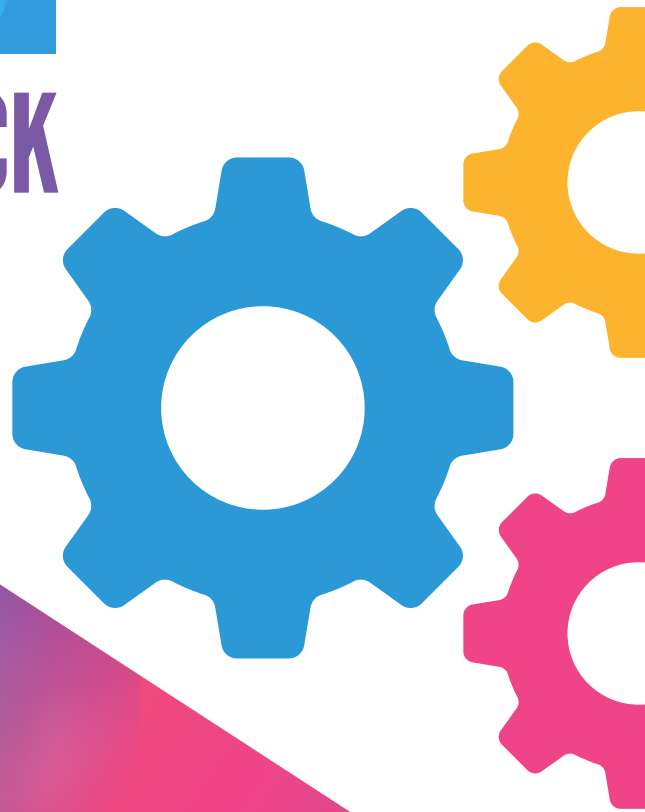# DCS DIGITAL INNOVATORS

TCS Digital Innovators

EDUCATION PACK

TEACHER INTRODUCTION

THE 2019 EDUCATION PACK

We've partnered with Tata Consultancy Services Ltd (TCS) for another year to launch this Young Innovator 2019 Education pack because we share the same beliefs about young people – beliefs we're certain many of you reading this believe, too.

The decisions and innovations of young people map out the future. They ARE the future.

Their brilliant, enquiring, creative minds are the minds that will steer the next wave of innovation; the wave of change.

As teachers, you don't need us to tell you that such minds need nurturing, but what's really important is that they know they can start innovating – start making changes – right now. They may be the minds of the future, but they're also the fresh minds of today.

This Education Pack is about encouraging KS2 and KS3 students to identify problems (big or small) and to use innovation to solve those problems; establishing the building blocks behind the brains that will shape the future.

WHAT WE WANT PUPILS TO ACHIEVE

In this Education pack we're asking *First News* readers to identify a problem and solve it with an innovation. More specifically, we're asking readers to come up with an invention that can help older people live safer, happier and healthier lives.

They should start by thinking about a problem that an elderly person might face. They then need to come up with an innovation to solve it – but there must be a digital element to it. Their innovation could be an app or a website, or could connect to an app, website or computer.

Pupils will need to draw and annotate their idea, explain how it would work and give it a memorable name.

This Education pack is designed to make children recognise the impact they can have on the world around them. It should inspire them to be able to respond to problems they see around them.

This project allows children to think practically and apply skills and thought processes that are not often utilised in the classroom.

It is also a tool to enable children to be creative and utilise their art and design skills.

INSIDE THIS PACK

You'll find case studies and interviews to help students focus their innovation ideas, including three examples of TCS innovations that have gone on to help older people/those in need, plus an interview with the CEO of Age UK Camden, Nikki Morris, to help students identify the immediate needs of the elderly.

The corresponding case studies, interviews and discussion ideas can be neatly implemented into Computing, PSHE and DT lessons, with clear curriculum links at **KS2** and/or **KS3** level.

LIST OF CONTENTS

TATA CONSULTANCY SERVICES – CAREER OPPORTUNITIES FOR YOUNG PEOPLE

Tata Consultancy Services has a year-round entry level recruitment programme for tech-savvy, enthusiastic individuals seeking to accelerate their careers in IT. It consists of graduate and apprenticeship opportunities in roles such as Software, Test and Network Engineers as well as Business Analytics.
To find out more visit **www.tcs.com/careers/graduate-hiring/en-uk**

TATA CONSULTANCY SERVICES

in partnership with **FirstNews** | **FirstNews EDUCATION**

STUDENT CHALLENGE

YOUNG HELPING THE OLD

In this year's Education pack, TCS and *First News* are asking young people to come up with an invention that can help older people live safer, happier and healthier lives.

We want you to get your thinking caps on and come up with a new innovation that could help elderly people. It will need to have a digital element. It might be a robot to help them around the house and keep them company, or a new design for a walking stick, or a wheelchair that's hooked up to a TV! The limit is your imagination – you're the innovator, remember!

THE CHALLENGE

Digital innovation has changed the world and will continue to do so for the rest of all our lives. In fact, in some ways it's already transported us into a sci-fi vision of the future. Drones? Check! Driverless cars? Check! Robots? Check! Artificial intelligence? Check!

We're living in an exciting digital age, where technology has already changed the way we talk, socialise, learn and live.

But technology isn't just about cool gadgets and gizmos – it's changed the way we help people all over the world, be that in the fields of medicine, charity or government. Digital technology allows us to make huge changes for the better.

Your mission is to find a problem and solve it with your innovation. That's the idea behind this Education pack, which we have created with our friends at TATA Consultancy Services (TCS), a company behind some pretty cool innovations.

1. Start by thinking about a problem that an elderly person might face.

2. Come up with an innovation to solve it. Let your imagination go wild, but also think about how your idea could actually work.

3. Make sure your innovation has a digital element. It could connect to an app, website or computer, or your innovation could be an app or website.

STUDENT CHALLENGE

CHALLENGE YOURSELF

To prepare for this challenge, work through the following tasks.

UNDERSTANDING INNOVATION
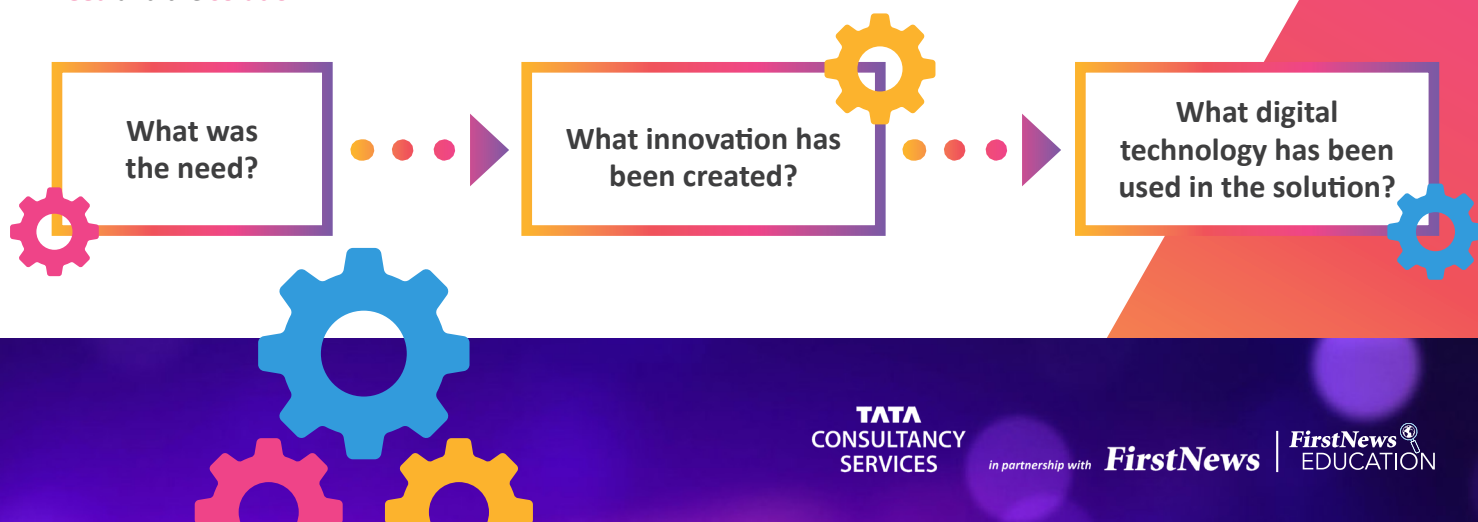
A: **What is an innovator?**

An innovator is someone who thinks up new inventions or concepts to solve problems. The greatest inventions change the world and go down in history. And so do the inventors who dared to dream of them! From Scottish-born scientist Alexander Graham Bell, who invented the telephone, to British computer scientist Tim Berners-Lee, who invented the World Wide Web, to Dorothy Arzner, who invented boom microphones for film and TV. Inventors change the way we do things. Where would we be without them and their innovations?

> **OVER TO YOU:** Do your research! Can you name five different innovators from different periods in history? For bonus points, list at least two of their greatest innovations.

B. **Developing solutions to problems in society**

All innovations, big or small, are developed to solve a specific need – be that a personal need or a larger one in society. Your innovations should solve a particular need facing older people, and that 'need' and 'solution' should be very clear.

Read the three case TCS studies outlined on **pages 8**, **9** and **10**. For each case study, identify the **need** and the **solution**.

What was the need?	What innovation has been created?	What digital technology has been used in the solution?

STUDENT CHALLENGE

IDENTIFYING NEEDS IN SOCIETY

Ageing happens to us all. As we grow older, our bodies change and some things we took for granted can get harder or become impossible to do. No doubt you've seen these changes in your grandparents or family friends.

What needs do people have as they get older?

1. Make a list of your initial thoughts.

2. Ask an expert: Read the interview with Nikki Morris, CEO of Age UK Camden on page 11. Add information you find out to your research list.

3. Talk to people in the situation, such as a grandparent: Prepare some questions for them – as the journalist did before talking to Nikki Morris – to really understand what their needs are, so you know what innovation is required right now. Add this information to your research.
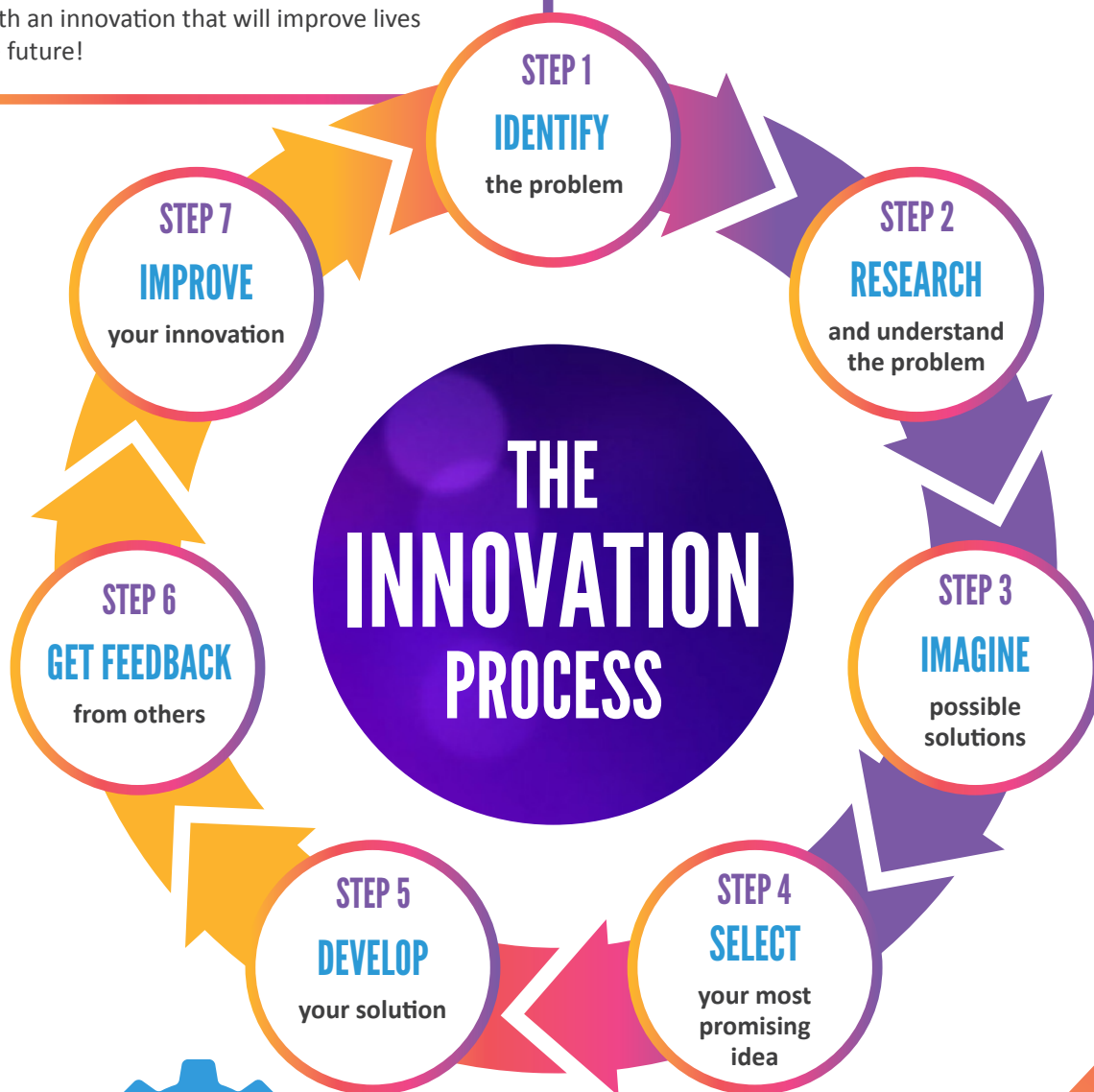
STUDENT CHALLENGE

INNOVATION TIME

To prepare for this challenge, work through the following tasks.

OVER TO YOU: The following innovation steps will help you to organise your ideas and to come up with an innovation that will improve lives in the future!

THE INNOVATION PROCESS

STEP 1
IDENTIFY
the problem

STEP 2
RESEARCH
and understand the problem

STEP 3
IMAGINE
possible solutions

STEP 4
SELECT
your most promising idea

STEP 5
DEVELOP
your solution

STEP 6
GET FEEDBACK
from others

STEP 7
IMPROVE
your innovation

INNOVATION IN ACTION

CASE STUDY 1

SHINESeniors

Here's a pretty cool example of a digital innovation – by super-smart company TCS – that is helping the elderly right now. Use it to inspire your own innovations!

What is SHINESeniors?

SHINESeniors is a huge innovation that TCS has been working on alongside Singapore Management University for some time now. Although the project is quite complicated, their goal is straightforward: to help elderly populations to continue living independently and safely.

TCS's SHINESeniors involves digital monitoring and assistive technologies (technologies that help people) in flats belonging to elderly citizens who live alone. It is currently being used and tested in 100 flats in Singapore.

What technology does it use?

SHINESeniors uses some pretty awesome technology (a combination of 'sensor-based internet of things technology' and data analytics) to monitor seniors throughout their home, alerting local caregivers if something doesn't seem right.

Why is this technology so good?

The technology allows seniors to feel safe and to monitor their own health and wellbeing at home, relying on local help as opposed to the healthcare system. This keeps medical costs down considerably, addressing a huge problem faced by many elderly people across the world. With hospitalisation and healthcare costs rising steeply around the world,

senior citizens in countries with large elderly populations – Germany, Japan, and Singapore, for instance – struggle to get the medical help they need while living independently. SHINESeniors means residents don't need to go to the doctor every time something appears wrong – they have support at home, both human and artificial.

How does it work for each person?

Essentially, SHINESeniors turns an elderly person's home into a 'smart home'. That smart home is then tasked with keeping an eye on that person's everyday movements (in a non-intrusive way), using sensors placed around the home.

Based on ongoing data captured by the sensors, a pattern emerges for each person, eg, when they brush their teeth at night, when they take their medication, when they wake up in the morning, etc. SHINESeniors creates a narrative that tells the story of an elderly person's daily life. From that narrative, the software can then spot when something doesn't seem right.

If something seems out of the ordinary, a community caregiver is sent an automatic message. They receive this message via a very clever app. If something is indeed wrong, that caregiver is then tasked with checking up on the resident. The caregiver can also interact with other caregivers through the app, should they need help.

SHINESeniors keeps a non-intrusive eye on elderly people in their home. The innovation uses digital technology and the support of local caregivers to ensure that the elderly are taken care of regularly and respectfully.

INNOVATING A NEW WORLD OF READING

TCS has opened up a whole new world of reading to those who thought that chapter of their lives was closed forever.

Technology changes lives

Digital innovations are often created to make life easier for us. From drones that can deliver our Amazon packages, to AI that can write our shopping lists, innovation has created a world where technology has touched and improved endless aspects of day-to-day human life.

Technology has changed all of our lives, but it has truly transformed some people's lives.

The gift of reading

Digital innovating goes way beyond creating thinner smartphones and slicker tablets. Take one such innovation created by our friends at TCS. It's a platform known as Access Infinity and it has given the gift of reading to thousands in India – a country where books published in Braille and other accessible formats are not readily available.

Reading is a gift that most of us take for granted. The ability to pick up a book, separate the pages and dive into a world of wonder and learning is something most of us barely think about, because we can choose to do it anytime we please.

Some aren't so lucky.

What is a print disability?

Millions suffer from what is known as a print disability. According to TCS, a print disability is "a condition which prevents a person from being able to read a printed book, either because of blindness or other physical impairment".

According to The World Health Organization, there are more than 285 million visually impaired people in the world, most of whom live in developing countries.

"Those with a print disability can only read books specially formatted for that disability," explains TCS.

"According to the World Blind Union, of the million or so books published in the world each year, less than 5% are made available in accessible formats." Imagine not being able to read 95% of the books in your school library.

It's all quite hard to imagine, isn't it? Not being able to read because of a physical condition? For many this is a reality, but TCS, believing in "accessibility for all", have found a solution using their unique innovation.

What is Access Infinity?

Access Infinity is a platform that brings together a range of organisations, including schools, libraries, universities, government bodies and publishers such as Bookshare – an international online library for people with a print disability – to achieve a groundbreaking solution.

So, how does Access Infinity work exactly?

Well, simply, the team at TCS automated the process that converts books into different formats. The platform allows quick and easy creation and distribution of reading materials into a range of formats, eg, Braille, DAISY text, DAISY audio and text synchronized, and Epub3, that are accessible to those with print disabilities. These formats can then be accessed across a wide range of channels – from local libraries to individual smartphones – in a wide range of languages, gifting reading to thousands.

Today, over 400,000 books can be accessed and read by those with print disabilities, thanks to this remarkable innovation.

INNOVATION IN ACTION

CASE STUDY 3

DEVELOPING A DIGITAL SKIN TWIN

A new computer model known as Digital Skin Twin is an upcoming TCS innovation that could revolutionise the way we take medicine.

What is Digital Skin Twin?

Some innovations are so revolutionary that they can actually change the way the world does things. Cars changed the way we travelled on land. Planes changed the way we travelled across seas. Social media changed the way we communicate online.

TCS's Digital Skin Twin, which is currently in development (innovations such as this require a huge amount of research and testing), could transform the way we take medicine and, in turn, save the lives of countless human beings and animals.

Innovation in healthcare

Innovation is constantly changing the healthcare industry. And be thankful that's the case, because without great innovations in healthcare we'd still be wearing unwashed lamb's hair drenched in brandy to get rid of our colds, and rubbing live snails against our burns and scratches.

Innovation has transformed the ways we take medicine and transformed the ways in which they are actually made. With their Digital Skin Twin model, those clever clogs at TCS are continuing to innovate these processes.

Identifying the problems

In the very early stages of the Digital Skin Twin innovation, TCS looked at the medical industry and saw two problems. One, it takes far too long for companies to administer new drugs and cosmetics and get them onto the market so that people can benefit from them. Two, a huge number of animals still undergo animal testing in labs prior to a new drug or cosmetic being released. These two problems are affecting the wellbeing and lives of humans and animals.

How does Digital Skin Twin work?

TCS proposed its Digital Skin Twin platform as a solution to these two problems.

TCS's Digital Skin Twin is essentially a digital replica of every unique layer of a human being's skin. This crazy-complicated digital replica allows scientists to explore hundreds of thousands of different molecule and drug combinations. TCS claims that this way of testing is far more useful and reliable than anything animal testing can achieve and, of course, it's far more ethical as the test subject is a digital replica.

The Digital Skin Twin platform uses multiscale modelling and virtual reality (VR) for "transdermal pharmaceutical and cosmetics delivery" – this just means that the drugs are administered through the skin after extensive digital analysis.

Treating diabetes

Head of Physical Sciences Research at TCS, Beena Rai, helps paint a picture using the example of treating diabetes: "Take the example of diabetes. If somebody has to take insulin, they have to inject it.

"I can put in a new formulation – the combination of insulin with certain other chemicals or certain nanoparticles that will help insulin penetrate the skin – and test it against the digital skin to see if it works. In this way, the model helps us to design formulations."
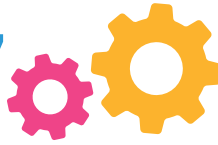
Robo-skin!

TCS has even said that the innovation is helping them develop emotive robo-skin for robots of the future! Here's where you go: Wow! The future is here!"

So, not only will TCS's Digital Skin Twin model help develop pain-free delivery of drugs through the skin (like a patch), but it could also help eliminate animal testing. So here's an innovation that could change the world – and it all started with the desire to solve a problem.

IDENTIFYING NEEDS IN SOCIETY

INTERVIEW WITH NIKKI MORRIS, CEO OF AGE UK CAMDEN

A new computer model known as Digital Skin Twin is an upcoming TCS innovation that could revolutionise the way we take medicine.

1. Is the government doing enough to help the elderly population?

The older population can be reliant on health and social services, and those are being really stretched at the moment, so it can be difficult for them to get the services that they need when they need them. The Government needs to listen to older people and charities like Age UK Camden to find out not only what services older people need, but also how they can access them easily. It's no good offering a service if an older person can't get to it because there is no transport, for example.

2. Can you outline some of the struggles faced by the elderly today?

Older people can often feel misunderstood and not listened to. Getting older doesn't mean that you don't know things or can't do things, it just means sometimes you can't always do what you used to be able to do, or you're a bit slower with how you move or think. Many older people feel isolated or lonely. They can miss going to work and, if they can't get out and about so easily, they can often miss the company of other people. They also sometimes find it difficult to do the things they need to do, such as shopping or getting to appointments.

3. What struggles do some seniors have to face that younger generations don't always think about?

Some older people have money worries. Not being able to go to work can sometimes mean that they are reliant on benefits and these can be difficult to live off. Some older people don't see other people very often. Their family and friends may have moved away and some may have died. Half

a million older people go at least five or six days without seeing or speaking to anyone at all. There are some issues that older people share with younger people though. A recent survey found that the people most feeling lonely were the younger generation and the older generation. That's why younger people helping older people can often be a good combination.

4. If you could click your fingers and have access to an invention that would help the elderly, what would it do and what would it be called?

Gosh, there are so many things that would make life easier. But to think out of the box completely I would invent a walking frame with a robotic arm. There would be a control pad on the handle so the older person could press a button to work it as they walked along. If both of your hands are needed to balance yourself you don't have a spare hand, an extra arm would mean you could wave, answer a telephone or even hold a door open without stopping. Lots of things take longer for people who need to walk with a frame because you can only do one thing at once, and that can be really frustrating for people. I would call it a stability agility frame because that's exactly what it does!

5. What kind of difficulties face the elderly community when they live on their own?

People who live on their own often miss having someone to talk to. Two-fifths of all older people say the television is their main company. Sometimes getting jobs done can be hard. They might not have the energy and sometimes they just don't know how to do something. If you live with other people you are a team (even if it's a team of two), if you live on your own you have to do everything yourself.

6. Can you outline some of the struggles faced by the elderly today?

Older people can often feel misunderstood and not listened to. Getting older doesn't mean that you don't know things or can't do things, it just means sometimes you can't always do what you used to be able to do, or you're a bit slower with how you move or think. Many older people feel isolated or lonely. They can miss going to work and, if they can't get out and about so easily, they can often miss the company of other people. They also sometimes find it difficult to do the things they need to do, such as shopping or getting to appointments.

7. In your opinion, what is needed to tackle the problem of loneliness within the elderly community? AND How can we stop the problem growing?

We need to bring communities together so that people know those who live near to them and feel they belong. Intergenerational activities need to be commonplace so that we all understand each other and are more caring towards each other. We need to ensure that charities like ourselves are supported, so that whatever government is in power, the voice of older people is heard and the right local services are provided in the right way.

8. What should someone do if they are particularly worried about an elderly person in their life?

They should speak to an adult who may know the person, or to someone that they trust to share their concerns, such as a relative, a neighbour or a teacher. People are often very good if they know somebody needs help, and sometimes the solution can be very simple. People can always speak to Age UK's advice and information line who will be able to put them in touch with their local Age UK.

9. Since you've been working at Age UK Camden, what innovations/inventions have changed elderly lives?

There have been lots of things. Social prescribing is a big thing. Staff now work in GP surgeries to link people with local social groups and services. Often these activities are more effective than medicines in helping people feel better. The staff take time to get to know the person, so that the services and groups that they link people with are right for them. It's fantastic when someone pops in to tell us how this service has changed their life.

10. What innovations would help the elderly in 2019?

Anything that helps older people to keep in contact with people and to meet new people, and anything that helps them get out and about more easily would be great. Some people suffer from dementia, where their memory doesn't work as well, so anything to help with that would be so good, too.

11. What can young people do to help the elderly community right now?

Little things matter – so do smile at older people when you pass them in the street. Do ask older people questions – you'll be amazed what you learn! And do get involved in your local charity for older people – we always need volunteers, and younger people are brilliant at keeping us on our toes! If we all did a little something just think what a difference we would make together!

12. First News readers are being tasked with thinking up innovations/inventions that will help the elderly in 2019. Do you have any advice for them?

This is a brilliant task! I would start by asking questions of older people they know. Questions like: What is the biggest problem that you have? Are there any small things that really annoy you? Once you've thought up an initiative or invention then go back and see what the older people think of it. They might be able to help you make it even better. I would love to hear the different ideas. We might even try some of them out at Age UK Camden!