



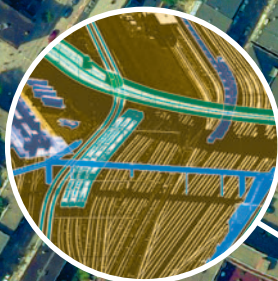
FORESIGHT

On transport, cities and
intelligent infrastructures
- a project for the
Secondary School Curriculum

OFFICE OF SCIENCE AND INNOVATION

change of place

what's wrong with our cities and transport
systems and what can we do about it?



Encouraging pupils to examine travel patterns in their own locality, to develop an understanding of how these relate to a UK perspective, and to envisage solutions for our future.





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change of **place**



A project achieved through partnership

This project is a pilot to develop ways in which Foresight findings of the DTI concerning the application of new technologies can be introduced into the secondary school curriculum. The following have been put in place:

- A set of trial curriculum materials available free of charge with downloads from the following websites:
 - www.ase.org.uk**
 - www.data.org.uk**
 - www.secondarydandt.org**
 - www.shapethefuture.org.uk**
 - www.tep.org.uk**
- Partner organisations who will promote the use of the materials are:
 - Association for Science Education**
www.ase.org.uk
 - Design & Technology Association**
www.data.org.uk
 - Nuffield Design & Technology**
www.secondarydandt.org
 - SETNET and SETPOINTS**
www.setnet.org.uk
 - Science Learning Centres**
www.sciencelearningcentres.org.uk
 - Shape the Future**
www.shapethefuture.org.uk
 - Technology Enhancement Programme**
www.tep.org.uk
- An organisation to collect feedback from schools using the materials:
 - Shape the Future**
Funded by the Royal Academy of Engineering, this organisation campaigns to raise awareness of engineering and technology as a stimulating career option and an essential and exciting part of modern Britain.
- Opportunities to use the materials including:
 - National Design & Technology Week**
25 – 29 June
 - Extra Curricular Activities**
to support STEM *Science, Technology, Engineering and Mathematics*
 - Enhancement activities**
for gifted and talented pupils



An appropriate pedagogy

The Project uses the following learning activities.

- There are **Small Tasks** to teach the pupils knowledge, skills and understanding required for a Big Task. These are short, highly structured and supported by work sheets. Small tasks take only one or two lessons to complete.
- There are two **PowerPoint** presentations to introduce important new ideas. These are supported by an interactive comic strip and a board game. These presentations and activities are also short.
- There are **Big Tasks** where pupils use what they have learned from the Small Tasks and presentations. These are much less structured and the pupils are expected to show much more autonomy and independence. The pupils will be to a large extent self directed choosing from a variety of options how best to present their ideas about cities of the future.
- There are two **Extension Activities** with which to engage particularly interested pupils in the developments of new technology.





An appropriate pedagogy

For Small Tasks, all Change of Place worksheets use the following framework:



why Providing a reason for the learning



Useful information about transport and cities



Questions to help you think about transport and cities



Questions to help you think with your classmates in a group of four



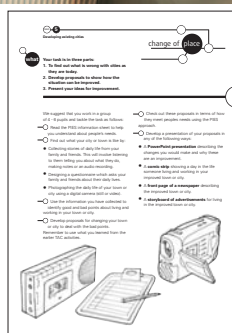
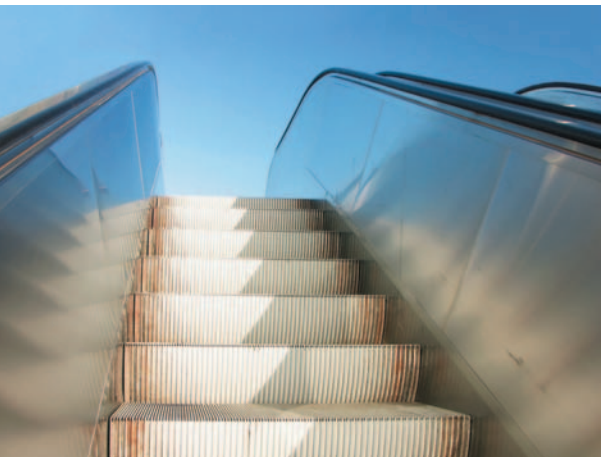
Suggestions for careful writing that will help you learn from your thinking and notes



Suggestions for presenting what you have learned



Suggestions for conversations at home

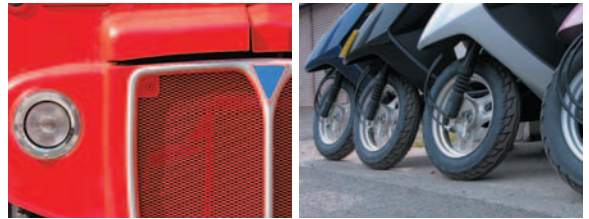




An appropriate pedagogy

There are two Big Tasks. The first involves the development of existing cities and has 6 stages

- Pupils are introduced to the idea of identifying people's needs using the PIES approach.
- They explore what is happening in cities now by any or all of the following:
 - a) Collecting anecdotes
 - b) Using questionnaires
 - c) Using digital photography (still or video)
- Using the information from this exploration they identify what is wrong with the transport and cities we have now.
- They develop alternatives and propose changes to the design of transport and cities using what they have learned from the Small Tasks and the PowerPoint presentations.
- They justify these alternatives using the PIES approach.



- They present their proposals in any of the following ways:
 - A **PowerPoint presentation** describing the changes they would make and why these are an improvement
 - A **comic strip** showing a day in the life of someone living and working in the improved city
 - A **front page of a newspaper** describing the improved city
 - **Storyboards of advertisements** for living in the improved city



An appropriate pedagogy

The second involves the designing a completely new city from scratch and has 6 stages

- Pupils are introduced to the idea of identifying people's needs using the PIES approach.
- They identify a future scenario using these questions:
 - Will people be concerned about the environment?
 - Will the government be concerned about the environment?
 - Will there be new energy technologies that provide environmentally friendly energy for heating, lighting and manufacturing?
 - Will there be new energy technologies that provide environmentally friendly energy for transport?
 - Will people accept these new energy technologies?
 - Will new information technologies be available to all?
 - Will people accept these new information technologies?
- They develop in broad outline a proposal for a city with a range of key desirables using what they have learned from the Small Tasks and the PowerPoint presentations.
- They identify how these desirable will be delivered.
- They justify these deliverable using the PIES approach.



- They present their proposals in any of the following ways:
 - A **PowerPoint presentation** describing the new city
 - A **comic strip** showing a day in the life of someone living and working in the new city
 - A **front page of a newspaper** describing the new city
 - **Storyboards of advertisements** for coming to live in the new city



The resources available

The following Small Tasks help students understand the present

task	1	How we use transport now	Helps pupils think about the way they, their friends and family use transport in their daily lives.
task	2	Travelling to work, for life and leisure	Helps pupils think about the forms of transport different people use to get to work, for their daily lives and for leisure.
task	3.1	Important technologies Part 1 Energy and Transport	Helps pupils understand how energy and transport be used to develop cities in the future.
task	3.2	Important technologies Part 2 Smart vehicles	Helps pupils think about vehicles that can control themselves and communicate with one another.
task	3.3	Important technologies Part 3 Materials and smart flows	Helps pupils think about the way we use materials now and in the future.

PowerPoint presentations and other resources help students think about the future

ppt	1	PowerPoint Part 1 What do people believe about transport and cities?	Helps pupils question presumptions about transport and cities.
ppt	2	PowerPoint Part 2 Possible future cities	Helps pupils understand scenarios for the future.
task	4	Comic to help thinking about presumptions	Helps pupils think about past, present and future presumptions
act	4	Board game to help with thinking about future cities	Helps pupils understand scenarios for the future.



The resources available

Big Tasks enable students to design cities for the future

task	5	Developing existing cities	Involves pupils in improving their own town or city.
task	6	Envisioning new cities	Involves pupils in designing a city for the future.
info		PIES Information Sheet	Helps pupils understand people's needs

Extension Activities

EA	1	Extension Activity 1 Thinking about SPIMES	To introduce pupils to the technology in SPIMES and their applications.
EA	2	Extension Activity 2 Jobs in the future?	To help pupils think about the impact of technology on future employment.
pics	1	Images for use in presentations	To provide images that pupils can use for presentations.





The four step approach to teaching about transport and cities

All the activities require group work, discussion, making notes and formal writing. In some cases there are opportunities to make presentations. The aim of this approach is to enable the pupils to articulate their thinking.

step one

Enables young people (aged 14 and 15, Year 9 and Year 10) to understand the present situation in their own locality and in the UK overall. A two-activity approach is proposed for this.

Task 1 How we use transport

Pupils consider how they and members of their families use the different local transport systems. They consider the strengths and weaknesses of each and build up a picture of the way the families in the class travel locally – how, how far and how often. They learn that at the moment travel is integral to the way their families live and work.

Task 2 Travelling to work, for life and leisure

Pupils consider the forms of transport different people use to get to work, for their daily lives and for leisure. They build on the picture established in Task 1 and come to understand that travel appears to be an essential ingredient of the lives of most people in the UK.

step two

Develops pupil's understanding of the new and emerging technologies that are important for transport and cities in the future. There are three activities.

Task 3 Important technologies Part 1 Energy and Transport

Pupils are introduced to the main findings of the Stern Review and its implications for the UK and our use of transport.

Task 3 Important technologies Part 2 Smart vehicles

Pupils are introduced to the projected development of vehicles over the next 20 years culminating in cars with autopilots.

Task 3 Important technologies Part 3 Materials and smart flows

Pupils are introduced to the application of closed loop systems (as exist in nature) to industrial manufacture.



The four step approach to teaching about transport and cities

step three

Enables pupils to consider future scenarios.

This involves two PowerPoint presentations with supporting activities.

PowerPoint Part 1 What do people believe about transport and cities?

This presentation asks pupils to consider the presumptions about transport and cities of those living 50 years ago, now and in the future.

The supporting activity, Task 4 Comic to help thinking about presumptions, enables pupils to discuss and comment on presumptions.

PowerPoint Part 2 Possible future cities

This presentation develop four scenarios for future cities.

The supporting activity, Activity 1 Board game to help with thinking about future cities, enables pupils to become familiar with the positive and negative features in each scenario.

step four

Provides pupils with the opportunity to use what they have learned so far in tackling the design of cities for the future. Two tasks are suggested.

Task 5 Developing existing cities

In this activity pupils identify the flaws in their own town or city and suggest ways to overcome these. They can present their finding through a variety of media.

Task 6 Envisioning new cities

In this activity pupils develop a scenario for the future and design a city for this scenario. They can present their finding through a variety of media.

Both Task 5 and Task 6 are supported by the PIES Information Sheet which introduces pupils to a consideration of people's needs.



There are two extension activities

There is also a range of images available as clip art which pupils can use in their presentations.

Extension Activity 1 **Thinking about SPIMES**

In this activity pupils learn about the convergence of current technologies into SPIMES – an emerging technology that will affect all our lives in the near future.



Extension Activity 2 **Jobs in the future?**

In this activity pupils learn about how new technology and the shape of our society will affect the way we work.



The cross curricular picture

You can use the change of place resources in response to a variety of National Curriculum requirements as indicated.

—○ At Key Stage 3

In Citizenship

Developing skills of enquiry and communication

Developing skills of participation and responsible action

In Design & Technology

Evaluating processes and products
Knowledge and understanding of systems and control

In Geography

Knowledge and understanding of places
Knowledge and understanding of patterns and processes
Knowledge and understanding of environmental change and sustainable development

In ICT

Finding things out
Exchanging and sharing information

In Science

Energy resources and energy transfer

—○ At Key Stage 4

In Citizenship

Developing skills of enquiry and communication

Developing skills of participation and responsible action

In Design & Technology

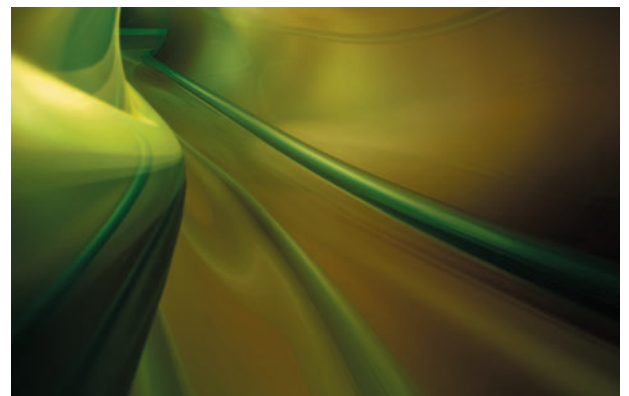
Evaluating processes and products
Knowledge and understanding of systems and control

In Information and Communication

Technology
Finding things out
Exchanging and sharing information

In Science

Energy resources and energy transfer





Feedback

There is a feedback form on the project website. *Shape the Future* will collate feedback from teachers and pupils who have used the project materials.





Reference sources for teachers

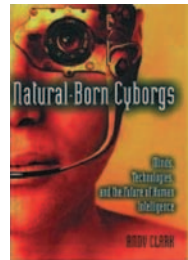
—○ **Me++ The cyborg self and the networked city**

William J. Mitchell
MIT Press Cambridge Massachusetts



—○ **Natural-born cyborgs: Minds, Technologies and the future of human intelligence**

Andy Clark
Oxford University Press, Oxford



—○ **When things start to think**

Neil Gershenfeld
Henry Holt and Company, New York



—○ **www.wired.com**

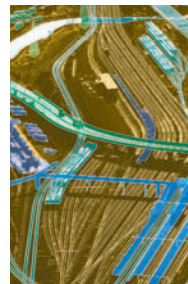


—○ **What's happening to Home: Balancing work, life and refuge in the information age**

Maggie Jackson
Sorin Books, Notre Dame IN



—○ **www.foresight.gov/Previous_Projects/Intelligent_Infrastructure_Systems/Index.htm**





Reference sources for pupils

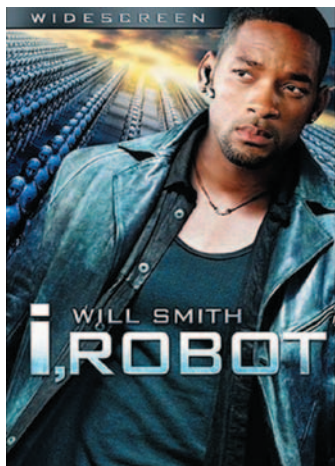
—○ www.wired.com

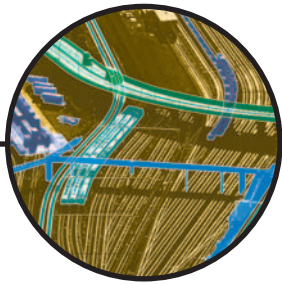


—○ The movie **Minority Report**



—○ The movie **I robot**





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