Thank you for downloading this Decide kit!

Every kit contains all the necessary elements for a group of up to 8 people playing Decide. If you have more participants, provide each group with a kit.

The kit can be printed on A4 paper or cardboard. For best results, use 160g/m2 paper.

The first 9 pages have borders of different colours, indicating the colour of the paper on which they should be printed. There are 3 or 4 green, 3 or 4 blue, 1 yellow and 2 orange sheets.

The other pages should be printed on white paper or cardboard.

The last 4 pages contain the placemat and the instructions for each participant.

It is important that each participant has a placemat in A3 format.

The instruction card should be printed preferably in colour, although it will work also in black and white.

Make sure that there are as many placemats and instructions cards as there are participants.

Enjoy Decide!

For any question or information, please email: info@playdecide.org

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"Decide" Nanotechnology Card Game

In this game, groups of up to 8 people engage with the complex issues surrounding nanotechnology. The game helps players find out about nanotechnologies and their possible implications and express their views to the other participants.

MATERIALS: (per group of 8)
Cards: 8 Story Cards, 24 green Info Cards, 24 blue Issue Cards, 10 gold Challenge Cards
A large table around which all players can sit

SET UP:
Scatter the Info Cards and Issue Cards face up in the center of the table. Spread out the Story Cards and Challenge Cards face down in one area of the table.

INSTRUCTIONS:
Before starting, choose 1 player to be the Instructions Manager. This person reads out each instruction to the group during the course of play.

1) Each player: choose a face-down Story Card at random. This will be your 'persona' for the game.

2) Look over the green Info Cards on the table and choose 2 that interest you. Place them in front of you. (5 minutes)

3) Let's play! Going around the table, each player reads his/her Story Card to the group.

4) Info Card trading: Going around the table again, each player reads his/her Info Cards. Which person does the Info Card most relate to? Decide as a group, and trade or give your card to that player.

5) Raising Issues: look over the blue Issue Cards and choose 2 that relate to your game persona/Story Card. Place them in front of you. (5 minutes)

6) Going around the table, read your Issue Cards and tell the group how "you" (your Story Card persona) relates to the issue. Ask if anyone has any comments or questions. Everyone should stay 'in character'!

7) Enough role playing – back to yourself. Turn over your challenge card. Going around the table, follow the instructions on your card. Answer the way *you* really feel/think, not your Story Card character. Discuss with the group whether or not you identified with your character.

8) Wrap-up discussion. As a group, discuss your thoughts on the game. What were the most interesting issues that came up? What surprised you the most? Anything else you want to share?

9) Clean up! Sort the cards into piles by color, paper-clip each pile, and return all materials to the envelope.

Info Card 1

What is special about things on a nano scale?

Lots! At this scale materials that we are familiar with can show new electrical, chemical and magnetic properties. We can manipulate individual atoms or even make tiny motors.

Info Card 2

What happens at the nano scale? 1

Nanoparticles are tiny pieces of a material. As the particles become smaller their surface area becomes relatively greater. This is why icing sugar dissolves more quickly than granulated sugar.

Info Card 3

What happens at the nano scale? 2

Nano-scale particles may be able to enter body cells or pass straight through the skin. Like any new technology (e.g. electricity) these properties could be either very useful or harmful.

Info Card 4

What happens at the nano scale? 3

Things behave in unusual ways. For example :
• Gold, normally unreactive, becomes more reactive and melts at a lower temperature.
• Copper stops becoming a good conductor of electricity.

Info Card 5

What is nanotechnology?

Nanotechnology is an umbrella term used to describe any technology that deals with objects measuring from 1 to 100 nanometres, in at least one of their dimensions.

Info Card 6

Nanoparticles can occur naturally

Gold and silver nanoparticles are observed in sedimentary rocks. Volcanic eruption produces nanoparticles, and some salt compounds in the sea contain nanoparticles.

Info Card 7

Carbon nanotubes 1

A nanotube is like a tiny sheet of carbon rolled into a cylinder. It has a diameter of a few nanometers, about 10,000 times thinner than a human hair.

Info Card 8

Recommendations of the UK Royal Society, 2004

"Factories and research laboratories should treat manufactured nanoparticles and nanotubes as if they were hazardous and seek to reduce or remove them from waste streams."

Info Card 9

Toxicity

Nanoparticles and nanotubes have different properties to the same chemical in larger form. Being so tiny, these particles may be able to penetrate cells and may sometimes be more toxic.

Info Card 10

Health risks

The UK Royal Society, an independent scientific body, recommended that people avoid exposure to airborne nanotubes until more research has been done.

Info Card 11

The ‘grey goo’ scenario

A scientist, Eric Drexler, suggested that nano machines might self-replicate and consume all the material on Earth. This is no longer thought feasible and the author has retracted his claims.

Info Card 12

Carbon nanotubes 2

They exhibit unusual strength (100 times stronger and 6 times lighter than steel) and electrical properties. This is potentially useful for drug delivery, as well as electrical and mechanical applications.

Info Card 13

Who is investing in nanotechnologies?

As of 2010, the USA and Japan are investing the most money. The EU plus European countries will be spending more than 4 billion euros over the next four years. Larger developing countries are also big investors.

Info Card 14

Current applications 1

Silver nanoparticles have been used in socks to reduce smell. The anti-bacterial effect of silver is enhanced by the greater surface area at the nanoscale.

Info Card 15

Current applications 2

The US Navy has started putting nanoscale ceramic coatings on its ships. This stops sea creatures from fouling metal components and saves about a million dollars a year for each ship.

Info Card 16

Possible applications 1

Magnetic nanoparticles can guide and position drugs at the site of disease. Nanotubes can be filled with drugs and delivery can be controlled from outside the body.

Info Card 17

Possible applications 2

Minute particles of gold attached to DNA fragments can be used to detect disease-causing organisms, such as viruses or bacteria, in the blood.

Info Card 18

Possible applications 3

Vaccines could be encapsulated in nanomaterials so that they would no longer need to be refrigerated. What will happen when these break down we don’t know, but is currently being studied.

Info Card 19

Possible applications 4

Iron nanoparticles can be made to bind to cancerous tissue. They can then be heated up using magnetic fields and used to destroy the cancerous cells.

Info Card 20

Possible applications 5

Currently, plastic hip replacements last around ten years. With a ceramic coating they could last for 40 years. This is because ceramics become much more durable at the nanoscale.

Info Card 21

Possible applications 6

New lighting devices using carbon nanotubes could cut the electrical power used for illumination by up to half.

Info Card 22

Possible applications 7

New materials could bring down the cost of solar cells. This could make the widespread production of electricity from solar cells a viable economic prospect.

Info Card 23

Possible applications 8

Specialised nanoparticles could be used to detoxify polluted water, land or even air. We can now also create membranes with pores small enough to filter virus particles out of water.

Info Card 24

Possible applications 9

Light emitting nanomaterials could be used to make paper thin TV screens that could be rolled up like a newspaper. They might only need a very low electric charge.

Issue Card 1

Human enhancement

Is it acceptable to use processes developed for medical treatment to enhance the human body, such as improving people's memory or slowing down the ageing process?

Issue Card 2

The impact of nanotechnologies

Some people think they will affect our lives as much as electricity or plastic, but no one knows how much of today's nanoscience will actually be useful in the future.

Issue Card 3

History of technologies having unanticipated consequences

Examples include, increasing drug resistance of viruses and bacteria, persistence of chemicals in the environment, nuclear accidents, oil spills and global warming. The effects of nanotechnology will be just as unpredictable.

Issue Card 4

Human rights and discrimination

The 'unimproved', those not enhanced, could be discriminated against.

Issue Card 5

Public engagement

How much should the public be involved in setting nanotechnology research agendas? And how?

Issue Card 6

Fairness and equity

The key equity issue is how we can use nanotechnology to help development, to narrow the gap between the rich and the poor worlds.

Issue Card 7

Nanoparticles inside organisms?

There are major uncertainties about what will happen if nanoparticles get inside organisms. One concern is that they will affect the way proteins work.

Issue Card 8

Is the health risk overstated?

Nanoparticles are not new. We inhale them from the exhaust of diesel engines, cigarette smoke, hairspray, burning candles and toast.

Issue Card 9

Lack of information

There is virtually no information available about the effect of nanoparticles on species other than humans or about how they behave in the air, water or soil.

Issue Card 10

Too much regulation hinders progress

For innovation to flourish the pursuit of knowledge can not be constrained by regulation.

Issue Card 11

Can technology be neutral?

Although some argue that nanotechnology is ethically neutral, and its impact depends on how it is used, many say that technology reflects the values of its inventors, funders and society.

Issue Card 12

Who owns the science?

Is there a difference between research funded by industry and that funded by the state? Should different regulations apply? Is it OK for commercial research to be kept 'secret'?

Issue Card 13

The developed/ developing world divide in money and health

Could nanotechnology widen the poverty gap?
Might strict regulations in the west cause manufacturers to move to poorer countries, forcing people there to deal with hazards that are prohibited here?

Issue Card 14

Two basic questions to ask with new technologies:

- Who controls their use?
- Who benefits from their use?

Issue Card 15

The ageing process

Should we be content to live a 'normal' life span, or should we try to stop the ageing process?

Issue Card 16

Why we need to research impacts

There is a danger of derailing nanotechnology if serious study of its ethical, environmental, economic, legal and social implications does not reach the speed of progress in the science.

Issue Card 17

Regulation versus public engagement

"Good regulation is more important than any amount of public engagement." Jonathon Porritt, UK environmentalist.

Issue Card 18

When should public dialogue take place?

The report of the UK Royal Society, an independent scientific body, says it should occur “before critical decisions about the technology become irreversible or ‘locked in’”. This tends to happen when companies start producing commercial products.

Issue Card 19

Is public engagement any use?

It is next to impossible to slow down or control some areas of science in one country when the world is so interconnected.

Issue Card 20

Regulation and the rate of change

Can we realistically develop a regulatory process to govern such a diverse and rapidly developing field as nanotechnologies?

Issue Card 21

Existing regulation

This may be enough to cover mundane applications in countries that have strong legislation in areas such as: health and safety at work, pharmaceuticals (drugs) and the environment.

Issue Card 22

Human rights and privacy

Governments would have “unlimited surveillance capacity”, with the possibility of invisible monitoring and tracking devices.

Issue Card 23

The sceptic’s view

The 21st-century technologies – genetics, nanotechnology, and robotics – are so powerful that they can create whole new types of accidents and abuses. For the first time, these are within the reach of individuals and small groups.

Issue Card 24

Chips in electrical goods

These would allow the shop and manufacturer to trace who has bought them and where they are. Is this more a benefit, e.g. to crime prevention, or a drawback, e.g. to privacy?

Challenge Card

Imagine what your grandparents would say about this topic! Share it with the group.

Challenge Card

Express any feelings on the subject that you have not yet expressed to the group.

Challenge Card

Tell the group who you think pays (in terms of resources, or consequences), and in what ways.

Challenge Card

Do you think that human needs are more important than the needs of those without a voice- nature, animals, embryos?

Challenge Card

Find out what the person on your left hand side feels on this subject. Play devil's advocate (disagree with) their viewpoint.

Challenge Card

Does this have an impact on nature? Let the group know what you think.

Challenge Card

Explain briefly to your fellow players what you think could be the effect on future generations.

Challenge Card

Are there any risks involved here? Think of a risk, tell the group, and ask two other players if they can think of another one.

Challenge Card

What do you think the media would make of all this?

Challenge Card

"We should maximise human life and pursue all avenues of research to help people who are ill."

Do you agree with this statement?

Story Card 1

Zed Omega

I am a transhumanist. I anticipate a convergence of genetic, stem cell, brain, cybernetic and nanotechnology research which will open up permanent human genetic changes and much else. These would not only eliminate genetic diseases but also enable enhancements. We could expand our intelligence, extend our sensory capacities, increase endurance, and overcome ageing. I scorn our current religious and ethical short-sightedness. We should grasp our human destiny in our own hands. Ethical regulation must not deny us that destiny.

Story Card 2

William Johnson

I'm an Anglican priest. I believe that a human life is a sacred life. I welcome the medical potential of nanotechnology, but I am disturbed by reports that it could be used to enhance human abilities or graft computer chips in the brain. I think scientists are tampering with our humanity or pandering to the illusions of the rich. Our real human problems are our moral and spiritual failings, which technology is powerless to change.

Story Card 3

Joel Reddy

I've been lucky enough to get a job at the new Institute for Soldier Nanotechnologies at MIT (the Massachusetts Institute for Technology in the USA). The sort of thing we're after is creating a combat uniform with built-in strength – to help a soldier lift heavy objects or to stiffen around a bleeding wound. I know that some people are our worried about some of what we're doing, using nanosensors to improve surveillance, for example. But we have to do this for national security – someone will beat us to it if we don't move fast.

White Card

White Card

White Card

Story Card 4

S B Patel

I did an engineering PhD at Harvard, but I'm now back in India, in Hyderabad, setting up my own nanotechnology company. I want to be in on the start of the next industrial revolution and make sure its going to happen in India and China, not just the US and Japan. I've had a lot of interest from venture capitalists because they can see that we have very bright people on much lower salaries than in the US. It also helps that there is so much manufacturing here, so it will be easier to apply the research we do.

Story Card 5

Claire Green

I'm a physicist. I work at a nanotechnology research institute, exploring the potential for tiny nanoparticles to clean up environmental pollution, converting harmful substances into benign ones. I was attracted to this job because I am very concerned about the environment. But some early results suggest these particles might sometimes have damaging effects on other species, and possibly humans. The risk is very low, but no one knows how low. Do the undoubted benefits outweigh the risk? Do I stay or do I go?

Story Card 6

Fred Smith

I'm a Medical Doctor. A patient came to me with a cough. I asked him for a blood sample to do a genetic test to find which antibiotic best fitted his genetic profile. I explained that with Nanotechnology I could profile his genes in a minute. The print-out shows the best drug to prescribe for the cough. However, his genetic profile showed a high risk of developing an disorder. This man only came about his cough, should I tell him? Does he want to know?

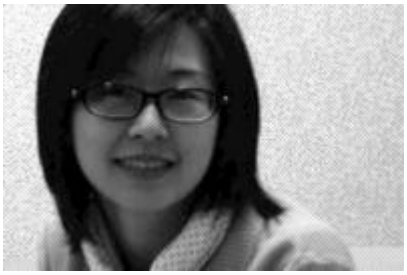
White Card

White Card

White Card

Story Card 7

Jane Bold



I am managing director of InsulinNano plc, which makes tiny needles for implanting in the skin, to deliver insulin into the blood automatically for diabetics. It was set up with government venture capital to help nano-medical companies get products to market. Once proven, there is a big demand. But the clinical safety trials are delayed, and funds are running low. The military are interested in developing our needles to inject soldiers on the battlefield with biological weapon antidotes. Should I seize this lifeline for our cash flow, or would it tarnish the company's medical aims?

Story Card 8

Sir Richard Macdonald

I have refined a way to attach a drug to nano-sized gold particles that could travel through the blood, seek and destroy diseased cells but leave healthy cells untouched. A group of activists disrupted my public lecture, shouting, "How do you know you won't hit the wrong cells? Those gold particles might cause cancer, too." "Nonsense!" I replied, "We have done detailed tests on animals and saw no adverse effects." "But you don't know in humans," they retorted. "No", was my answer, "but no form of progress is without risk."

White Card

White Card

White Card