade the drones’ airtime to over two hours in the coming months, and increase the artificial intelligence of the whole solution.

As earthquakes, violent storms, and other disasters will continue to be an unfortunate part of our lives, we want to be ready to use Nokia Saving Lives in real-life emergencies when the need arises. So the next step is to work closely with rescue teams to refine our concept. We will have trials with several global and national relief organizations this year, to make sure that the technical concept fits their needs.
UNHCR – Raising awareness through technology

In support of the UN Refugee agency (UNHCR), we provided a Nokia OZO virtual reality camera, equipment, and support to The Humanitarian Cooperative to enable the creation of a film to raise awareness and action on the current European refugee crisis. Read more on page 68 in the Improving Lives section of this report.

Sharing a little joy during the festive season

In December 2016, we once again took the opportunity and spirit of the festive season to engage with our employees and encourage them to participate in our annual charity donation program. Nokia donated small amounts to select charities that share our purpose of enabling the human possibilities of technology. Charities that are connecting the unconnected, enabling equal access to education and opportunities, and helping preserve the planet’s resources, and saving lives. We gave employees the opportunity to choose their favorite charity from a selected list of smaller charities that are using technology to improve the lives of people. These donations were in addition to Nokia’s ongoing work with larger non-governmental organizations (NGOs) such as Children and Youth Foundation, Plan, Save the Children and UNICEF, where we provide our technical know-how and innovation. The donations were made through GlobalGiving, the first and largest global crowdfunding community that connects nonprofits, donors, and companies in nearly every country around the world.

This year we selected five charity projects from around the world. The selected charity projects:

1. Educating Syrian Refugee Girls at the Za’atari Refugee Camp in Jordan
2. Sending 100 girls to technology camp in Nigeria
3. Supporting kids to learn to code globally (multi-country)
4. Helping Syrian refugee children in Serbia
5. Supporting the Free Yezidi Foundation Women’s Center in Iraq

Supporting local communities through volunteering

Volunteering is an important part of our employee engagement and enables us to make meaningful contributions to the communities where we operate. By working with local communities and projects of their choice, our employees can learn new skills and gain new perspectives, and the communities benefit from the professionalism and experience of our employees.

In 2016, as part of our overall Corporate Community Investment approach, we created Nokia Volunteering Guideline. Nokia has promoted volunteer activities as far back as the last century. We are committed to giving back to communities and encourage all employees to take part in volunteer programs. To support participation, each Nokia employee can dedicate working time to their community and contribute to a good cause. The guidelines and related support were launched company-wide in early 2017.

Our new target

2020
Foster the spirit of employee volunteerism across the company and increase their engagement.
Our key projects for the coming year 2017

In 2016, in addition to multiyear signature programs with Plan International, Save the Children and Oxfam, we approved and planned seven new key projects for launch in 2017 with Unicef, RailsGirls, greenlight for girls, Anita Borg Institute, Junior Achievement, HundrED, and Codebus in Africa.

Seven new global programs for 2017

100% of Nokia’s 2017 CCI collaborations listed below align with our three thematic priority areas.

Nokia is a main sponsor of the HundrED education initiative launched as part of the 100-year anniversary of Finland’s Independence. HundrED aims to search for examples of optimal teaching and education practices and create a global sharing platform for teachers around the world. The initiative kicked off in Finland in January 2017 and aims to go global.

More information

An official Finland 100-year-anniversary Independence project that runs 1-day creative coding workshops for youth – especially girls – in ten African countries during spring 2017. The project is run in collaboration with Aalto University, Mehackit, Finnish embassies and several African tech hubs, schools and private companies. The aim is to provide equal opportunities for girls and boys to explore how technology can enable their future. The project celebrates technology, learning and youth empowerment.

More information

Nokia and greenlight for girls (g4g) are working together globally to help inspire young women in science. We begin our partnership by launching at Nokia headquarters in Espoo, Finland, hosting the first ever signature greenlight for girls event, g4g Day, with 200 girls. Following Espoo, we will launch g4g Days in Tampere with 100 girls, and Oulu also with 100 girls. The aim is to engage participants aged 11–15 from local schools, ideally with at least 20% coming from less advantaged communities, with hands-on Science & Technology workshops and activities run by role-model professionals.

More information

Rails Girls Summer of Code is a global fellowship program aimed at bringing more diversity into Open Source. Successful applicants are paid a monthly stipend, from July–September, to work on selected Open Source projects. It’s about helping women and non-binary people dive into the world of programming full-time. They expand their knowledge and skills through 3 months of self-guided learning with the support of coaches and Open Source project maintainers.

More information

The Anita Borg Institute connects, inspires, and guides women in computing and organizations that view technology innovation as an imperative. As a social enterprise, they recognize women making positive contributions, and advise organizations on how to improve performance by building more inclusive teams. We are working with ABI through our “Women Transforming Technology” program, which drives our work with organizations, academic institutions, media, and the highly skilled women they serve.

More information

We will work with UNICEF over 2 years on their mHealth project in Indonesia for better health and nutrition. The objective of this pilot project is to strengthen community capacity to take appropriate actions to safeguard the nutritional and health status of children under five in Indonesia. Indonesia is one of our target countries for Corporate Community Investment.

More information

The STEM Innovation Camp is a one to two-day intensive experience for students aged 15–18, which develops their idea-generation and collaboration techniques. They learn how to arrive at innovative yet viable solutions by addressing real problems in business or the community.

More information
Collaboration with universities, cities, and other industries

We also collaborate with the public sector to further the use of technology in enhancing sustainable development and improving the day to day lives of citizens. In 2016, for example, we announced that we were joining the Bristol Is Open initiative that is creating a dynamic test bed in the UK to develop an open programmable city and explore how integrated technology solutions can benefit citizens – from helping solve problems such as traffic congestion, air pollution, and assisted living for the elderly, to trials of self-driving cars.

Digital innovation for improved healthcare

Health and well-being are of increasing importance as digitalization and the medical industry come together securely. We work with hospitals, universities, and other medical institutions to bring digital innovations to a wide variety of health and wellness challenges.

In 2016, Nokia began collaboration with Helsinki University Hospital (HUS) and the Faculty of Medicine at the University of Helsinki. HUS comprises Helsinki University Hospital and four regional hospitals. Apart from diagnosis and treatment of patients, the Hospital’s services include education and research of a high international standard in close collaboration with the University of Helsinki, Aalto University, and several medtech and pharmaceutical companies. One example project involves remote monitoring of the vital signs of patients who have suffered from a stroke, using new medical-grade consumer products and software which enable the patient to stay at home rather than in hospital.

We are committed to medical research and working with numerous universities, health institutions, and enterprises to further study and gather anonymized health data. A snapshot of our collaborations in connected health is given below. To learn more visit our website here.

Examples of medical use of Nokia connected devices

<table>
<thead>
<tr>
<th>Partner</th>
<th>Concern</th>
<th>Description</th>
<th>Device used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell University</td>
<td>Nutrition</td>
<td>An intervention using Wi-Fi scales and graphic e-mail feedback, the caloric titration method (CTM), to reduce age-related weight gain over 1 year among college students was evaluated. CTM intervention was effective in preventing age-related weight gain in young adults over 1 year and thus offers the promise to reduce overweight and obesity rates.</td>
<td>Body Scales</td>
</tr>
<tr>
<td>American Medical Group Association</td>
<td>Hypertension</td>
<td>Nokia teamed up with the American Medical Group Foundation (AMGF) to work on an 18-month project seeking to improve blood pressure control in patients with uncontrolled hypertension, in conjunction with the national Measure Up/Pressure Down® hypertension campaign</td>
<td>Blood Pressure Monitors</td>
</tr>
<tr>
<td>Partner</td>
<td>Concern</td>
<td>Description</td>
<td>Device used</td>
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<tr>
<td>Inserm-Université Pierre et Marie Curie</td>
<td>Activity &amp; Hypertension</td>
<td>A study was built upon cross-sectional and longitudinal data from a pool of 19 000 adult owners of Nokia activity trackers and wireless blood pressure monitors. The aim of the study was to assess the link between physical activity levels and blood pressure. The study gave way to an abstract at the European Society of Hypertension</td>
<td>Data</td>
</tr>
<tr>
<td>Tampere University of Technology</td>
<td>Weight Management, Behavioral Science</td>
<td>The aim is to study randomized data sets of longitudinal weight data to determine how variations in weight are related to successful weight management and to develop coaching algorithms that would prove more efficient in self-guided behavioral change.</td>
<td>Data</td>
</tr>
<tr>
<td>Mayo Clinic</td>
<td>Chronic Heart Failure</td>
<td>Mayo Clinic uses remote monitoring for patients with Chronic Heart Failure with the help of the Nokia activity tracker, Body Scale, and Nokia Blood Pressure Monitor to decrease the number of readmission rates</td>
<td>Blood Pressure Monitors, Body Scales &amp; Nokia Activity Tracker</td>
</tr>
<tr>
<td>Stanford University</td>
<td>Bariatric Surgery</td>
<td>The aim of the study is to assess the impact of a connected scale and an activity tracker on patients undergoing bariatric surgery. All patients undergoing bariatric surgery will be recruited preoperatively. They will be provided a recommended exercise regimen and also some general wellness information via the Health Mate application. Also, they will receive bi-monthly phone calls to monitor and encourage their progress</td>
<td>Nokia Activity Tracker &amp; Body Scales</td>
</tr>
</tbody>
</table>
Trialling telemedicine in Taiwan

We are committed to assuring universal access to healthcare at a reasonable cost. Collaborating with Nokia through the ng Connect Program, Taiwan is achieving its economic and social healthcare goals by enabling broadband applications.

Taiwan has been operating its healthcare system as a single payer model for about 20 years. The priority is to provide complete coverage to all citizens. So far, it has been able to provide coverage to most of the metro, suburban, and rural areas while keeping costs at a reasonable level. Because of its single payer system, costs have been lower than other countries due in part to its favorable demographics. Demographics have been shifting rapidly as the population ages and are accelerating the cost of providing services. This trend, coupled with the country’s objective of providing equal access to healthcare for everyone, wherever they live, will drive costs up in the near future.

One of the many initiatives to tackle these challenges involves performing certain services remotely and streaming information using high-speed networks to central locations for analysis and advice. This requires high-speed networks, new applications—in addition to regulatory, behavioral, and policy changes. The market trial for this telemedicine solution was conducted during 2016.

Currently, 34 percent of Taiwan’s healthcare costs are spent on those aged 65 and over. That population is now about 11.5 percent of the total population—a percentage that is expected to grow to 24 percent by 2030.

A number of challenges need to be solved from the affects of an aging population to the need for better infrastructure. The solution required includes three key components in order to enable a remote healthcare solution:

1. An infrastructure capable of providing the bandwidth needed to view high-resolution medical images, as well as low latency to ensure seamless communication.
2. Software for video collaboration
3. Software to move, share, and manipulate high-resolution medical images

Nokia, Calgary Scientific, and Softfoundry have integrated their products to create this market trial solution. Qualitative feedback on the trial solution has been high. Feedback has come from the Taitung MacKay Memorial Hospital (Taitung MMH), the Taitung Health Bureau and, under its management, the Daren Township Clinic and the Tuban Village Health Station.

Existing and trial connection speeds

<table>
<thead>
<tr>
<th>Location</th>
<th>Internet Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td></td>
</tr>
<tr>
<td>McKay Memorial Hospital, Taipei</td>
<td>Existing: 100 Mb/s VPN</td>
</tr>
<tr>
<td></td>
<td>Trial: 100 Mb/s VPN</td>
</tr>
<tr>
<td>County/region</td>
<td></td>
</tr>
<tr>
<td>McKay Memorial Hospital, Taitung*</td>
<td>Existing: 100 Mb/s VPN</td>
</tr>
<tr>
<td></td>
<td>Trial: 100 Mb/s VPN</td>
</tr>
<tr>
<td>Township</td>
<td></td>
</tr>
<tr>
<td>Daren Health Center</td>
<td>Existing: 512K DSL</td>
</tr>
<tr>
<td></td>
<td>Trial: 100 Mb/s VPN</td>
</tr>
<tr>
<td>Village</td>
<td></td>
</tr>
<tr>
<td>Tuban Health Station*</td>
<td>Existing: 512K DSL</td>
</tr>
<tr>
<td></td>
<td>Trial: 20 Mb/s DSL</td>
</tr>
</tbody>
</table>

Existing: 4 Mb/s
Trial: 4 Mb/s VPN

Market trial inclusion
Visited early September 2015

Visit the Nokia People & Planet Report 2016 [here](#).
Making life smarter

We partner with cities around the world to help them realize new possibilities for people today and for generations to come, with a combination of visionary thinking and shared, secure and scalable technology solutions. There is no single approach to creating a smart city, collaboration is key to making cities smart, safe, and sustainable.

On December 13, 2016 Nokia hosted an online future of smart cities debate with leading experts Léan Doody from Arup, Julian David from TechUK, Jeremy Green from Machina Research, and Thorsten Robrecht from Nokia. During the online panel debate the group of experts explored what makes a city ‘smart’, looking at three key pillars:

- **Business** – Trade agreements, governance, and innovation
- **Wellbeing** – Engagement, privacy issues, and public safety
- **Technology** – Digital infrastructure solutions and borderless data

The debate followed the release on November 11, 2016 of a Nokia-sponsored report: “The Smart City Playbook” by Machina Research, a leading provider of market intelligence and strategic insight on the Internet of Things. This comprehensive publication is based upon a series of interviews with city project executives, and aims to provide smart city stakeholders with relevant insights on strategies, solutions, and pitfalls to be avoided in the process of becoming smarter cities.

In an attempt to bring some order to the smart city universe, Machina Research has grouped their projects and activities under the headings smart, safe, and sustainable.

### Smart

Smart applies to applications that aim at improving the quality of life for citizens, bolstering innovation, social and economic development, and making cities more attractive places to live and do business. Smart use cases cited by the report come from Dubai, Paris, and Singapore.

### Safe

Safe describes applications aimed at helping to prevent, or minimize the risks and impact of adverse events including crime, accidents, environmental pollution, and natural disasters. Examples of safe city profiles identified by Machine Research include Mexico City, New York, and Shanghai.

### Sustainable

Sustainable addresses applications intended to reduce the environmental impact (especially energy consumption and carbon emissions) of the municipality’s own operations and the activities of business which operate within its jurisdiction, and citizens who live there. Look for sustainable city examples showing what’s being done in Pune, San Francisco, or Vienna.

You can download a copy of the Smart City Playbook [here](#).
Intelligent traffic management in the Netherlands

In September 2016, we announced support for Europe’s first dedicated testing facility for the use of unmanned aerial vehicles (UAV) for traffic management. The facility, at Twente Airport, near Enschede in the Netherlands, will enable Nokia to develop and trial its UAV Traffic Management (UTM) system for the use of drones in proximity of urban areas, people, manned aircraft, other drones, and hundreds of other objects. Under a Memorandum of Understanding signed with the Municipality of Enschede, the Province of Overijssel, Unmanned Systems Center B.V. and Area Development Twente, Nokia will design and deliver the infrastructure to test and develop the Nokia UTM system at Twente Airport through real-life simulations and commercial demonstrations.

Making Dubai mission-critical ready

Nokia and the United Arab Emirates General Civil Aviation Authority (GCAA) have entered into a strategic collaboration to drive the development of an end-to-end UAS ecosystem that will make the UAE the first country in the world to allow the operation of drones by both businesses and government agencies in a safe, secure, and managed environment. The project is part of an initiative by the GCAA to make Dubai one of the world’s smartest cities by 2017, and will allow Dubai government security network operator Nedaa to develop a next generation network for mission-critical and smart city services within the GCAA regulatory framework.

“Dubai has historically pioneered in providing exceptional quality of life, and an unparalleled business and technology innovation environment, Nokia has been an integral part of Dubai’s security communications network since 2001, and the company’s eagerness to adapt to our new, stringent security requirements gives us the confidence to make our city the safest and smartest in the world.”

Yousif Al Ali, Chief Technical Officer, Nedaa

Applying IoT for emergency services support, e-government, transportation, and healthcare

5G-ready high-bandwidth voice, video, and other data apps for mission-critical services
Nokia has joined the Bristol Is Open initiative, becoming the first major telecoms vendor to participate in Bristol’s unique living laboratory and underlining its commitment to smart city solutions, an increasingly important part of our connected world.

Bristol Is Open (BIO) encompasses the entire city, effectively transforming it into a dynamic test bed to explore how integrated technology solutions can benefit citizens - from helping solve problems such as traffic congestion, air pollution and assisted living for the elderly to trials of self-driving cars. BIO is a joint venture between the University of Bristol and Bristol City Council and it is funded by local and national government and the European Union, along with academic research funding and financial backing from the private sector.

Nokia was invited to join the project because of its track record in developing solutions for smart, sustainable cities, and its long history of collaborative research, including the Nokia-founded IoT Community for cross-industries collaboration.

Experts from across the company - including Nokia Bell Labs, who already have a strong relationship with Bristol University, particularly in the area of photonics - will provide consulting services to Bristol Is Open, while our IP networking division will provide network and infrastructure support. In addition, the Nokia-founded ng Connect Program will bring solution concepts and business model innovation, leveraging its ecosystem of 360+ companies from a wide range of industries and markets, into the BIO development program.

Small sensors, including the smartphones and, in the future, GPS devices of willing citizens, will supply information about many aspects of city life, including energy, air quality, and traffic flows to the three new fast networks in the center of the city. The high-powered operating system developed by Bristol University will dynamically host this machine-to-machine communication, allowing the development of a wide range of applications that are linked to the various sensors and actuators deployed across the city.

The BIO initiative was spurred by the continual need for sustainable growth, taking into account an increased awareness of pollution and the City Council’s desire to offer an improved range of services to its citizens. The initiative promotes smart city growth within the UK and across Europe as governments seek to meet environmental targets.

Using agile infrastructure, through which it is possible to test applications and demonstrate their sustainability, we plan to use this exciting opportunity to test a whole range of applications from Nokia Bell Labs’ innovations in video to environmental impact studies, healthcare, and public safety. Our first project in BIO will focus on video analytics on the city-wide CCTV system of over 1,700 cameras.

See more examples of smart solutions and projects on pages 62 - 65 in the Improving Lives section of this report.

Cooperation with universities and academic institutions

Our work with academic institutions ranges from collaborative research, training programs, and events that foster innovation, to supporting talent and continuous learning. In addition, the Nokia University Donations Program enhances collaboration between the world’s leading experts from universities around the world with the aim of promoting scientific innovation, talent, and knowledge creation.

In 2016, we supported 36 universities through the University Donations program, including open donations to the Finnish Aalto University, Technical University of Tampere, Universities of Helsinki and Oulu. European universities were also supported in Germany, Austria, Hungary, Sweden, France, and Denmark by topical donations.

In China, we supported, among others, the Beijing University of Posts and Telecom, Beijing Jiao Tong and Xiyan Universities. In addition, the Soongsil and Yonsei University were supported in Korea, and Kyoto University in Japan. In the US, our support...
included, the University California campuses in Berkeley, San Diego, Santa Barbara, as well as more eastbound universities: Princeton, Carnegie Mellon, Penn State, and New York. In Canada, Toronto University received a donation.

The topics of the donations varied from networking at edge, virtualization, and latency, to virtual reality, clinical cystic fibrosis research to Artificial Intelligence, which, for example, was supported by sponsoring the Berkeley Artificial Intelligence Research lab.

Nokia Bell Labs collaborates on today’s key technical challenges with the best and brightest university students. Bell Labs has established relationships with the top universities and research institutes around the world, and with the appointment of our research executives, actively foster and expand those collaborations to build relationships.

During 2016 Bell Labs engaged in active collaboration with almost 40 academic partners across the globe. Through these collaborations we foster a shared compelling vision of the future and a deep engagement with the best and brightest minds on a range of exciting challenges including topics such as:

- Creating a 5G network with dynamically optimized bandwidth and latency for all services, users, devices, locations
- Creating 10 X optical network capacities cost-effectively
- Re-imagining interactivity between people, machines, and their environments
- Creating cognitive systems and networks
- Making the execution and scaling of complex services in the cloud as simple as using web apps

**Americas**

In the US, through the donation to Berkeley Artificial Intelligence Research Lab, we have supported high quality deep learning research. As an example, take a look at the paper [here](#) about the artificial creation of photographs out of Monet’s paintings and vice versa.

**Europe**

From a donation to Aalto University Professor Riku Jäntti, there was a development on ambient re-scattering communications that increases the capacity of the system. Ambient re-scattering is a method where one is transmitting information by scattering an existing radio signal. This requires much less energy than using a standard system, where every node creates its own radio transmission. The system could be used for low energy sensor nodes.

**China**

A tele-heath donation to Xidian University provided the background for a Nokia - China Mobile demo at Mobile World Congress 2017. The use case was inspired by the donation work, and Nokia built a 5G storyline and a live demo on top of the work. Read more [here](#)

**Sustainability**

Our work with a number of universities around the world also covers sustainability related topics that can bring social or environmental benefits. During 2016, Nokia acted as a sponsor for Aalto University CEMS program where a team of international masters students made an extensive analysis on Nokia sustainability impacts. An Aalto University professor acted as the academic tutor, and Nokia representative as the business tutor for this analysis which covered Nokia external social, environmental, and economic impacts throughout the value chain. It looked at both positive and negative impacts with the aim to quantify these external influences in terms of monetary value to the extent possible.

In addition, an Aalto University student working for Nokia made her masters thesis which focused on the Impacts of Connectivity on Sustainable Development, including environmental, social, and economic areas. The study focused mainly on Nokia activities and some 150 references, with close to 30 expert interviews being used as sources for the 100 page thesis.

Our donations supported topics such as urban mobility, immersive interaction with virtual environments, technologies for future 5G systems, and the use of virtual reality in healthcare. In addition, our Technologies unit cooperated with Aalto University in Finland on an indoor positioning system for sustainable manufacturing. Indoor positioning can be used, for example, for asset tracking.
Our achievements

Corporate Community Investment strategy created and approved in 2016, and rolled out in Q1 2017

In 2016 we contributed EUR 3 million from corporate-level resources, which supported 42 community programs in collaboration with 39 community organizations

We announced that we were joining the Bristol Is Open initiative that is creating a dynamic test bed in the UK to develop an open, programmable smart city

We became a member of the GSMA Humanitarian Connectivity Charter which aims to support improved access to communication and information for those affected by crisis

Our community programs reached an estimated 868,300 direct beneficiaries, with children making up the largest proportion of the beneficiaries

Our donations supported topics such as urban mobility, immersive interaction, future 5G systems, and the use of virtual reality in healthcare

We are helping government security network operator Nedaa to develop a next generation network for mission-critical and smart city services in Dubai

We created Nokia Volunteering Guideline, giving guidance and encouragement to all employees to take part in volunteer programs

Around 76 cooperations with universities and academic institutions in 2016