

WELCOME TO THE FUTURE

Suomi Finland
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In 2017, Finland is celebrating the country's 100-year independency by innovating to solve our global challenges.
Ministry for Foreign Affairs of Finland, 2017. Production Otavamedia OMA.
Photos: Finland Image Bank, Visit Finland and Otavamedia.

"In 2117, Finland is an inventive land of solutions, solving some of the biggest challenges facing the earth."

– Suomi, Finland

Finland, taking care and playing fair

The future is now being created in Finland. This is a place where you can realise your potential and your dreams.

Internationally, Finland places at the top of educational and skills rankings and above average on a range of measures from jobs and earnings to environmental quality, wellbeing, personal security, social connections, housing, and work-life balance.

In addition to major centres, Finland boasts pure awesome nature, with numerous forests (Finland is Europe's most densely forested country) and thousands of lakes. There are 39 national parks and vast networks of green spaces and waterfront access year round is available or close-by in many of the large cities.

Finland is a bit like its nature – it's honest, clean and straightforward. Add to that a reliable infrastructure in this functional country where things work, and the result is what you see is what you get.

As the world faces great challenges from sustainability and food security to a stalling global economy, Finland too has been affected and faces many of the same issues that are curbing the world. But Finland's vision is to be a land of solutions that solves – from the grassroots level up to government – some of the biggest challenges facing the globe.

If you wish to join in building the future, Finland is the place to be. We are in this **TOGETHER**.

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MEGATRENDS IN FOCUS

*Finland has eyes fixed
into the future.*



1 The age of resource wisdom has begun

Wise use of energy and raw materials is one of the most important development areas of the coming century.

Human society changes in cycles, or waves, that last for decades. The sixth cycle of the industrial age has just begun.

“At the start of this century, we will see a period of dramatic growth of resource efficiency,” says **Markku Wilenius**, Professor of Future Studies at the University of Turku. **We will shift from wasting energy, raw materials and other resources towards conserving them and using them in a smart way.** The same trend will continue throughout the century.

Finland is a worldwide leader in the circular economy and resource wisdom. Good examples

of this include recycling solutions, materials made from wood and the development of renewable fuels. Wilenius estimates that during this century, the use of plastic, for instance, along with many other traditional building materials, can be replaced completely with advanced materials made from wood fibre and other renewable sources. Since the days of architect Alvar Aalto and earlier, Finland has been developing and using new materials, e.g. plywood.

In the coming decades, we will see ingenious examples. Using nanotechnology, carbon in the atmosphere can be converted with solar energy into carbon nanomaterials that are a hundred times stronger than steel. The new materials will make it possible to build buildings that are 20 kilometres tall — while at the same time removing



INNOVATION OF THE FUTURE?

The lithium ion battery, which has an energy density equivalent to that of fuels, will change the future. The electric plane is coming!



the buildup of carbon dioxide in the atmosphere.

Fossil fuels are being completely replaced with solar power or, for example, small fusion reactors. Solar energy is also being used to create fuels that can power fuel cells when the sun is not shining.

First, electricity networks and energy use will become smart. Ultimately, all energy will be produced locally and according to need.

“I believe that after the 2050s, electricity networks will become obsolete,” says future researcher **Risto Linturi**. That said, revolutionary advances in battery technology, such as lithium-air batteries, are enabling us to make all devices and machines, even airplanes, electric.

With an action plan for energy-smart built environment, Finland’s ambitious goal is to reach efficiency requirements set for 2020 three years early, in 2017, Finland’s centennial year.

Initiatives for cutting carbon emissions include increased use of public transport, cycling, and walking.

Energy-efficient land use utilizes intelligent urban planning – this primarily means the adoption of calculated effects of carbon emissions of energy supply solutions, transport services, and new buildings.

2 Fresh water for all

Ensuring sufficient clean, fresh water is one of the most important challenges of the future. To make it possible, we need new technology.

“What we have is a shortage of fresh water, not water in general. We need new ways to recycle water better than before and create fresh water from salt water,” says **Markku Wilenius**, Professor of Future Studies.

In the future, water will become a more significant strength for Finland. The country is home to a great deal of fresh water, and we have developed advanced technology to process and treat it. In this century, new methods will become a part of everyday life for people all around the world. For example, the use of solar energy to transform seawater into clean fresh water will become commonplace. Nanotechnology will enable even more advanced methods.

“There is always some humidity in the air, and some insects are able to collect the water they need this way. The nanomaterials of the future will enable us to collect water directly from the air,” says future researcher Risto Linturi.

Access to clean water is particularly challenging in cities, while the world’s population is becoming ever more urbanised. However, the trend of urbanisation may change directions during this century, which would also relieve the challenges related to water.

“If we look 70–100 years into the future, we will not necessarily need urban structure in the same way we do now. With new technology, social community, sharing and consumption will not require the same closeness to one another as they do today,” says future researcher Ilkka Halava. This may lead to a model where people live in more rural areas and in closer contact with nature.





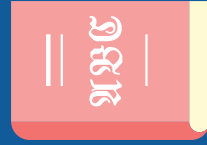
**INNOVATION OF
THE FUTURE?**

Using nanomaterials to collecting fresh water from seawater or directly from humidity in the air will change the future.

THE BUILDING BLOCKS OF FINNISH INNOVATION

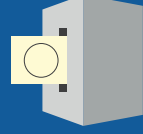
Finland has developed through centuries with innovations.

Finland's national epic
The Kalevala compiled and edited
by physicist and folklorist
Elias Lönnrot is published.



1543

Bishop and scholar
Mikael Agricola
publishes first primer
in Finnish *Abckiria*.



60

Translated into 60 languages, its
influence is wide reaching, including
literary luminaries such as **J.R.R.
Tolkien** (Lord of the Rings) who
was greatly affected in his work by
Finnish mythology.

Suomi

First novel in Finnish
Seven Brothers published
by **Aleksis Kivi**.

1870

1922

Maternity and
child health clinics
founded.

1907

First female members of
parliament in world history
were elected in Finland.

1906

First country in the world to
give all men and women the
right to vote and to be elected.

1.8

Rate of maternal and child
mortality dropped quickly:
in 1936, 95 of every 1,000
children died before age 5 –
by 2013 that number had
dropped to 1.8



1938

Finland's first four
national parks
were declared.

1929

Leads to current
universal healthcare system,
whereby every municipality
is responsible for providing
healthcare to their residents,
usually through municipal
health care centres.

Committee to look into
public health care founded.
Signals the start of modern
healthcare system

First Nobel prize for
literature won by **F. E.
Sillanpää** for
Meek Heritage.

1939

The Finnish national
vaccination programme
has its origins in the
1940s. Owing to the child
welfare clinic system, it
has built a world leading
coverage of vaccinations.

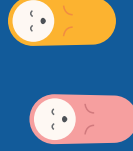


1949

The Finnish education
system has developed a
world leading tradition of
open-source thinking and
tech innovations, such as
Linux operating system.

1949

Since 1949 the Finnish
baby box maternity kit has been
given to all expectant mothers. A
starter kit, it contains all the things
needed for a new-born from clothing
and a sleeping bag to a snow suit, a
teething toy, a bib, hats and a baby
brush and it all comes in a sturdy
box that doubles as a crib.



1973

The roots of universal
day-care stretch back more than
100 years. In 1973, a law passed
guaranteeing access to public day care
to all children under seven.
The Finnish education system
provides older children and young
people with equal opportunities. In
1972, common basic education was
launched across the country.

Finland has one
of the lowest
child poverty
rates in the EU,
while the female
employment rate
is among the
highest.



1995

In 1995 both Finland
and Sweden join the
European Union.



The right to roam or every
person's right (*jokamiehenoikeus*) means that
everyone has access to nature for walking,
skiing, cycling, hiking, berry or mushroom
picking or camping, regardless of who owns
it. Implicit in this privilege is respect for the
property and its owner's peace and privacy.

today

A new curriculum is introduced
for early childhood and basic
education. The curriculum
emphasizes the joy of learning
and sustainability.

A long tradition of nature
preservation dates back to
the mid-1800s.



Today, laws guarantee
the preservation of
native nature for future
generations.

People who live in Finland share a love of
nature and use it as inspiration for innovation.



INNOVATION OF THE FUTURE?

Biorobots move within the human body and repair its functions, right down to the level of individual cells. That will change the future.



3 Looking after your health

Over the past hundred years, human life expectancy has increased by decades, and the development will continue this century. We will see the arrival of revolutionary new methods for healing diseases and maintaining health.

“Repairs to the human body will increase in two ways. With stem cell technology, we can create new body parts from a person’s own stem cells,” says future researcher **Ilkka Halava**. “In the future, 3D manufacturing technology will also enable us to create individualised prosthetic limbs equipped with a sense of touch.” People will be able to recover much more quickly from accidents than they do now. Hereditary diseases, on the other hand, can be prevented through gene manipulation.

Today, the majority of healthcare focuses on treating diseases. In the coming decades, the focus will shift to preventing diseases and promoting good health.

“In the future, people will look after their own health more carefully, and I believe that, in time, this will become the world’s largest business. In Finland, we have a lot of technology in this area,” says Professor of Future Studies **Markku Wilenius**.

One important development trend is the automation of healthcare. Users’ own smart devices will be able to identify many diseases and health problems automatically, often before the user has even noticed anything is wrong. When the situation requires help from a doctor or automatic diagnostic service, it will be brought to the person by remote connection.



4 *Food production efficiency multiplied by a hundred*

In addition to tech innovations that encourage a healthy lifestyle, there are a slew of new innovations that address health and sustainability concerns such as meat substitutes from oats and broad beans.

Oats and rye are a Nordic super-food that has positive effects on heart health, blood sugar, and digestion. One of the most ecological crops in the world, oats also directly addresses the need for a global reduction in meat intake for environmental, sustainability, and health reasons.

Restaurant Day, the concept where anyone can open a restaurant for a day that started in Finland and has spread internationally, is about

food access for everyone and the joy of sharing a meal or a snack together.

The recent microbrewery boom in Finland is another good example of using pure local grains such as barley, rye, wheat, and oats. Though Finland has a long history of making beer that dates back to the Middle Ages, the current local beer boom has seen the number of microbreweries double in three years to 69 microbreweries in Finland.

In the future, the production of food will change significantly. Using artificial or non-traditional ingredients, such as artificial meat, insects, worms or maggots in food production will increase.

“Finland is a forerunner in indoor farming,” says future researcher **Ilkka Halava**. What we are seeing is a revolution in agriculture. “Indoor farming can be up to a hundred times more efficient than traditional farming,” Halava comments. **This means that, in theory, a small part of Southern Finland could produce enough food for all of humanity.**

“With indoor farming, we can produce local, organic food,” says Halava. When the conditions are controlled, farming can be done naturally without any harmful substances.

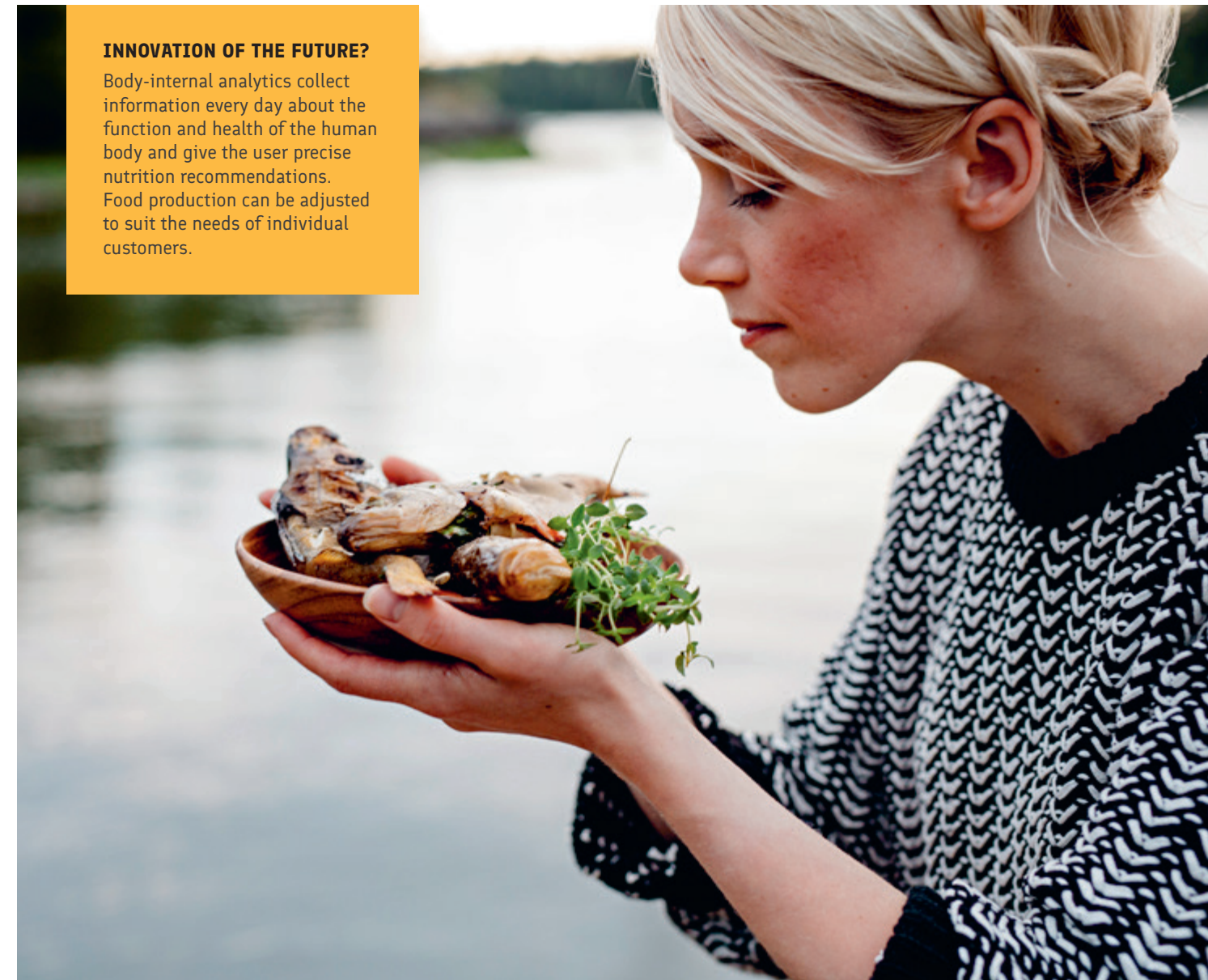
With gene manipulation technology, we may be able to create genetically new species for food production within this century. For example, normal edible plants can be modified to withstand watering with salty seawater. Meat, on the other hand, will be created artificially.

Traditional outdoor agriculture will be transformed into regenerative farming, in which the soil will be maintained through natural means rather than fertiliser. This means that agriculture can become a means to prevent climate change, as plants bind carbon dioxide.

The changes will affect not only food production but also food consumption. Technology for measuring health and assessing the condition of the body has been developed in Finland for a long time, but in the future, its possibilities will rise to a completely new level. When people can measure the functions and needs of their own bodies — and study their own genetics — everyone can receive personal daily nutrition recommendations. Food production can even be adjusted individually to suit these needs.

INNOVATION OF THE FUTURE?

Body-internal analytics collect information every day about the function and health of the human body and give the user precise nutrition recommendations. Food production can be adjusted to suit the needs of individual customers.



5 *When the robots come*

Finland has traditionally been a worldwide leader in adopting new technologies. This century will bring fundamental changes to our world in the form of robots, novel manufacturing methods and innovative ways to get around.

In Finland, the authorities are already making way for the use of new forms of transport, such as self-driving cars. "The importance of robotic transport for Finland is greater than for many other countries. In countries with long travel distances, the services of the future can be built on wheels," says future researcher **Ilkka Halava**. People will not have to travel to access

services, as robotic cars and solar-powered flying devices will bring the services to people.

Great changes are ahead in the transport world, too. Forms of travel like the Hyperloop will shrink the travel times between Finland's most distant cities to under 15 minutes. We will be able to get to cities in neighbouring countries in just a half an hour. Transport will become a multifaceted service utilising various different automatic ways to get around.

In the future, robots will do most of the work for people, but this is only a part of the transformation. Once robots can learn to obtain information independently, they can also be taught new skills.



INNOVATION OF THE FUTURE?

Building a high-rise with a printer. The building materials are carbon nanomaterials created from carbon in the atmosphere using solar power. With these materials, buildings can be up to 20 kilometres tall.

© KONE Corporation

6 A new kind of social life

Finland is one of the world's first countries to have embarked on a programme of experimental governance. One of the key projects is to promote an experimental culture. That means finding innovative ways to develop society and services through digitalisation, experimentation, and deregulation.

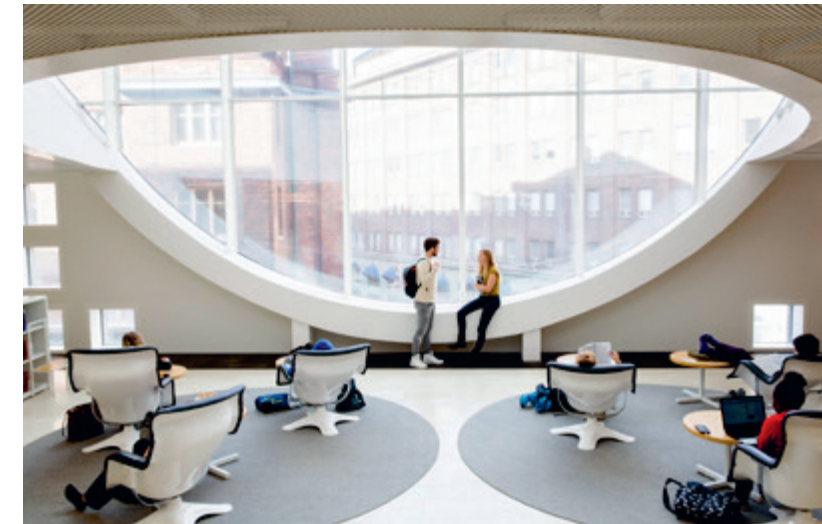
Key approaches include strengthening employment and competitiveness by improving conditions for business and entrepreneurship, creating new learning environments for knowledge and education, and revamping wellbeing and healthcare with services to be based on customer needs.

As part of the current experimentation programme, a universal basic income experiment is being trialled with the objective of identifying and comparing different models. In essence, universal basic income is an income granted unconditionally to every citizen without a work requirement.

The purpose of the experiment is to find ways to reshape the social security system in response to changes in the labour market – the experiment will also explore how to make the system more empowering and effective in terms of providing incentives for work as well as reducing bureaucracy and streamlining the benefits system.

The elementary and secondary school reform, which stepped into effect in fall 2016, represents a key shift in the much-lauded Finnish education system. Key aims of the reform are developing schools as learning communities, and emphasising the joy of learning and a collaborative atmosphere, as well as promoting student autonomy in studying and in school life.

When virtual reality and artificial intelligence become more commonplace, it will undoubtedly lead to changes in people's social lives. Altering reality will become a part of everyday life.



During this century, virtual reality may bring surprisingly major changes to people's lives. People may have very realistic alternate lives online. They will be able to live as any character they want and in any world they want — either in the company of other people or with artificial intelligence.

A virtual layer will also be added on top of everyday life. With augmented reality glasses, the reality around us can be supplemented or altered. Houses may not require windows, as they can be created virtually. When this technology is connected with various sensors and radars, people can gain a kind of supersight.

At the same time, robots and artificial intelligence will have more and more impact on people's social lives. Human-like, self-learning robots will carry out things in the home on behalf of residents, just like the servants of yesteryear. Objects will also be able to communicate with one another. Devices, machines and vehicles will work together, using automation to guide deliveries, for example.

The role of technology will increase, but it may also give people more time and possibilities to be people. On the other hand, many solutions of society will have to be reconsidered. Social models like basic income for citizens may become more commonplace, and taxation will have to be built on a new foundation.

"In the future, we may not necessarily tax work anymore, but rather raw materials and energy, for example," says Professor of Future Studies **Markku Wilenius**.

"The next thirty years will be very exciting for the future of humanity. The winners of this age of transformation will undoubtedly be those countries with a high level of education," says future researcher **Ilkka Halava**. "Finnish society is very well organised and intelligent; the best in the world on many scales. People here are also used to managing in different climate conditions and looking after each other. Finland is entering a golden age."

INNOVATION OF THE FUTURE?

Augmented reality contact lenses add a virtual level on top of reality. The lenses contain a computer that is as powerful as today's supercomputers, and that will change our perception of the future.



The views expressed herein are solely those of the authors.
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FINLAND**

