Technocracy
Building a new sustainable society for a post carbon World

Andrew Wallace

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Acknowledgement

The ideas presented in this book began with an interesting demonstration when the author studied at University on how voting democratically on a technical matter could just as easily lead to an erroneous result as the correct result where a technically correct result exists. That combined with the author's interest in robotics lead to the development of an alternative idea for society, which the author, independently, referred to as technocracy.

These ideas developed further as a result of the author's research work in agents and robotics. The author made additional changes when the author discovered that a system of technocracy had developed in the US in the 1930s, with the idea of energy credits.

Further development of the ideas occurred as a result of the formation of the Network of European Technocrats in 2006 and the thrashing out of ideas in the forums on their web site.

As a result, many people have contributed in many different ways to the ideas presented here; most of whom the author has lost in the mists of time. However, the author would like to thank them for their contribution in developing technocracy for a sustainable World.

In addition, the author would especially like to thank those more recent people who have help with this book; Eva-Lena Wallace, Samuel A. Falvo II and Igor Srdoc. Thank you all for your help, support and corrections.

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About the author

Andrew Wallace studied Electrical and Electronic Engineering at the University of Portsmouth in England where he gained an upper second class degree. He obtained his PhD in Robotics from the Open University, in the UK. He has worked as a consultant software engineer on projects as diverse as virtual reality training systems to mobile phones to robotic and control systems. He has lectured at Chalmers University of Technology, the IT-University in Gothenburg and The University of Borås, in Sweden in the areas of robotics, artificial intelligence and software engineering.

Figure 1: Dr. Andrew Wallace PhD

Dr. Wallace has always had an interest in society and the future and has studied sociology and economics. He helped to found the Network of European Technocrats (NET) and currently holds the positions of Director of the Sequence of Research and Deputy-Director of NET.

Dr. Wallace lives in Sweden together with his wife and two children.

The website, http://en.technocracynet.eu has further information on technocracy and NET.

Forward

Do you ever get the feeling of doom? A feeling of the human race charging at full speed over a cliff? Peak oil, climate change and population pressures all seem to conspire against us to bring an end to life as we know it. However, that does not form the whole picture. We still have a choice. We can still avoid, or at least mitigate, the disasters heading our way but to do so we need to move to a sustainable society.

To a what?

A sustainable society?

That sounds nice but just what do we mean when we use the term “a sustainable soci-

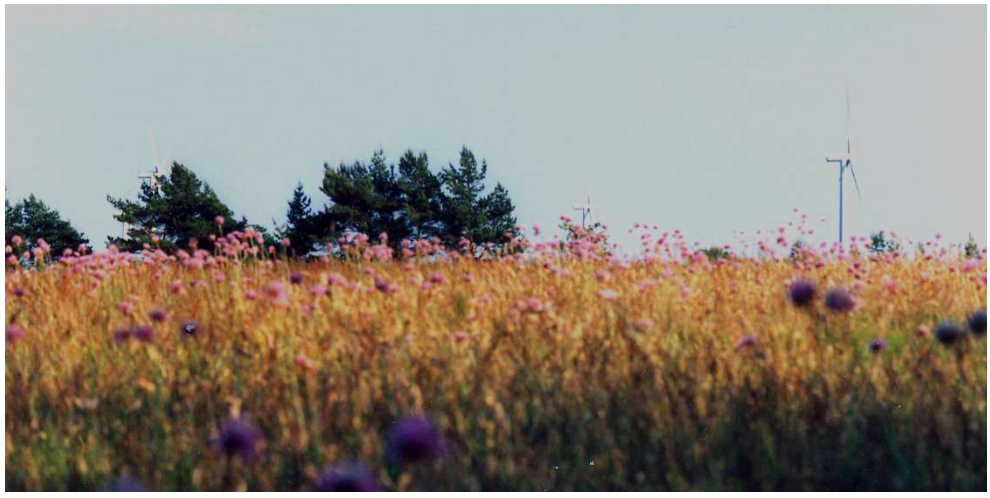

Figure 2: A sustainable society

One where the needs of nature balance with those of society.

Figure 3: Sol 3

Planet Earth, our home.

ety"?

A sustainable society can mean many different things to different people. It could mean a society much like we have today, with sustainable growth going on forever; at the other extreme, it could mean falling back to a primitive, almost Stone Age like, society.

This book presents an alternative view. It does not support the idea that we can sustain this current society and especially the idea of infinite growth because we live in a society that has only a finite amount of resources available to it. We only have a finite amount of land and minerals and we can only grow a finite amount of food. Even with advances in technology, sooner or later, we will reach our limits and even this society will fail. Furthermore, it looks like this could happen in this century.

On the other hand, we don't have to fall back to a more primitive way of life either. We

have our technology and intelligence, but we do not necessarily use it well. However, that does not mean we have to abandon it.

This book presents an alternative for a sustainable society. One that neither requires constant economic growth nor one that falls back on a primitive way of life, but rather, one that balances the needs of nature with those of society. Balances the needs of the people with those of nature; science with technology. An alternative that has the name Technocracy.

Introduction

If we could choose one word that would summarise technocracy we would probably find it difficult to choose a better word than "balance". Balance between science and technology and ecology; between people's needs and demands and those of nature; between supply and demand.

Today's society does not have that property. It has the property of continuous growth. As a result, today's society has a number of challenges facing it. Environmental damage in the form of pollution, global warming, the hole in the ozone layer, the destruction of the rain forest and the rapid decline in the number of species in the World, which according to some approaches the level of the large scale extensions of the past such as the time when the dinosaurs died out, exemplify but a few of the problems facing society today; all human caused or at the very least humans have made a good contribution to.

Then we have other human made problems. We have a large amount of the World living in poverty; yet we have a minority living in luxury. We have starvation and hunger in some parts of the World; yet in others, we have so much food that we waste large amounts of it.

We can then compound the situation even further if we notice that we have built our current civilisation largely on a mineral slime called oil. Not only do we have a finite amount of, but, all the signs indicate terminal declining production as we hit or rapidly approach peak oil. We have used it like it came from an infinite supply, wasting it as we go. Now reality has begun to catch up with us.

Governments have made many attempts to try and rectify the situation, such as carbon trading. Various different organisations campaign to limit or reverse the damage, but they meet with limited success. For example, the rain forest has declined from 14% of the World surface to just 6% with the possibility that it could all be gone at the end of the 21st century. Poverty and starvation affect people just as much today as it did 20 years ago. Despite our best efforts, we seem unable to solve these problems.

Figure 4: Pollution in our throw away society

Perhaps the time has come for us to ask ourselves Why? Why can't we solve these problems, and more importantly, why do we have these problems in the first place? If we start to look at both questions we see that things appear very complex. To start with, we can not find one centralised authority that makes the decisions. We can not find any one organisation, government or nation which says "let's destroy the rain forest today" or "let's destroy our ozone layer". What we see we can characterise as a large number of entities interacting. We have governments, non-governmental organisations, industry, and most of all we have people all interacting according to a set of rules. Some of these rules we find embodied in the laws of different countries or in international agreements. Some rules we can consider as more basic such as primeval instinctive behavioural patterns that we all have (like wanting to have higher status than our fellows). Some rules we can characterised as based on opinions and others on beliefs, deeply rooted in mythology. In the end, the interactions of all these entities produce the World we live in, for better or worse. It produces some good things and some bad things. The environmental damage and the pollution mentioned above exemplify some of the bad things. Some of the good things could include the medical knowledge we have and our

housing that results from science and technology.

We refer to all these interactions between people and governments and other organisations as our socioeconomic system. All we see around us results from our current socioeconomic system. The World we live in does not result from an individual choice or the result of some organisational planning but the system we live in shows all the characteristics of possessing emergent properties typical of a large and complex system. The pollutions, waste, starvation as well all the cities and the landscape emerges as a by-product of the way we do things, each of us making our own small contribution to the whole.

So we can say that the problems that face us today result from people interacting as part of our socioeconomic system. So, if we try and tackle problems from within that system, using the rules of that system, we would find it difficult to achieve our goals, as it would just come down to one group or individual against the rest of the World. It would have similarities to standing in front of a stampeding heard of elephants and yelling, "STOP!" in an effort to stop them. It doesn't really work, which could form the underlying reason why most efforts to correct the problems our society faces do not really achieve very much in the grand scale of things. You need a really large part of society on your side to get anywhere. Trying to fix things within the system resembles trying to patch up the facade of a rotten house!

So, how should we go about fixing the problems that face society today? If we agree that the core of the problem results from the socioeconomic system, then replacing that system would form one possible solution. Like a machine with a faulty part that shows all the beyond repair signs, if it doesn't work, get a new part!

Saying we should just replace the current socioeconomic system with a new one sounds like an easy thing to say, but not an easy thing to achieve. To start with, if we intend to change the system we would need a new system to change into. So, perhaps we should start there and ask an important question: what should we replace our current socioeconomic system with?

If we look, we could find many alternative suggestions to our current system that we could use. We have systems such as socialism, dictatorships, theocracies, and fascism, to name but a few. Most of which people have tried in the past, and none of which have really worked.

That should not come as a surprise. In the end, they all have common characteristics that show them as just different forms of the same socioeconomic system. They have a minority that rules, whether self appointed or elected, a political system based on subjective opinions and irrational beliefs and they still use the same financial system based on money and subjective value, which we will call the price system.

Figure 5: What of the car in a post carbon World?

"Post carbon" refers to a time when we experience the terminal decline of oil production. We only have a finite supply of oil. How will we live when production starts to decline?

In this book, the author proposes an alternative system. A system that does not have the same basis in people's opinions, nor based on their beliefs, nor based on subjective values, as we can consider other alternative systems as having. Instead, the system proposed in this book has its grounding in reality and prioritises rational thinking, science, and engineering. The system starts with what science shows as our physical limits and works from there. It does not promise a perfect society. It does not say that we will not have any problems or challenges to overcome. It does, however, promise to work with in the limits nature has imposed on us and it does have the goal of maintaining the highest standard of living for the longest time possible for all of us, not just a select few. It also promises that if we change the current system to this new system we will have the ability to solve most, if not all, our current environmental and social problems. That system has the name Technocracy!

The outline of this book

This book forms an introduction to technocracy. Technocracy encompasses so many different aspects and entails studying the whole of society that one book would scarcely do it justice. As a result, this book only serves to introduce the reader to the tip of an iceberg! We could go into any one of the following chapters and analyse the subject in more detail, and we could find much more to add to our studies that we have hardly covered in this book, such as human psychology and sociology. However, the author hopes that this book would serve at the first step to exploring a vast and complex subject rather than forming a complete reference. The author also hopes that it will encourage debate and further development of technocracy. To aid the reader in that quest the author has divided this book into three parts. The first part provides a soft introduction to the whole idea of technocracy. A number of essays compose the first part and the reader could read each essay in any order.

Science forms the subject matter of the second part. Science has a central part to play in technocracy so it becomes important to explain what we mean when we refer to science. This part has a very philosophical nature to it, as it looks at truth and reality and how scientists can make claims to know.

The final part looks at technocracy in more detail. Even though the final part has more detail to it than the first part, it still forms an introduction to technocracy. The author hopes that after the reader has worked their way through the book that they would have sufficient interest to extend their knowledge and look at other aspects of technocracy in more detail, and even contribute to the developing field of technocracy.

Part I

What do we mean; Technocracy?

Chapter 1

Designing the future!

This book argues for the construction of an alternative, sustainable, society, called a technate, as a replacement for our existing socioeconomic system. The form of government used we call a technocracy, but what do we mean when we use the word technocracy? And, in what way can it implement an alternative to the socioeconomic system that has dominated the World for hundreds, if not thousands, of years? To start with, we can have a look at what the word technocracy means.

The word technocracy can have some negative connotations in some people's minds. They may see it as a form of government where scientist and engineers dictate. However, such people would have an erroneous view. Technocracy, as a word, comes from the Greek words *"techne"* meaning "skill" or "craft", and *"arkhos"* meaning "rule" or "power", so we define technocracy as meaning, literally, "rule of the skilled". Note at this point that "skilled" does not mean "scientist and engineers". We could find examples of many skilled people who work neither as engineers nor as scientists, but as hair dressers or accountants, for example.

"Rule of the skilled", however, does not say much. What does rule of the "skilled really mean"?

Skilled people have a knowledge and understanding of specific subject areas or crafts, such as smithing, where we can consider a smith as a person skilled in metal work. For something as large and as complex as a society "the skilled" would come from many different areas such as science, engineering, administration and medicine to name but a few. Thus, the "skilled" could have any skill but we currently do not have any one profession that would we could call "skilled" to become a "ruler" in this sense as we, so far, do not have a distinct skill for governing a technate. We would need a specialist education program to train people to become skilled in technocratic governance, much

Figure 1.1: Society; people plus technology

the same as a medical doctor would undertake a specialist education to become a skill medical practitioner. Those skilled would then take a rational approach to society, so science and rational thinking would have a central role to play in the way people would govern society. However, those who rule in their respective fields would not typically have the classification of scientists or engineers.

"Technocracy", because the concepts of science and engineering do play a central role, we can consider as the application of science to society. As such technocracy becomes a multi-disciplined science in its own right. That means that we can see "rule of the skilled" as a rational system of governance but that does not really get to the heart of what "rule of the skilled" means. To really get to what rule of the skilled means, we would need to see how the skilled would rule; what plan would they have for society?

We can also see "technocracy" as a plan for society where people would use technology for the benefit of the people, rather than maximise profit for the minority. We can see our modern society as composed of people plus technology; yet we can describe our methods of running our society today as people orientated, such as representative

democracy. Our current problems, however, we can see as technology related, such as pollution and environmental damage. We can summarise technocracy's plan as running the technology side of society as technology, where those who have skills in the technology and its running would make the decisions, while, for example, we would use direct democracy to run the people part of society. So now we see more clearly what the phrase "rule of the skilled" means. It means that those who have the best skills, and have undertaken an appropriate education, for the job would run the technical aspects of society.

On the technology side of society, in a technate (which means the area of operation where we would run society according to the technocracy plan), experts use their knowledge in a particular area to direct the utilisation of resources in such a manner as to maintain a high standard of living. That means technology becomes a tool used to achieve a goal and the resources and means of production available to society would not have the "held in private ownership" property. Instead we would all commonly own the resources. Peer review forms the method of appointing experts to their positions and they appoint people because their peers consider them as the best person for that job, because of their skills, education, expertise and experience. This form of "governance" differs form other forms of governance, such as democracy, communism, socialism or theocracy, that we have or have had in our World today.

The application of scientific thinking and ideas underlines the ideas behind technocracy. In other words, a government based on technocracy would become a system based on rational thought and empirical evidence, which those who manage parts of the system would use to support decisions making. This means that a society run according to the ideas of technocracy has the attributes of a hi-tech society, where those who rule use technology to benefit society. So, for example, instead of introducing robots in factories and making people unemployed, we would introduce robots into factories to reduce the work load on people and give them more free time and a better quality of life.

This brings us back to another aspect of technocracy; it has as its goal the use of technology to improve the standard of living for people. Technology for the benefit of the people! That would mean less working hours, better health and a high standard of living as well as a better environment. In other words, we can state the goal of technocracy simply as;

Achieving the highest standard of living for the longest time possible.

To achieve the goals of technocracy, advocates of technocracy proposed that society should manage its resources and its production capabilities in a more intelligent way.

That means we should do planning on a local level, spiralling up to an overall control board giving general directions to meet demands of the technate. It means we should have a balance between ecology and technology, between supply and demand. If we manage our resources intelligently we should only take from the Earth what we need (reusing and recycling what we can) and we should only do so in a way that maintains and protects the ecosystem. Thus, as a by-product of technocracy, appears an eco-friendly society, where people have a high standard of living in a "green" environment.

Technocracy proposes that we could achieve this through using *energy* as a means of measurement and control. Society has a finite amount of energy available to it in any time period. Society uses the energy to produce goods and, consequently, any society could use energy as a means to regulate society's demands on the environment. This involves registering the energy usage of a society carefully and matching the supply to the demand. Money would have no use for this purpose as it does not represent a direct measure of anything as it has a "generated out of nothing" property (we will come to this in more detail later in this book). Together with using environmentally friendly and energy efficient technology this would mean less waste and less destruction to our environment, while still maintaining a sustainable high standard of living. It also means a radical change to society; we could not manage our resources with today's money grabbing, self-centred methods.

But would such a system work? The ideas behind technocracy have their roots in science. The Technical Alliance of North America in the United States of America (USA) developed the ideas first. A group of scientists, engineers, mathematicians, architects, and economists composed the Technical Alliance. They conducted a survey of the resources of the USA. Much of the results and ideas behind technocracy have its basis in the research that they undertook. This means that the ideas behind technocracy do have some basis in science, and therefore, has some possibility of working. To confirm that we will still need a good deal of research, simulation and construction of a "proto-technate" to test the ideas as much as possible.

What does this mean in a European context? Basically, the plan developed in the USA forms a good starting point for Europe, but it would still need more work both to bring the plan up to date and to fit it into a European context. This book present a view of technocracy for Europe, but the ides still exist in a state of flux. For example, one possibility the European technocrats have we can sum up as having a more decentralised characteristic than the one proposed in the USA. It could also, potentially, have people forming it from the ground up (politicians and politics would not have much use here), formed from a network of self-sufficient communities each supporting the others and a network of informed supporters which then moves to a full technate as and when the

Figure 1.2: One possibility

A sustainable future without the car!

current system runs into trouble and the people decide that a technate represents the best way forward. However, we still have a need for more research into this to know it will work in Europe. At the moment it exists as a good idea but we need more certainty and conducting research and experiments becomes the only way to do that.

One thing we can hold as certain; we can not continue this way forever. If peak oil doesn't bring about changes then we have limits to growth anyway and we have to consider environmental change on top of that. Sooner or later we will have to change or have nature force change upon us. We have many paths we can chose to travel down. We have a great potential to build a better World and we have the opportunity here before us now at the beginning of the 21st century. We could design a society where we would have a high standard of living, low working hours, and more leisure time to spend with friends and family, if only we put our minds to it! Do we wish to choose a path to such a sustainable society? Alternatively we could do nothing but patch our

current system up and have nature force change upon us. After all, we make our own future. We do so though our actions and our inactions.

Chapter 2

History of technocracy

A number of currents came together to form the river of technocracy. Technocracy did not appear in the 1930s in America out of nowhere. It received many contributions from those that went before it. Thorstein Veblen appears foremost among those that contributed to the formation of technocracy. Veblen had the occupation of sociologist and economist and in that capacity he formulated his theories of the leisure classes. In his works, Vebeln coined the phrase "conspicuous consumption" when he described people as irrational entities seeking things like status even above their own well being. He also saw engineers as the architects of a more rational form of government. He even tried to organise the engineers into a revolutionary council called the "Soviet of Technicians" but his revolutionary ideas failed and the Soviet took on the form of a series of lectures. Vebeln's work was referred to as "technocracy" in the 1920s and this was probably the first use of the word and we could see the "Soviet of Technicians" as an early technocracy organisation.

The Soviet of Technicians had a member called Howard Scott. Howard Scott exemplified an extreme form of the progressive engineers. The progressive engineers represent a group of engineers that held an idea that a number of engineers in America at the later end of the 19^{th} century had. They consider that engineers had a greater understanding of how things worked than those in charge of the factories and so they felt that engineers should have more control over production. This idea gradually died away in the early part of the 20^{th} century but a few engineers still held on to the idea.

Scientific Management formed another stream that flowed into the river of technocracy during the early part of the 20^{th} century. The engineer Frederick Taylor first proposed the idea and then Henry Gantt, another engineer. The Scientific Management method takes a task orientated approach to management in an industrial context. Adherents to

Scientific Management felt that they had the right method, given the right data, to efficiently manage industry. However, Gantt felt that businesses took up the idea poorly and he established an organisation called the New Machine, which we can also considered as another early technocratic organisation but the organisation broke up within a short period after its creation.

Next came the First World War, for all the waste of lives and resources the war represents it did have one aspect that impressed many people in the United States (US). The War showed that give the resources and expertise a nation such as the US could efficiently organise an army and transport it to another part of the World.

The last stream to merge with the others to form technocracy became the movement to eliminate waste in industry. Many people became aware of much waste in industrial production at the beginning of the 20^{th} century and they started efficiency movements to eliminate waste.

These streams came together to form the begins of technocracy after the First World War with the formation of the Technical Alliance. A number of people formed the Alliance, including Thorstein Veblen and Howard Scott, who led the group. The Alliance tried to analyse American industry however, the group ran into problems as Howard Scott wished to base the survey on energy which the other members of the group could not accept and the Technical Alliance soon fell apart.

After the group broke up, Howard Scott continued the energy survey on his own through the 1920s. He still maintained contact with Thorstein Veblen, who formed a big influence on Scott until his death. However, when we get to 1930 Howard Scott had met with Walter Rautenstrauch then a professor at Columbia University. Walter Rautenstrauch had come to much the same ideas as Scott but from a different route. Rautenstrauch helped Scott set up a project at Columbia University to continue the energy survey and a number of other people join in with the work. They included Dr. M. King Hubbert, later to develop the peak oil theory.

The group announced its result in 1933, which cause a strong public interest in technocracy. A number of technocracy groups formed and they made an attempt to have a national conference. However, the interest that the public showed only lasted for a short time and many of the early technocracy groups vanished as quickly as they had started. Lack of an implementation plan appears as one of the main reasons for the decline. Technocracy at the time offered an alternative to the then current socioeconomic system, then in the grip of the Great Depression, but no way to go from A to B. The height of the Great Depression had occurred in 1933 and other groups had presented other solutions which presented a way out of the depression, which attracted people away from technocracy. In addition, lack of the right kind of leadership could also have

influenced the rapid decline in interests, as the technocracy movement at the time had a fragmented nature and a lack of a clear definition. 1933 saw many independent groups of technocrats emerging and having different ideas of what technocracy meant. Howard Scott had set up Technocracy Inc. with a few others, and remains as the only group to survive that time.

Interest in technocracy continued to decline after the Second World War. However, we have seen a rise in interest in the ideas of technocracy as people look to new solutions to the World's problems of war, starvation, climate change and over population that present politics appear inadequate to solve. New groups formed in the early part of the 21st century. For example, a group of technocrats formed the Network of European Technocrats (NET) and registered the organisation in Sweden in 2006. So the story continues ...

Chapter 3

Technocracy and socialism

Technocracy aims for a society where everyone has a fair and equal share of the resources. It aims for a balance between nature and technology, supply and demand. Technocracy proposes a moneyless society where energy would have a use as the means of regulating distribution. To achieve that aim, technocracy proposes the "communal ownership" of the means of production (or perhaps "communal management" as people in a technate would not own anything beyond small personal possession and no one would actually own the means of production).

Much of the ideas embedded in technocracy appear similar to socialism, particularly Utopian Socialism. In various branches of socialism the community owns the means of production. Socialism places emphases on cooperation and community even to the point of going above that of the individual and socialism considers everyone as having equal status within society.

People tried socialism during the 20^{th} century with states such as the Soviet Union, China and those in Eastern Europe as well as Cuba. Some have seen the fact that the Soviet Union collapsed and China had to move away from communism when its leaders introduced some free enterprise as indicating a failure of socialism. However, many people would also consider that those states did not really practise socialism as they should have practised it, but such arguments do not fall within the scope of this book.

Although many people can see similarities between technocracy and socialism technocracy does not come under the heading of socialism for a number of reasons.

First, although in technocracy everyone has equal access to the resources of the technate, technocracy does not consider everyone as equals in all respects. Technocracy

makes distinctions between people of different skills, and aims to fill needed industrial or administrative positions with people best suited for those positions based on the natural or acquired skill set. Those people with the best skills would have the highest positions in society. People would choose what careers they wished to follow based on their own wishes, interests and aspirations.

Second, the socialist states of the 20^{th} centuries fall in to the category of different forms of a price system, which means that they utilised money and subjective value as a means of regulating the system. They also aimed to keep everyone employed. Technocracy, in contrast, advocates an *energy credit system* for distributing production rather than money and would like to minimise human labour to the level that the technate would need and no more. That would most likely mean less working hours for the citizens of the technate and a shorter working life.

Third, we can class socialism as a political ideology, where politics has a basis in people's opinions. Technocracy, however, has the characteristic of applying science to society and, therefore, represents a more rational form of governance. That means that the advocates of technocracy do not accept or reject ideas based on opinions but on how well they agree with fact or experimentation. So, technocratic ideas should have a basis in rational concepts with evidence to support them thus we can consider technocracy as science applied to society. Science and engineering then become a very important or even central aspect of technocracy.

Chapter 4

Technocracy and fascism

In the early days of technocracy, technocrats used the phrase a "dictate of science". However, a "dictate of nature" would represent a better expression, as ultimately nature does the dictating and science becomes our way of finding what nature dictates. Some people may compare technocracy to fascism and see technocracy as a form of fascism because of this dictatorial aspect of technocracy. In addition, technocracy has the idea of fitting skilled people to positions that suit them. Some people may also see this as similar to fascism or Nazi ideas of an ideal super race and thus, see technocracy as another form of fascism.

However, comparing technocracy to fascism misses some fundamental differences. Nature does place limits on what we can do. For example, nature dictates that we need energy to work and we will not have the ability to do any work if we first do not have the energy, regardless of our opinions of beliefs to the contrary. Technocracy acknowledges these limits and then aims to work within the limits that nature imposes and balance our needs with nature rather than trying to impose our will on nature.

This type of "dictatorship" does not equate to a fascist dictatorship, where a small group of people dictate to the majority based on their own whims. No matter what we think or what we believe or what we do in the end, nature wins! We could then say that working with nature would represent a sensible strategy.

To that end, technocracy acknowledges that people have differences; not everyone has the same level of skill, expertise, or interests as everyone else. It also recognises the limits that nature places on us. However, realising that people have differences does not equate to treating people as unequal. Technocracy sees people as having differences, but also as having *equal value*. The composition and structure of society necessitates the need to have different people at different levels in society with different skills and

abilities. Society can then operate effectively due to the differences in people, and those differences become a positive force for society. Each person has their part to play to make this World the best we can make it for ourselves and for others, as well as for future generations. Thus, each person has equal value in society regardless of their different skills and interests.

This approach to people clashes greatly with that of fascism or Nazism which sees some groups of people as inferior and other as superior based on irrational grounds, and then treats each group differently with some subjected to a lower standard of living while others have a better standard.

To put it another way; technocracy has no concern for race, religion, sex nor gender a person may have. It only has concern exclusively for their skills and sees each person as having a valued part to play.

Chapter 5

The technocracy car

We could take a look at the "technocracy car" for one way to see how technocracy could work. We can imagine the technocracy car as an ordinary looking car, but has all the features one would expect for an environmentally friendly car. Now, imagine yourself and your friends going for a ride. Where should you go? From the cars point of view it does not matter where it goes, so long as the car has the physical ability to get there. "Where should we go?" exemplifies the type of question that comes under the *people side* of technocracy. You and your friends can vote on that. It has no real bearing on the functionality of the car. Imagine that you vote in a direct democratic way and the vote comes out that you should all take a trip to the beach.

Now, imagine that only one person among you and your friends knows how to drive, so that person becomes the driver. Now off you go to the beach. On the way the car goes down a steep hill and picks up speed. If left to continue to build up speed it would not take long before the car reaches a dangerous speed so it needs slowing down, which we find easy to do as our technocracy car has brakes but let's imagine that only the driver has the knowledge of this fact. How should the group go about deciding how to slow down the car? The car has three pedals, should the group vote which pedal to select? This exemplifies a *technological* question; the group only has one answer that we can consider correct. This sort of thing exemplifies a question best left to the technical expert (the driver) to make the decision. The group would just as likely select the accelerator or the clutch as the brake!

We can say, as an analogy to society, the technocracy perhaps represents an over simplification, but it does show some aspects of society. Modern twenty-first century society shows all the signs of a complex system composed not just of people but also of technology. Such complex societies have aspects that require a technologically correct answer,

like knowing which pedal we should use as the brake, and when best to apply it. For example, how to utilise resources efficiently or how to generate the energy that society needs exemplify technical problems that requires technical expertise. For other aspects of society, which we can class as not so technical and do not require a technically correct answer (like in the technocracy car example above, where the decision of where the car should go to illustrates a decision that did not have a technically correct answer). The laws regarding marriage would demonstrate such an aspect of society.

Our current society may well have a technological element to it but the controllers of that technology do not control it for the benefit of the people in society, but for their own benefit, and they often lack technical knowledge of the underlying physical reality that limits our technology. Any benefits that the people may receive comes as a by-product, not as a planned result.

Technocracy, however, represents an alternative to our current system. We can characterise technocracy as a secular and non-capitalist system that would control the technology of society to achieve a goal; the highest standard of living for the longest time possible. Not just for a few, but for all citizens.

Part II

Foundations

Chapter 6

Science, knowledge and the truth

We can define science as a body of knowledge and a method for obtaining that knowledge. Scientists find out about our World. Scientists explore our World and try to understand it. Science exemplifies a rational system of thought. Scientists have built up the body of knowledge that forms science from facts that scientists reasoned from other previously established facts, experiments and observations. Scientists try to find out about the truth. Which brings up a question; what does the term "truth" mean?

The meaning of truth

Let's take a simple test. Answer the following three questions, true or false.

- A cow belongs to the set of sacred animals. (T/F)
- A queen has more power than a king. (T/F)
- 12 + 1 = 1. (T/F)

Let's have a look at the answers. Do you believe in Hinduism? If so, then I would expect that you answered true to the first question. But what happens if you believe Hinduism. Can we still consider the answer as true?

What about the second question? If you look through history a queen may have less power than a king or, at most, has equal power. So we should answer false here, yes? But what happens if we talk about chess?

Now, we see the last question as obviously false, do you agree? Simple basic arithmetic says that 12 + 1 equals 13, right? But what happens if we talk about a 12 hour clock? Would 12 o'clock + 1 hour become equal to 13 o'clock?

The above has a point; from the forgoing we can see "truth" as a relative concept. We cannot talk about an absolute truth. We consider something either true or false within certain bounds or a certain context. Before we can know if we should classify something as true or not we need to know under what conditions we should consider the truth value.

For example, the first question we classify as true within the context of a religion. The second we classify as true in the context of chess and the third we would classify as true if we talk about a 12 hour clock.

So, what conditions do we use in our everyday World to evaluate whether or not we should classify something as true or false?

And the answer to that becomes .... reality! We use reality as a measure to ascertain whether or not we should classify something as true or false. We can say that something has the classification of truth whenever we find it agrees with reality!

But ...

What do we mean; reality?

If we judge whether or not we should classify something as true within the context of reality, it becomes important to know what we mean when we use the word, reality. This, we can consider as a bit tricky! Basically, we have two views. Either we define reality as ...

- Something external and independent to ourselves.
- Something made up in our minds.

Other people might have other views but these we can consider as the most popular views. Other views we may come across would most probably fall into one or other of the above categories. Which should we consider as correct?

If we look at the latter first, the argument goes something like this: we only know about the World around us through our senses, such as our eyes and ears. So, we don't get

Figure 6.1: Reality; all in the mind?

a direct input of the World; we only get what our senses tell us, which shows all the signs of imperfection. Therefore, our brain constructs reality in our minds from the information that comes back from our sensors. Therefore, the word "reality" refers to a construct of our minds and what one person classifies as true another person may just as well classify as false, and we should consider both views as equally valid.

Do we consider that as right? Do we really consider reality as just what we make up in our minds?

A lot of people *think* so, at least with their minds. Most people with that kind of view don't practise what they preach, however. If they stood in front of a fast moving car their legs would hold to a different view of reality! If they don't, they would end up dead or locked away in a nice padded cell somewhere. Most people, whether they admit it or not, hold to the first view of reality, where we define "reality" as something external to ourselves. This view agrees with our everyday experience of the World as we interact with it. Hey, lets face it, if we really construct reality in our own minds, would we construct the World this way?

But what about our imperfect senses? Our sensors provide us imperfect information and our brains construct some aspects of our experience with the World. But this does not mean that we should define reality as only in our minds.

Instead we should understand that each individual has their own personal experience of the external reality which we can class as a "perception" of reality. That personal perception of reality may have the property of right or wrong. What someone thinks we should classify as true we should classify as true but it may need classifying as false. If they have an incorrect view of reality then we might say that they have become delusional. Most of us for most of the time have a view of reality that we can consider as in broad agreement with most people's views. We can see that from our experience

Figure 6.2: Reality!

of the World. People tend to walk through what we perceive as a door way. We tend to understand what people say to us and we tend to avoid falling of cliffs.

Sounds OK to you?

Perhaps, perhaps not.

We have a problem with the above and the problem we can state as; we have only made a guess. We can't show that we should classify either view as right or wrong because we have no test that we can perform to show the nature of reality so we just pick one.

Science goes for the idea of reality external to ourselves. This view agrees with our common sense experience with the World and it works, at least in the sense it keeps us alive! From that we can say that something has the property of truth when that something agrees with reality. That leaves us with a small problem. How do we know if something agrees with reality and, therefore, we should classify it as true, if we only have an imperfect view of reality?

How do we know when something has the property of truth?

This comes back to science a method for building a body of knowledge. Scientist may use many different methods in their work. Some may look at the very small with a microscope, others at the very large with a telescope. Some scientist mix things together

to see what would happen, other smash things to bits to see what they can find inside. Creativity and imagination has an important part to play as well. However, behind all this scientists have one method that links them all together. This method we refer to as the Scientific Method. Scientists use this method to explore the World.

The scientific method has roots deep in philosophy; indeed, science comes from philosophy and we can class it as a form of natural philosophy. The above discussion of truth and reality forms part of the philosophy that underpins science.

The scientific method begins with a set of assumptions. It assumes reality as external to our minds, that it has the testability and observable properties, and that it plays fair. Scientists have not proved these assumptions, and we can view them as a bit dogmatic. However, scientists do not arrive at the assumptions arbitrarily. They arose out of many hundreds of years of investigating the World and they fit in with our common perception of the World.

The "plays fair" part means that things don't just happen without a reason. Even if we do not understand the reason and something unexpected happens, the event will always have a reason for it. Scientists apply the scientific method, really, to try to find those reasons. The assumption that we can test and observe reality means we can do experiments and carry out observations, and from them, learn something about reality. Coupled with the "play fair" part, it means that when we conduct an experiment others can repeat it. If not, then nature has a reason for that which scientists can also find out.

From these basic assumptions, scientists then test reality. They do so through conducting experiments and making observations. Scientists then call the results of the experiments and observations facts. We can define a fact as an agreement between observations or experiments.

The next part of the scientific method becomes finding alternative explanations for the evidence. Here scientists exercise their imagination and creativity; we could say that science has room for a great deal of imagination. For any one fact we may find many different reasons why that fact appears as it does. Scientists try to gather as many facts relevant to a phenomenon as possible. The more facts the scientists can find, the better. The more alternative explanations scientists can find for the facts, the better.

With all the facts at hand and as many explanations for each fact as possible the next step a scientist takes becomes looking for a common explanation. An explanation should fit as many (preferably all) of the facts as possible. Scientists consider the one explanation that can explain all the facts as the one explanation that, most likely, they should class as true. Sometimes, life may not appear that simple. Sometimes scientists have more than one explanation that fits the facts. In that case they use a mental tool called *Occam's*

Figure 6.3: The best fit?

razor. Occam's razor basically means that scientists take the simplest explanation as the one that, most likely, they should treat as true.

We could find a number of reasons why scientists can't find an explanation that fits all the facts. Perhaps they don't have enough of them or that some of the facts show signs of corruption or error in some way. If the worse comes to the worse and scientists just can't find an explanation that fits, then they may well have to do more experimentation and look for more alternatives but they don't alter the facts to fit the evidence!

When scientists have an explanation that fits the facts they don't stop there. The next step in the scientific method becomes testing our explanation. Scientists make some guesses about the World, and then they test those guesses. They do this through experimentation that aims to show their guess as *wrong*. If they turn out as showing their guess as correct, then it probably means that scientists should class their explanation as true, but they still keep checking. The more scientists check an explanation and show it as correct, the more confidence we have in it.

However, in science, scientists always have the little cop-out clause that says, "until further evidence shows otherwise". You see, you can always show an explanation as wrong, but you can never show an explanation as 100% correct. You never know when, in the future, you might do a test that shows that you had the wrong explanation. Scientists must always have a willingness to change their minds in the presence of new evidence.

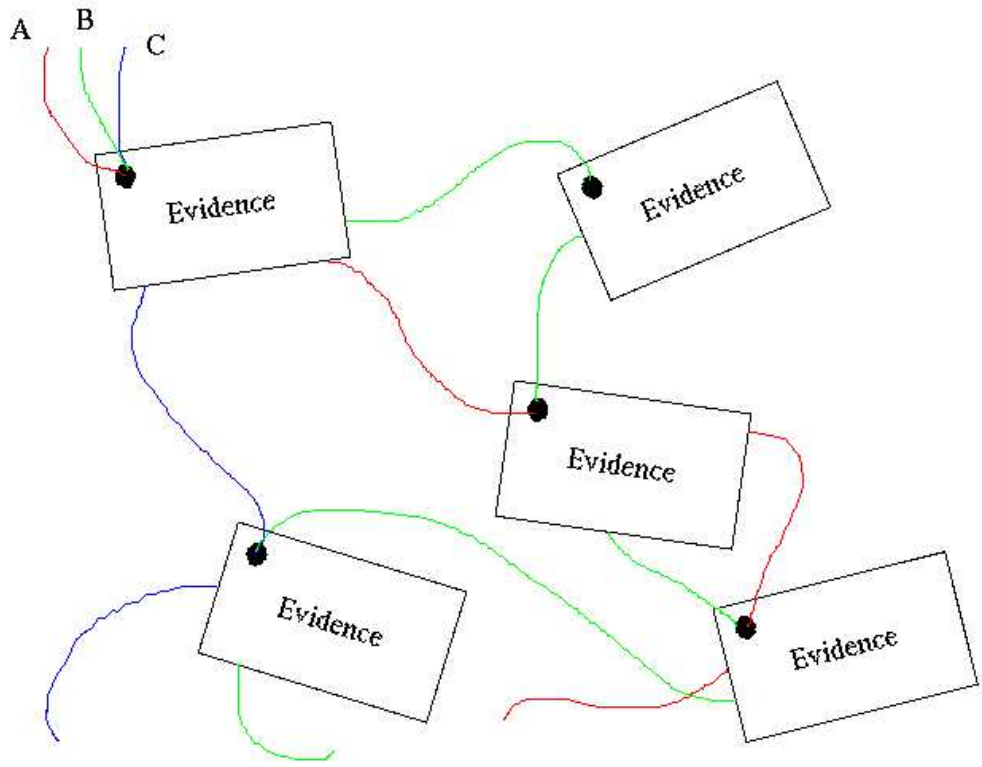

Figure 6.4: The best explanation

Line B represents the best explanation, threading all the evidence together.

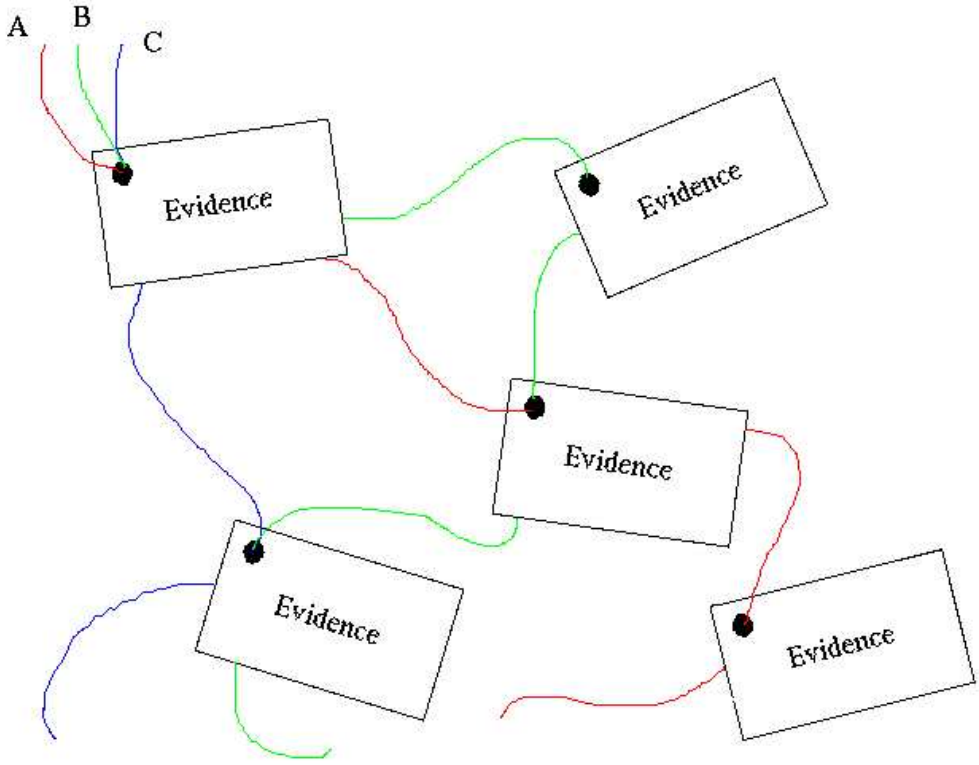

Figure 6.5: The imperfect nature of the evidence!

Line B represents the best explanation even if it can not explain all the evidence. It just means we have more work to do!

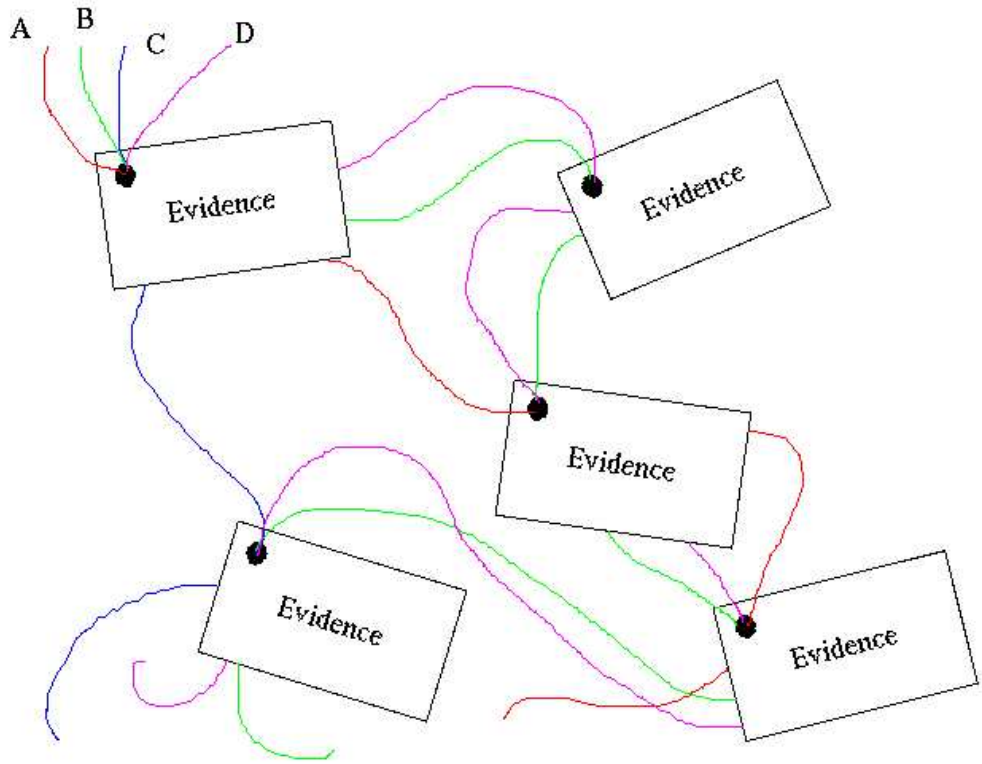

Figure 6.6: Occam's Razor!

When we have two or more explanation's that fit the evidence equally as well, we pick the simplest.

Figure 6.7: How we know!

How do scientists handle errors?

We talked earlier about reality and our imperfect sensors. We only know a part of reality as presented to us through our senses. We consider our sensors as imperfect, so we can never have certainty that what we see, hear, feel, taste, or smell we should really see as accurate. However, we do live our lives believing we have a fairly good idea of what we perceive as reality really matches reality in the real World. Most of the time, it seams like we have the right impression of the World. Sometimes we get it wrong, and this becomes a source of annoyance or amusement. We also have people like magicians or con men who specialise in deceiving our sense.

If ever we feel unsure about something or we think we may have made an error we can always ask for a second opinion. When it comes to science, scientists also have the possibility of error. Not only does the possibility that we have an incorrect view of the World exist, but also the possibility that scientists have done an experiment wrong exists. Science has a way to correct for this, which we can consider as much the same as asking for a second opinion. When a scientist makes a claim or conducts an experiment, the scientist publishes the results for others to look at and review. Other scientists perform the same experiments to confirm the results. This, then, becomes a self-regulating mechanism which has helped to catch accidental errors as well as deliberate attempt to deceive. It has also helped to correct some of our earlier ideas and, through this method, science has advanced.

Summary

So far this book has laid the foundations. Technocracy aims to apply science to society and as such we have so far looked at what we mean when we use the word "science". We consider science as both a method and a body of knowledge obtained from that method. A Scientist's claim to knowledge lies deep in philosophy and on the assumption that we can assume reality as external to ourselves and something we can test. From this assumption science builds up its body of knowledge in a rational way using experimentation and logical to derive new knowledge. Technocracy then aims to apply this method and what we already know to society, to build up a rational form of governance for society so that we have a high standard of living for as long as possible.

In the next section we will continue to lay the foundations of technocracy as we look at energy.

Chapter 7

Society, its organisation and the distribution of goods

Technocracy proposes a radical restructuring of our current socioeconomic system. It proposes a system where we would fairly distribute goods using energy as a basis rather than money. To understand the rationale behind this, we need to look at money and energy. We will start with energy.

What does the term "energy" mean?

We can simply answer that question with, "we don't know!" If you look up a definition of energy, it will say something like, "it is what we need to do work", which doesn't say a lot. We do, however, know a lot *about* energy even if we don't know *what* it is. We know that it comes in various forms. We know that it has a relationship to mass. We know we needed it to do anything. We even know we can measure it but we don't know exactly what it *is*. We can say, then, that we can define energy as the ability to do work.

Energy comes in a number of different forms; such as kinetic energy (energy of motion); chemical energy (such as that obtained from oil), heat energy, and sound energy, to name but a few. Energy comes into play whenever we wish to *do* something. If we wish to move an object, we need energy. If we wish to paint, draw, play games, watch TV or any other activity, we need energy. If we had no energy we would not have the ability to do anything - not even blink!

Therefore, energy, obviously, underpins any society. We can say we build societies on energy and societies run using energy. With no energy, they cease to exist. All our production, transportation, leisure activities, and everything that makes up the World around us, we find possible only because we have the energy to enable us to do what we do.

We built Western society during the 20^{th} century and early 21^{st} largely on one cheap source of energy; oil. We use oil for transportation, production of plastics, fertilisers and pesticides for agriculture, as well as for heating. Although not the only source of energy used, we find oil as the most important source of energy at this point in time.

One area of science of interest to technocracy and to society as a whole we call thermal dynamics. Heat forms the subject matter of thermal dynamics. We can define heat, however, as energy in motion and the results of thermal dynamics have great interest to any society that uses energy, which includes all of them.

Figure 7.1: Energy from the wind!
Energy determines our limits!

Scientists have defined three rules in thermal dynamics. The first one really states that you don't get something from nothing. In other words, if we take energy out from any system what we take out equals what we put in minus the losses of the system. So, if we take a car, for example, we put a bit of energy (chemical energy) in, in the form of oil (petrol or gasoline), and we get a bit of energy out of the car in the form of motion (kinetic energy). We also lose a bit of energy in the car in the form of vibration, waste heat, as well as sound energy. If we add the energies up we find that our kinetic energy equates to a bit less than the chemical energy that we put in. That bit less equates to the losses in the car due to the vibration, heating and the sound. We didn't gain any extra energy, we can find it all there somewhere.

The second rule of thermal dynamics refers to the losses in the system. If we take the output of a system and feed it back as the input, we will find that the system will eventually run down and come to a stop. This happens because of the losses in the system so our output will equate to less than our input. As we feed the output back to the input, we get less and less energy in the system. We call this phenomenon the entropy of the system.

Scientists have defined a third law but that relates to the behaviour of a system as it approaches absolute zero. In such a situation, thermal processes slow down and come to a virtual stop.

Chapter 8

A short history of money

Money has a long history. It goes back to the ancient World where our ancestors traded using a system of bartering. Bartering has a problem; namely how do you fix the price of goods relative to other goods? For example, should we value a cow as 3 pigs or as 2 pigs and five chickens? To overcome this sort of problem people began to define prices relative to some sort of precious commodity such as metal. We still find a subjective element to the value of goods but at least you now had some relative idea of value of different goods. We might value a cow, for example, as a bag of silver and a pig as a quarter. We might value a chicken at one tenth of a bag of silver. Or something like that. Now you would have some idea how many pigs and chickens you could get if you sold your cow.

Like so many things, when you solve one problem, you invent a new one. Now merchants had to carry certain amounts of gold, silver or copper around with them. Given their potential for purchasing a wide variety of goods and their relative ease of transportation (compared to having to carry around a few cows) they became easy targets for the less honourable members of society. Not just thieves, who would have a willingness to relieve passing merchant of their heavy burden, but also the merchants themselves. Some merchants would ensure that the gold, silver or copper they used did not meet the given specification, or they would ensure that the weights used to measure the amount of metal did not equate to their specified weight.

Of course, dishonest trading can have a short term benefit to the one practising it, but in the long run it can become a hindrance to the whole trading system, especially if we find too much of it about. Would you trade with someone if you have no certainty of their honesty? To overcome this, certain respectable sources, such as local or state governments would issue measured amounts of a certain metal and then stamp the metal

with their stamp to indicate that the producers had used a fair quality and a fair weight of metal. Thus, people formed the first coins and for a long time, the weight and type of metal determined the value of a coin.

People solved the other problem of thieves, at least partly, with the invention of banks. Merchants would deposit money in a bank in one place. Travel to their destinations and take out the same amount at another place. It didn't take long before people realised that they could also borrow money from these banks, so long as they paid it back before the owner of money required it. In fact, people did not want to take the actual money away, they just wanted to know that they could have access to it when they needed it, so the banks would issue a certificate to say they would pay the barer the amount specified. Thus, people invented bank notes.

Now as we head towards modern times, banks began to realise that they could actually lend out more money than they have. As long as all the people depositing money in the bank did not want their money at the same time the banks would just have to ensure that they had a small amount in reserve to cover day to day transactions, and then they could lend out eight to ten times the amount they held. And where did this extra money come from? Nowhere! The banks just make it up! Thus they create money and put money into circulation. When those who have borrowed the money have paid it back, they cancel the money. If we have more money created than destroyed we have a situation of *inflation*. This whole process has become much easier with the advent of computers. Now we don't even need physical money in the bank, just numbers in the computer.

The above shows a rather simplistic overview of money and its history. If you delve into it in more detail, things become a bit more complex; but, we can consider the general overview as correct and it shows two important points about money.

First, we can see money as a certificate of debt. The money you have shows you that someone, somewhere, has borrowed that amount from the bank and has to give it back at some point. Not necessarily the first person who borrowed the money, however, as people pass the debt around. We also note that the value of goods has a subjective element to it, and can rise and fall depending on what people feel willing to pay for the goods or sell them for. That part of the system we call the free market, but even under a system where we find no free market, people still determine the value of the goods subjectively. As a result, the money provides some sort of information about the economic system but that information does not always correctly reflex the true state of the system due to the subjective valuation of goods.

We can add to this and say that people can also horde money. We can save it in the bank, for example, and we may well know of a number of people who have horded a vast amount of money in one form or another. We find the ability to horde money, or at

least the promise that we too can horde money, so attractive that we desire the system to continue. Of cause, the majority of us do not get to horde vast quantities of money and we see many people around the World living in poverty, but most people do not want to dwell on those negative aspects of money.

Chapter 9

What does the term "price system" mean?

Thorstein Veblen used the term Price System (P$) to describe today's socioeconomic system that relies on the subjective valuation of goods as indicated when people allocate a price to the goods. You can see that wherever you go to buy goods: the capitalist, free market socioeconomic system of the Western World, and also in the centralised, planned economies of the former Soviet Union and communist China. Any system where the people regulate the distribution of goods using subjective valuation indicated through a price we can classify as a price system.

A price system has a number of problems associated with it. We can state the first problem as a problem associated with the control of the system. Price systems rely on a subjective element of where people decide what the price for an item should be. That price becomes determined, in a free market, through how much the sellers thinks they can sell the item for, and how much the buyer may feel willing to pay for it. The buyer tries to get as low a price as possible and the seller as high a price as possible. At some point the buyer and seller agree and a price becomes fixed. In a centralised planned economy, a centralised authority determines the price of an item. In both systems the final price may have nothing to do with the physical realities of the item. Gold, for example, can command a higher price than silver yet as far as we know we can find more gold than silver on this planet. Below this subjective layer of price, we can find some physical reality that people may not take into account when they fix a price. In effect, the price becomes a control variable used to control a system, yet it does not truly reflect the state of the system we have attempted to control. This could result in the system going unstable; have we seen oscillations and near or total collapse of

economies perhaps for this reason?

Secondly, price systems tend to create inefficient and unbalanced distributions. We can see this in the form of competition, economic cycles of boom and bust and the division between the rich and the poor. Competition can lead to the same work performed in different companies. For example, one company can produce an item and its competitor can produce its version of the same item. Both companies would then employ people and expend resources to essentially do repetitions of each others work (although we may see some differences in the details). This repetition represents an inefficient utilisation of resources.

Boom and bust cycles of the economic system also result in inefficiencies. In the bust phase, workers and machines may end up idle as companies go under. Yet, if we could ignore the financial situation we could still have used those resources.

In a prices system, you would need money to establish a company to produce wealth. If you have no money, but only a good idea, you will find it unlikely that you will get anywhere with the idea. Yet, if you do have the money and you achieve success, you could find that you have a larger amount of money than other people. If you have something that people consider desirable you could make a lot of money. In such a system you end up with an uneven distribution of money.

Chapter 10

Growth and its limits

Living things, left to themselves, tend to grow. That doesn't just mean individual animals and plants, also collections of things like forests, or whole populations of animals. Natural systems keep growth in check through disease or prey / predator relationships. For example, if we had a plentiful supply of a prey animal, say for example rabbits, then we tend to find a corresponding increase of the predator animal, like the fox. As the number of foxes increase they tend to catch more rabbits. As the foxes kill more rabbits the population of rabbits decline. As the population of rabbits decline, the amount of food available to the foxes declines, this results in a decline in the population of the foxes. That means that we will have less foxes around and less rabbits caught. So now the population of rabbits can start to increase again and we begin the whole cycle again. Thus, natural systems tend to settle down into a state of dynamic equilibrium.

What would happen if we do not see all things as equal? Say, for example, some illness wiped out the foxes in a certain area. What would happen to the rabbit population? With no foxes around to kill the rabbits, one might expect the population to rise exponentially; it won't take long before we have a very large rabbit population. Then what will happen? Will the population continue to grow? If the rabbits live within a finite area then the population will not have the resources to grow forever. Sooner or later they will run out of food and the rabbits will start to starve. The population will crash and the few survivors will have to start again. Eventually the rabbit population would settle down to a level that the area they live within can support.

A few things come out of the above. First, we have growth. Second, we have the idea of exponential growth. Finally we have limits to growth and dynamic equilibrium. These ideas become very important when we talk about human society. We, as human beings, do not represent a special case on the Earth. We, like the rabbits, have limits to our

growth as well. We have limits in the land we can occupy and the amount of resources that we have. However, current wisdom tends to suggest that we form an exception, that we can keep on growing in our finite World forever, mainly because we have had success in breaking the barriers to growth with new technology. However, even new technology has a limited ability to break barriers.

The early technocratic works of Dr. M. King Hubbert showed the folly of infinite growth with finite resources but the "Limits of Growth" brought this to the Worlds attention in more dramatically way. Essentially we can't keep growing forever. Sooner or later we will hit a limit, and no matter what new technology we have, we just won't grow beyond that point. Not here on Earth anyway!

Chapter 11

What do we mean “distributed” and “self-organising” systems?

If we look at our current society, we might ask “who designed it the way we see it?” Was it you? Was it me? Who decided that we will have the cities where we find them? That the roads should meander their way through the countryside? When we think about it we find no one designed the World we live in. We can find no one single person who decided the World should exist as we see it. Perhaps you can find an example here or there where a committee decided that workers should build a road here or a building there, like when they designed the layout of New York or parts of London, but when you look at what they did and what came to pass you will see that it often ends up a bit different from what they originally planed. New members may join the committee and new ides may come to the fore, or the plans just changed after a time.

When we look around the World, we can find no central organisation, plan, or individual that has responsible for the way we find it. So, then, how did it get the shape and form that it has today?

Many individuals have built the World around us, our cities and our road and rail networks. These people build things the way they do for reasons that they sometimes find specific to themselves, and sometimes they find more general. For example, before navies built the canal network in England surveyors surveyed the land. The navies built canals where terrain made it easy to build them and where canals could link towns and coal fields. In other words, a number of factors determined the location of the canals, some due to the nature of the business and some due to geography. We can say much the same of the cities. People built cities where we find them for a number of reasons, for trade, for communications, because of the geography, because the land had a cheap

price, and so on.

That means we have the World the way we have it because of the interaction of a number of factors; people, geography, trade, business and materials.

This all forms an example of what we call distributed, self-organising systems. The distributed part means that the parts that make up the system have the property of geographical spread; for example, why we build a city where we build it may not just involve local factors, but also because the city forms part of a network of cities that may cross the surface of the Earth. The self-organising part refers to the fact that organisation has no overall centralised control but the organisation comes out of the interaction of individuals, organisations and various rules and regulations as well as physical limitations.

We can find examples of self-organising distributed systems all around us. Take for example an ant hill or bee hive. Again, the queen bee or queen ant does not really conform to the idea of a queen. She can not direct or nor does she control the construction of the hive or ant hill. The organisation results out of the work of the ants or bees following rules. Phenomena from Mexican waves to traffic jams also form as a result of self-organisation and the way the individuals follows rules. In fact, we can say that the whole universe exist they way that it does as a result of self-organising with no central control or direction.

Summary

In this section we have looked at energy and money and how society (indeed, everything) requires energy to function. However, our current socioeconomic system requires money to function. We may well consider energy as physical, but money and value has a subjective element to it. From a technocratic point of view, we would not consider the using of money to regulate our current socioeconomic as an effective means of control due, partly, to the subjective interpretation of value. In other words, money does not give a true reflection of the state of the system. Energy, on the other hand does. We can only do what we have energy for and no more. Thus, energy becomes a better choice for a control variable than money.

We also looked a bit at the nature of society. We looked at growth and saw that with finite resources we have limits to our growth and that any society that wises to have the property of sustainability has to live within those limits. We also looked a bit more at society as a self-organising system. This part becomes import to our understanding,

as any system that wishes to replace the current system has to take this property into account.

In the next part we will start to look more at technocracy and the technocratic plan for society.

Part III

Technocracy

Chapter 12

How do we build a new society?

We should see technocracy as more than just a word or a label for a collection of ideas. It also has associated with it a plan for a rational society. The original plan, from 1933, proposed a hierarchical structure with a board of control at the top and centralised planning. Under the board, various sequences manage various technical aspects of society such as manufacture, research, heath care and so on. The original plan then had area boards below that. People would live in communities of about 10 000 people in what the early technocrats called urbanates.

The idea had its basis in what people knew of Scientific Management at the time, and drew on the example of how a people could have organised production and distribution systems in an efficient way from the way the US army organised itself in the First World War. During that war, America successfully organised the transportation of men, machinery and equipment from the US to Europe to fight in the war.

Since then, however, we have witnessed numerous advances in our understanding of organisations such as the understanding that complex systems, built out of autonomous building blocks, can self-organise.

In additional, times have moved on. In the 1930s there we had an abundance of energy which we have since squandered. We now face a time when our energy supply has the likelihood of beginning to shrink and we, therefore, need a socioeconomic structure that fits in with the energy we have available. We can still have an "abundance" of energy, but only if we manage that energy carefully and minimise the use of energy, such that we can do what we want to do efficiently and have energy left over at the end.

Taking in what we have learnt since 1933 and the energy situation means we have to make a change to the basic design originally put forward. The energy situation post-peak means that a post carbon society would need to localise as much as it can as

society would not have the same level of abundance of energy after we have used up half of our oil supply as it does today. Tasks that we can not localise we would conduct in cooperation with different groups and between groups going out as far as needed but only as far as needed.

One possible way we could achieve that would entail building a future technate out of basic building blocks and to group those blocks together and network between the blocks and the groups. A structural organisation called an eco-unit that Swedish systems ecologist Folke Gunther has proposed would exemplify one such possible building block.

In this system, a community would consist of about 200 hundred people living within a certain area. Within the area, the community would have the property of self-sufficiency *to some degree*. They would manage their own food production and waste management, recycling all the waste back into the food system. They would also have there own energy production and storage facilities. This basic eco-unit would replace the urban sprawl that we have today and the process of moving from the city landscape that we have now to a structure based on eco-unities, which Folke called ruralisation.

The eco-unit would meet the basic needs of the people living there in terms of food, energy and housing in an environmentally friendly and sustainable way. There, we have an environmentally friendly, sustainable building block with which to build a sustainable society. We would then add some degree of industry to the eco-unit as the next step. We would then have a building block that we can use to build not only a sustainable society but a sustainable technological society that has the property of balance with the eco-system.

We would then link one eco-unit up with others, say five eco-units together. That will increase the manufacturing power of the eco-units as each eco-unit would form part of a larger manufacturing system. However, we will still have the environmentally friendly aspect as each eco-unit will manage its own waste in its own area. That includes any waste products from manufacturing.

We can also introduce specialist eco-units at this stage. We do not specify that each eco-unit necessary has some manufacturing capacity. Although all will have the same basic capacity to produce their own food, energy and manage their own waste, some units could have other capacities than manufacturing. An energy farm would represent one such specialist eco-unit; an eco-unit that specialises in producing more energy than it needs and in storing excess energy for use in other eco-units. We could use such an energy farm to aid nearby eco-units if and when they have problems with their own energy production. We could also use the energy store to supply energy to projects that go beyond the local eco-units, such as supplying energy to a modern, high speed,

Figure 12.1: The future without the car?

energy efficient, rail link so that trains can transport goods and people as needed from place to place along hi-speed and energy efficient rail links. Centres of education or training, or even bases for the military could form other specialist eco-units.

A group of five eco-units would have a population of about 1 000 people. Group ten of them together and you have about 10 000 people. This larger grouping could form a basic unit for forming a new implementation of the original technocratic idea of an urbanate.

We could characterise the basic concept of eco-unit as a rural village, but we could extend this idea and bring in the concept of agro-engineering. In agro-engineering we do not see the farm as just a farm but also as an engineering project. This brings in possibilities of extending the basic eco-unit in the vertical direction. This would have the advantage of minimising the eco-foot print of the eco-unit as we would need less ground; yet, we could still maintain a rich environment for the inhabitants.

Chapter 13

What do we mean with the term "expert"?

Having experts rule sums up the central idea of technocracy. The characteristic of rule of the skill sets technocracy apart from any other system such as democracy, where the people appoint rulers based on political ideology rather than on their skill to rule, or communism where party members appointed rulers as a result of internal manoeuvring where politicians formed alliances within the communist party, or fascism where the strong rule. But just what do we mean when we use the term, "expert"?

Well, the word "expert" was once said to have two parts forming it; "ex" meaning "has been" and "spurt" meaning "drip under pressure". However, perhaps a more workable definition would go like this: *the term expert applies to people who have a high degree of skill and / or knowledge in a given subject*. Having skill, in turn, means they have a *high degree of proficiency*.

In the past, people have considered technocracy as a form of government where engineers or scientists rule. However, from our definition of what the word "expert" means we can see that a scientist or engineer may not meet the criteria to rule. A scientist could have expertise in science and an engineer in engineering but ruling does not come under the classification of neither science nor engineering.

A scientist who knows about biology or chemistry may not know about managing an agricultural unit. An engineer who acquires expertise in electrical systems may not know how to run the energy systems of a technate.

So just who would we consider an expert to rule? As science and engineering forms a central part of a technate, we can say that an expert would have a good understanding

of science and engineering. They could have even started out as engineers of scientists. However, within a technate, we would also need other areas of expertise such as farming and psychology as well as art.

Those that rule would not only have a technical expertise but must also have a managerial expertise. They would need to know about people, teams, projects and society. As such we would probably find no such experts today. That means we would need a whole new education program to train and educate people so they can take positions within a technate. They would have training to understand the science and engineering that underpins society as well as how to manage that technology and the people that operates the technology. They would have education in how to cooperate with others, and to organise and manage projects. They would also need to understand the environment and how their decisions would impact on the environment. They would need to know how to manage things efficiently.

As you can see, an expert would need to have expertise in a number of fields, which would no one person could probably achieve. Thus, to achieve the goals of a project we may well find that we need a team of experts to manage. Thus, we could also see “rule of the skilled” as meaning rule of teams of experts.

Chapter 14

How do we balance the needs of the Earth with the needs of society?

When the original technocrats conducted their survey of the US they found that competition produced a wasteful and inefficient system, which may come as a surprise; conventional wisdom tells us that companies must work efficiently to compete. However, when two or more companies compete with each other, they end up essentially producing the same product with some variation. Take, for example, mobile phones. Mobile phones from different manufactures can work with each other, so that if I used a phone from one manufacture and you used one from some other manufacture, we could still talk to each other. Essentially we can see them as the same thing: mobile phones! They may differ in the outward form. They may have different software in them. They may have different games. But, in the end, we use both devices to communicate. Basically that means we have two companies doing the same thing. The variations between them result from the differences in the people who produce each phone and the fact that each company needs to produce something slightly different to attract people to buy its phone rather than a competitors.

This represents waste and inefficiencies as we now have two or more companies employing two or more different teams of people to work at the same job. Whereas, from an efficiency point of view, they would have achieved more effectiveness if they had formed one company employing one team of engineers to produce mobile phones.

Of cause, we don't do things the efficient way because, in a price system, the introduction of competition has the effect of lowering the price of the goods. We see a monopoly as bad for a free market economy and the end consumer. Therefore, we have waste and inefficiencies as a by-product of our socioeconomic system.

We can see another example of waste in the packaging that goes with a product. Instead of just buying a mobile phone, we also buy its packaging, which for the most part we just throw away. Its has the purpose of making the product attractive to the purchaser to help sell the product. We also produce goods with a short life expectancy so that we have to throw away the item and buy a new one. We also have fashionable goods, which again, necessitates the purchasing of new goods. We can see them all as examples of waste and inefficiencies. We can find many more examples of waste all around us in our throw away society, and it only takes a trip to a land fill site to see the results.

Some wastes may inevitably occur. The whole idea of entropy causes us to doubt if we can show a system as one hundred percent perfect, but can we consider the level of waste in our current society necessary to maintain our current standard of living? If we want to maintain our current socioeconomic system, then we should answer yes. Our current system needs constant growth, new products and people replacing old for new. It needs that to survive. However, technocracy argues that it does not need such a waste to actually produce a society with a high standard of living.

Technocracy aims to maintain the highest standard of living for the longest time possible, and for that to happen, the system must have the attributes of a high degree of efficiency, less waste, and it must balance the needs of society with the needs of the eco-system. Technocrats argue that we could reduce the amount of production, and replace what remains with more energy efficient means of production, thus reduce our impact on the Earth.

We could achieve this if we removed business people from controlling the means of production, and replacing the current socioeconomic system with one based on skilled people operating it, and switching to energy credits as a means of control. In such a system, we would find the means of production no longer used to produce goods to make profit. We would no longer have any need to produce constant growth. In stead we would produce goods to meet people's needs and within the energy constraints of the system. We would also produce goods in the most energy efficient way known. We would then engineer the goods to last as long as possible within the energy limits, which would help to reduce people's needs for new goods as well.

So, how would that work? Let's look at it from the citizens point of view first. Society has a set amount of energy available to it within a given time period, and with that energy, it can produce certain amounts of goods with the resources it has available. The system would need some energy for large projects such as building a hospital but the system would make available a certain amount of that energy for citizens to allocate. A citizen would have a certain amount of energy credits available to them which would represent that energy. They could then allocate their credits to the production of certain

goods depending on how much energy it takes to produce those goods. Say, for example, a citizen requires a new computer. The computer would represent a certain amount of energy. It takes energy to acquire the raw material for the computer, to process those materials, to produce the basic parts and to make the computer from those parts. The citizen could then allocate some of their credits to the production of a computer. In doing so they have allocated part of the available energy that society has to the production of an item. In this way the production system would produce things to meet people's needs and would balance production with the citizen's demands.

We can now look at this from the other side; the production side. Experts would control the production systems. They have responsibility for the design of the products, as wells as, ultimately, for the design and operation of the means of production. They would run the production to minimise the energy and its effect on the environment. We could find many different ways to produce the same item and the production experts will look for the one that they consider as optimal according to the goals of the technate.

That could mean, for example, that the item produced could have a modular nature, like a modern Personal Computer, or they could make the item using a different manufacturing procedure than today. The expert would have a number of variables that they have to take into account to decide what way becomes the optimal way to produce an item. For example, one process, process A, may have a very energy efficient attribute but the goods may have a short life expectancy. Process B may have the attribute of a bit less energy efficiency but produces a product that has a longer life expectancy. Process C, on the other hand, may have the attribute of high energy use but the product would have a very long life expectancy. Which process would we consider as the best process? Which should we choose? That may depend on the actual figures but an expert in the processes may opt for, say, processes B, as that could well give the lowest energy drawn over a long period of time.

The expert would also have to look at what environmental effects each process could have. One process, for example, may involve digging new ore from the Earths surface, but another process may well involve recycling old material or reusing old parts.

The choices facing an expert in a given system we may consider as staggering, but then, this shows why we need experts! Through the careful selection of the optimal design and manufacturing process, the system balances the needs of society and its citizens with those of the eco-system, minimising production, energy expenditure, and impact on the environment. This would then form the part of the way the society would become a sustainable society.

Chapter 15

What do we mean with the term "energy credits"?

We mentioned earlier something called energy credits. We didn't go much into the details at that point, but the time has now come to explain what the term, "energy credits" means.

Energy, we noted at the beginning, underpins all that we do. We cannot do anything without it. We do not even have the ability to use our resources if we have no energy. So, energy becomes one of the limiting factors of our ability to construct or do anything. Whatever society we live in must work within the limits of the energy available to us. Or, to put it another way, society must fit in with energy. We cannot have a society that requires more energy than the actual energy available.

With that in mind, we can see energy credits as a way to regulate our production system with the idea that, in a technate, we would calculate the amount of energy available. It may come from a number of energy sources such as bio-fuels, wind, solar, geothermal etc. Whatever the source, we can know the amount available. We can also calculate the amount of energy needed to produce an item. We can calculate how much energy it takes to mine ores, produce a computer, or grow food. We can then take the amount of energy available and divide it up. We would then allocate a certain amount of the energy available to the citizens, which they allocate to the production of goods. The amount available to each citizen we represent with energy credits and each citizen would have the same amount of energy credits. Each citizen can allocate energy to the production of whatever personal goods they require, such as a television (TV). When they have allocated the energy, the energy associated with the energy credit becomes used, and we can no longer use the credits allocated.

At the end of each accounting period, which we can set to every two years, the citizens would lose their unused credits and would then get a new allocation of energy credits for the next accounting period, representing the energy available for the next period. We intend that each citizen would have more energy credits than they could use in each accounting period.

Now, how does this differ from money? First, you can’t save energy like we can save money. Once we have expended the energy, we no longer have it available for use. So when you allocate a certain amount of energy to the production of a TV, then the production of the TV uses up that energy, and the production system cannot reuse the energy. Also, the energy available in a certain accounting period we will only have available in that period. For example, if the sun shines a certain amount of energy on the Earth in a given accounting period then we have that energy available when it arrives on the Earth. If we do not use or store that energy then we lose that energy. At the end of the accounting period, any energy credits not used become null and void. That’s not a problem, as we would then issue each citizen with a new set of credits for the next period, which means people do not have to worry about not spending credits in any one accounting period. In addition, the energy credits reflect the potential ability of the technate to produce goods; the credits needed for an item does not have a subjective measure of value element but forms an objective measure of how much energy it actually takes to produce that item.

The use of energy credits means that each citizen has a fair and equal share of what society can produce and the resources available to society and they have direct control over part of what the production system actually produces. This also means that we will not “pay” citizens for work that they have done. They will not save up, and indeed, they will have no need to save either. Some people may then consider that people would then work for “free”.

Chapter 16

Why would people work for “free”?

As people would not receive payment in monetary terms, some might consider the citizens of a technate as working for free (working for free in this context means working for no money). However, we can ask: do people work for money in the current price system? Now, it would seem that we should obviously answer that question with a yes. However, if you think about it, people do not just work, get paid, and then sit on their money. They actually work for the money so they can do something with that money such as pay the rent, buy food or save for a rain day. We could then argue that people do not work for money but for what the money brings. Effectively, we can say people work for something, some kind of return, which, in our current price system, we can see money as representing.

We can look back now at the idea of working for free in a technate. Yes, citizens perform work for no money, but do they really work for no return or for free? In a technate, citizens have “free” housing, “free” food, and they can have “free” supply of consumer goods but they can only have this if they actually put work into the system. In other words, the “free” supply of goods results from the “free” work that those citizens put in. In that respect, the citizens do not work for “free”, they work for the rewards that come from working in a technate. They work for the standard of living or they work for the things they want. In some ways we can see it as a bit like working for money, but in a technate, we remove the money part of the system and the citizens go straight to the goods.

In such a system, where people have an equal amount of energy credits and obtain goods for free, we might wonder if such a system would ever work. What would motivate people to work? Thus, motivation in a technate becomes an important issue. In our current socioeconomic system we might find it hard to see how this might work.

We have all become so used to the idea that we should work for money that the idea of working for no pay would appear rather foolish to us. So, what evidence do we have that says that this system of energy credits could actually work?

Well, without testing the idea through actually using energy credits we can't show that it will work or not. However, we can find a body of evidence that suggests that it does have a good probability of working. First, we can find examples of projects where people work for free. For example, the open source projects, where programmers not only put their time, energy, and effort, into producing code for no pay, they also distribute the results of their hard work for free. They do so because they want the end result. They have a willingness to put the effort into working for it, and to cooperate with other people, people that they have probably never even met, because they know that others also want the end result. Working together serves them as much as others. Their reward becomes the end product which we can all benefit from. Second, we can find examples of a number of projects where people work for free because of a belief or an ideology. Such examples include working for a charity shop, or working for a charity in some other function. People putting unpaid time, energy and effort into local community activities such as the local school fiats, would form another example.

The technate would automate as much as possible of the dull, repetitious and dangerous work leaving the more interesting work for the people. The system would aim to provide a stimulating working environment for people. People would find work that interests them and fits their talents and expertise. The work would become a place for people to develop themselves as well. However, the citizens of a technate would have an obligation to work a minimum number of hours, say, for example, 16 hours a week but we would place emphasis on rewarding and stimulating people to want to work and avoid punishment for people who do not want to work.

Chapter 17

How do we ensure that the system does not become corrupted?

Adolf Hitler became dictator of Germany legally and democratically. This shows just one example of how people can corrupt a political system and direct it away form where the founders had intended to go. We could probably find more examples of how people corrupt democratic institutions if we study the system, from politicians taking bribes to big business having over-powering influence. Would a technate find itself subjected to the same problems?

In some respects we could never invent a system that has 100% perfection so a technate, like any other system, would run that risk. Perhaps we could ask a better question; would we find it more or less likely to corrupt than the current system? We could answer that and say that we would find it, most likely, harder to corrupt people in a technate than the current socioeconomic system. In a technate, we would have no money and this fact forms the main reason why people would find it harder to corrupt the system. People would find it harder to bribe or corrupt an official when they have no money to offer and officials have free access to consumer goods.

Additionally, a technate would have power more of less distributed because power would not rest in one person or a small group of people but in a large number of experts in various fields, which becomes another reason for making it harder to corrupt the system in a technate. A technate has experts in their respective fields governing different parts of the system. Those experts have the final say only in that part of the system and in no other. Other people in other positions may have the able to direct the overall goals, but each person has authority over their part of the system and the final decision on how that part of the system runs falls to them.

As each expert also governs a technical aspect of the system, that person may have authority over a team, but their authority only extends to running the part of the system they have responsibility for. This, again, makes it harder to corrupt the system, as corruption would have to affect a large number of people in a variety of technical fields.

The people-side to the technate also has a part to play in preventing corruption. This social aspect runs separately from the technical aspect of society. If someone became an expert in a given field then they could govern one aspect of the technical side but they would have no power in the people side of the system. We would use, for example, direct democracy for running this part of the society.

However, even if there exists less chance that people may corrupt others in a technate, we still need a mechanism in place to ensure that it doesn't occur or that we can correct the system if it does occur. In the proposed technocratic plan for Europe, the means through which we keep the system in check we can summarise as using openness and peer review, which forms the same method of self-regulation that scientists use. For any person to obtain a position within the system they first have to get others to appoint them to that position. The person's peers make the appointment. Other experts in the field appoint people to positions within a technate based on their personal skills and suitability for the position, which they, as they form a group of experts in that field, hold the expertise to assess. In addition, the process has the attribute of openness, so that the assessors will know each candidate for each position, their skills and their experience. So, if anyone has any doubt about the suitability of a person for a position, they can check the records.

People judge another's suitability based on the person's skill and nothing else. So a person's gender, age, sexual orientation, race, etc. does not get taken into account. We would only give consideration to their technical skill and ability to actually do the job at hand.

We could make this process of selecting a person for a position more objective through bringing in a point system where a person gets so many points for their qualification and experience. In additions, some, or perhaps even all, positions may require an exam. The grade in the exam could also contribute to the points that a person earns.

However, sometimes some things go wrong, and even with the checks and balances of a technate, the wrong person may still end up in a position that they should not have or begin to abuse their position. In this case, the system has a mechanism for removing a person. We can only accomplish the removal of a person from a technical position within the technate through decisions that the persons peers make. In other words, only those who have the classification of technical experts in the area have the knowledge to make judgements as to another's technical ability. The case to remove a person must

have a basis purely in the technical skill of the person. To bring up other aspects, such as the person's private life, belief system or ethnicity, form examples of non-acceptable reasons to remove a person. The experts would then present the case to a person who has responsibility for the administrating the area above. Again, the system will also make all this public and open to peer review.

In both cases, where we have appointed someone to a position or have removed a person from a position, the system allows appeals. The appeal must again only focus on the technical ability of a person to perform a specific job. People make the appeal to the next level up in the administrative network.

So, openness forms the key to insuring that people will not corrupt the system. We have everything available for review, and focusing on technical competence and nothing else. The technate has only interest in a persons ability or skill and wishes to appoint the best person for a given position in an open and fair manner.

Chapter 18

How would people live in a technate?

This chapter forms a bit of a speculative look at how people might live in a technate. First, we consider housing. In the original plan put forward in the US, the original technocrats had the idea that people would live in an "urbanate". However, they never fully explored the urbanate concept in the US and in some respects we may not really develop it fully here, either. Experts in architecture, ecology, behaviour science / psychology, sociology, among others, would design such future housing. However, we could say a few things about urbanates and look at what possibilities they might have if we look at ideas that others have put forward or have implemented.

We have defined an urbanate as a place of a high standard of living for something like 10 000 people. It should offer space, recreational facilities, and jobs within a close proximity yet still offer privacy for it inhabitants. In addition, in today's World it would need to have the property of energy efficiency with minimal ecological impact. That would mean that an urbanate should have a self-sufficient property to some degree. It does not need a 100% self sufficiency level, and indeed, as the old saying goes, "no one is an island" so it would form part of a network. The urbanate would form an *integrated* part of society but the people living there should produce most, if not all, of their own food, energy and handle their own waste.

The inhabitants could achieve food production using methods such as permaculture, hydroponics with specialist greenhouses, or even agro-engineering with its vertical farms, so they could extend both the range and the growing season. Growing the food supply in or as close to an urbanate as possible minimises the energy required to transport food from one place to another. It also cuts down on the environmental impact of transportation. Some foods, perhaps difficult to produce in the urbanate, would most likely come form other locations, but the inhabitants would produce a good deal of it locally.

Producing energy locally can also help in minimising energy losses encountered in traditional grid based energy distribution. The inhabitants would most likely use a variety of methods, such as wind and solar, and perhaps geothermal. However, some inhabitants of urbanates may not have the ability to produce sufficient energy for their needs so some urbanates may have the role of energy farms where they generate and store energy for other urbanates. In addition, the technate may have to produce energy at remote locations as well as needing energy for large scale systems such train networks.

Waste management forms another important aspect. To have the attribute of eco-friendliness, and to contribute to the objectives of technocracy, and keep the high standard of living for the longest time possible, each urbanate would need to prevent the pollution of the environment and, thus, the living area of the people in the urbanate. The inhabitants of an urbanate may have a waste management system such as a recycling system that allows, say for example, the reuse of plant matter and animal waste, returning them back to the food growing system or, they may have a system where otherwise harmful chemicals get neutralised or recycled.

As to how an urbanate would look like, we could find several projects in motion today or which people have proposed that could give a view of what we might see as possible. However, in a technate, we may well find a number of different forms for an urbanate.

Eco-units form one possibility. An eco-unit has housing, work areas, and food production areas. Swedish systems ecologist Folke Gunther developed the idea and intended them to house up to 200 people; but, we could build a number of them close to each other to form an urbanate of about 10 000 people. We can see each eco-unit as a self-sufficient community where the inhabitants manage food production, energy production and waste management within the eco-unit. The inhabitants' food production would use methods such as permaculture and, indeed, we can liken an eco-unit to permaculture on a massive scale. The inhabitants would recycle waste so that they would not lose any of the important nutrients, especially phosphorus, and Folke has developed a number of methods for handling waste including water parks. We envision Eco-units as horizontal mixed units of plants, people, and some industry.

For another possibility we could extended the eco-units vertically. This would represent agro-engineering. In agro-engineering we would build farms together with human populations in a vertical structure. We could also use much of the principles of eco-units and permaculture here.

Extending the idea even further, we could build structures upwards such as Pyramid City or Sky City. The Shimizu Corporation of Tokyo, Japan developed the idea of Pyramid City and Dr. Dante N. Bini from Bini Systems has developed ideas to build it (called Try 2004). We could, perhaps, build something like these with integrated trans-

Figure 18.1: Try 2004

port system and a high level of self-sufficiency for the inhabitants, thus, keeping things as local as possible and minimising people's needs to go else where. Or, alternatively, we could build the city underground.

Other possibilities include The Venus Project, which Jacque Fresco and Roxanne Meadows run in the US, which present a number of possible designs for cities, housing and transpiration. A dome structure forms the basis of their constructions. A dome construction can have the property of minim usage of energy and materials for a give area covered when compared to traditional oblong shaped buildings. Although we can not classify The Venus Project as technocracy it does, however, have a number of similarities as it also represents the idea of science applied to society.

Domes also feature in the designs of Buckminster Fuller. Walter Bauersfeld first invented the geodesic dome, however Buckminster Fuller independently invented the same idea and the geodesic dome has now become closely associated with Buckminster Fuller. The geodesic dome has a unique property of becoming stronger the larger

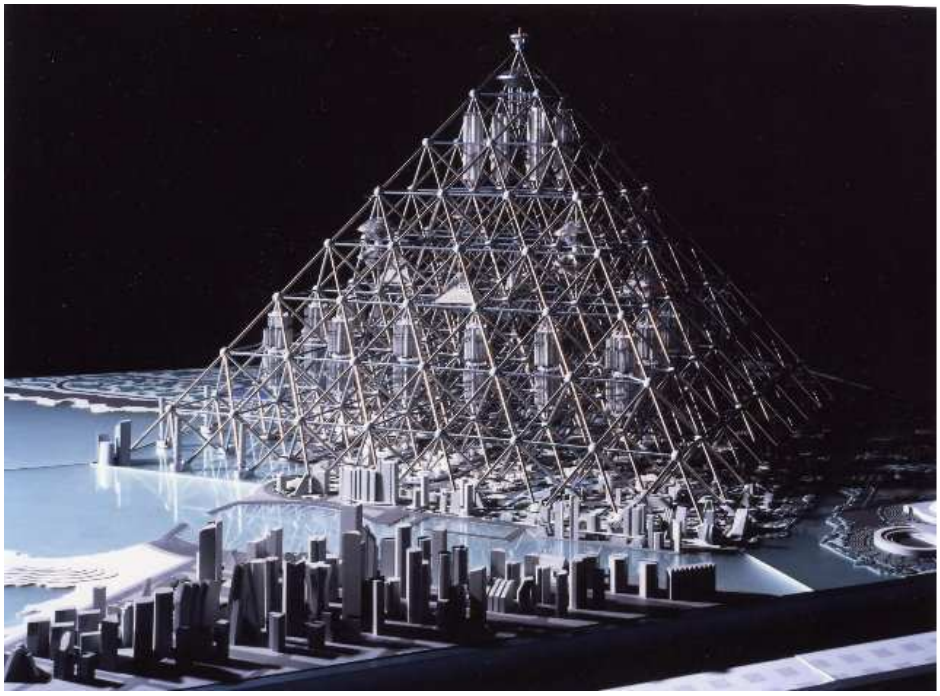

Figure 18.2: A model for Try 2004

it gets.

Arcology represents another possibility of which the town of Arcosanti exemplifies. We can define arcology as a design philosophy that combines both ecology and architecture in to hyperstructures. Paolo Soleri first put forward these ideas. This has similarities to technocracy's ideas of balance between ecology and technology.

Figure 18.3: Geodesic domes from the Eden Project

Figure 18.4: Inside one of the domes at the Eden Project

Chapter 19

How would people get around?

The car, in a post-peak World would most likely not form the main mode of transportation. Although the future society could have renewable fuels such as bio-diesel and ethanol, we can consider it unlikely that we will have the ability to produce enough for everyone to use a car as much as we do today. Most probably, we would find bio-diesel used for those few specialist needs that society has such as military transport, emergency vehicles, public transport, or some specialised "off road" use. Therefore, any future sustainable technate must seek an alternative. Not just for personal transportation, but for the transportation for goods and equipment as wells as for construction vehicles and such.

Ultimately, we could see the most energy efficient solution as minimisation of people's transport needs, use of energy efficient transportation systems and integrate transportation with the places where people live. Such a change may require a major rethink of our current infrastructure!

One way to minimise transport needs could involve keeping work as close as possible to the place where people live. To some extent, the urbanates aim to achieve that. The urbanate would not only form a place to live, but also a place to work and play as well, all integrated into one area and exemplify a key technocratic idea of multi-use. Automation could possibly have a major use as well as telecommuting to minimise people's needs to actually travel to another location to work. Keeping things local and working at home combined with automation, we would eliminate or reduce much of the people's transport needs. People would tend either not to have to travel to locations, or they would find their workplaces within easy walking or cycling distance.

To add to that, in a technate, those responsible for new urbanates would integrate energy efficient transport systems within the urbanate. This would allow quick transportation

Figure 19.1: A high speed maglev train

Using super conductors, we could see such trains as the replacement for the jet air plane.

from place to place in an urbanate when some people find some places a bit too far to walk. The transport system might then extend out of the urbanate to link urbanates and other locations. Such systems might use maglev trains using energy effect super conductors or some other form of high speed transportation that works within the energy available to society. We could, perhaps, use airships for long distance cargo transport, for example.

Even with integrated transportation, we might still find a need for personal transportation to take people to places that the technate would find inefficient to build a main communications link. Also workers may have need for working vehicles that can travel off the main routes. This may mean cars which would run of bio-diesel or other bio fuels but it could also mean some other system as well, such as robot vehicles designed to travel across a variety of terrains using battery power.

Chapter 20

What forms the technocratic plan for society?

We can define the essential aspect of technocracy as science applied to society. So whatever our technocratic plan may have as its building blocks, we can say the plan for society must have those building blocks based on scientific ideas and way of thinking. Technocracy, from its definition, has the characteristic of a form of government where those who have the skill in a task make the decision for that task. We can also describe it as a system where we replace the price system with energy credits as a means of distribution. This would then lead to a technological, sustainable society that maintains a balance with nature. Then we can describe the plan for society as a form of social engineering. These we can consider as the essential characteristics for any system referred to as technocracy to come under the heading technocracy. Beyond that it may take many forms in its implementation. In the US, Technocracy Inc. have a plan developed and it has existed in the US for over 70 years. The plan has all the characteristics of technocracy but it defines a plan for the American continent. We should not assume that the plan will necessarily have applicability to Europe. However, the European plan may well have a lot in common with the American plan. So just what do we propose as the European plan?

We have not full worked out the European plan, but we can point to certain aspects of it that have. Here, the reader should consider "Europe" as a lose term as the actual geographical area has to take into consideration the resources available and, therefore, may not correspond to the geopolitical entity of Europe but may also include parts of Russia, the Middle East and Africa.

First, the plan has the central characteristics of science applied to society and the util-

isation of energy credits instead of money. It also has the aspect of the skill ruling. However, we need to conduct a survey of the resources in Europe and the potential of Europe as the first thing we should do. This survey would have the goal of analysing the production capability and resources available to Europe, in terms of energy (as energy becomes the determining factor that limits our capability). That also means we need to assess the energy production capability and potential capability.

We can then carry out more detailed planning to build a technate that has the properties of both energy efficiency and balance with nature; only then can we term it as a sustainable society. This may well involve a major restructuring of Europe, which could take many decades / generations to accomplish. However, we can consider it likely that a "technate" would not have the ability to undertake such a move initially, so for the first step, the plan would have to involve meeting immediate, post carbon, needs of the technate and secure food and energy supplies through forming local communities. Once we have a secure foundation formed, then the technate can move on to the full survey and restructuring of Europe.

As we will use energy credits, the plan would also need to establish ways to measure energy, supply credits, and ensure that citizens have a fair share in those credits. Again, we could see this as something that would take time to implement and will, no doubt, have some teething troubles that we must overcome. We could alleviate this if we develop a skeletal proto-technate initially, which we could define as an experimental platform for technocracy that would have the property of growing to become a full technate at a later date.

As to the actual organisation of the technate (and proto-technate), the proposed European technate could have two main forms of organisation; the geographical organisation (or holonic) and the logical organisation (sequences).

Geographical Organisation

The geographical organisation lays out how we would group together people, urbanates, production facilities, and other resources. For Europe, the proposal has a distributed form of organisation composed of autonomous units referred to as holons.

The concept "holon" forms the basis of the organisation. The word "holon" means "part-whole". Each entity has the property of forming a whole entity in its own right, but it may also form part of other entities as well as having a composition formed of other entities. A cell in a body forms an example of a natural holon; other autonomous

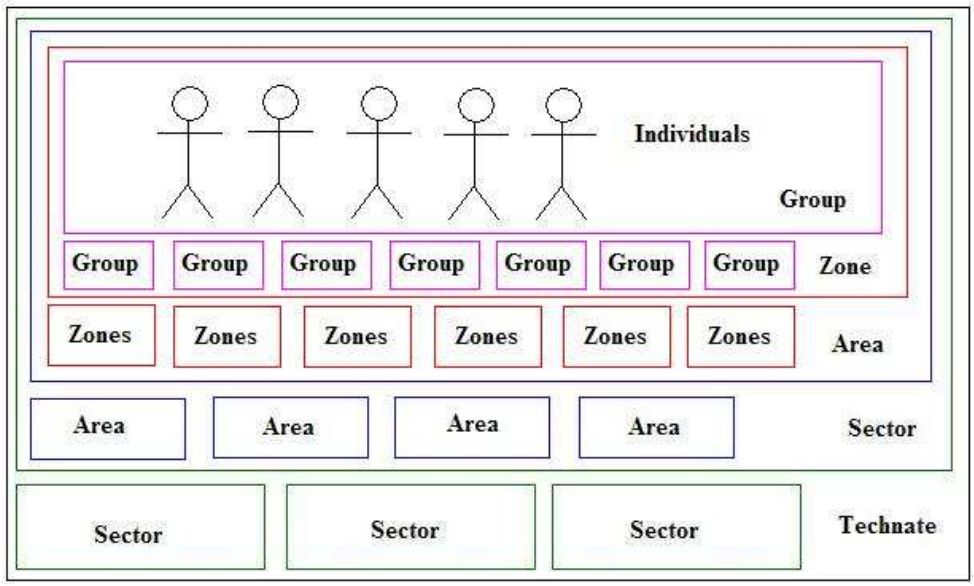

Figure 20.1: An incomplete view of the holonic structure of a technate

parts form a cell as well as a cell forms parts of other autonomous structures such as the organs. Similarly, the construction of a technate would also have a holonic nature.

Holons group together to form other holons as cells group together to form organs. We term such and arrangement a holarchy.

The following forms a possible holonic structure for a technate (working from the lower holons to the higher ones):

- Individuals
- Groups
- Zones
- Areas
- Sectors
- Technate

The individual forms the basic holon. An individual would have membership of a group and live in an urbanate. All the individuals of an urbanate could have membership of the same group or an urbanate might have a number of groups associated with it. We would classify each group as either a specialist group or a general group. A specialist group would have members that all have membership of one sequence (see below). A general group would have members from a number of sequences. Each group organises work in the form of projects, and each group has a goal. The goal must have compatibility with the overall goal of a technate.

Groups then form zones, each zone formed of two or more groups. Zones work in a similar manor to groups but on a larger scale. Zones handle projects that its composing groups find too large or require cooperation with others out side the group. Every member of a group would also have membership of the zone. However, to ease communications, each group has an appointed representative who acts as the interface to each group.

Areas and sectors have similar properties to groups but on still larger scales. They handle projects that lower level holons find too large for them to handle.

The "Technate" forms the largest holon; composed of sectors and, like the lower holons the technate handles projects but at the largest scale.

Logical organisation

The geographical organisation has a logical organisation superimposed on it. "Functional sequences" form the basis of the logical organisation and this part has the form of a hierarchy. A Board of Directors forms the root of the hierarchy. The functional sequences form the next level down. These sequences have responsibility for technical aspects of a technate, such as transport, education, health, and research (among others). Each sequence has a director who also sits on the board of directors. The director for the whole technate heads the Board of Directors.

Each sequence has the main function of providing communications channels to aid cooperation between holons. Other functions include ensuring that holons do not duplicate work; that the holons have goals compatible with the overall goals of the technate, and that they work on those goals and not others. The holons, however, work autonomously, and the directors do not have power over the internal workings of each holon unless the activities of the holons clash with the overall goal of the technate.

Each level of the holarchy has a corresponding sequence. For example, the sectors

would have a sector sequence for each sequence (unless a special case exempts them). The same applies for areas and zones.

Each citizen would have membership of a group and a sequence, and would work on a project relating to that sequence.

Experts would run the technical aspects of society according to the technical plan for society. The technocratic plan for society outlines how the experts would manage the technical aspects of society such as research, manufacturing, agriculture, waste management, ecology, education, policing, health, and housing among others. Each of these areas would have a sequence to coordinate the projects. For example, we would find a Sequence of Agriculture, a Sequence of Education, and a Sequence of Health. Each sequence would have a director that manages the sequence and expert members in the field of operations of that sequence. Each director of each sequence would also have membership of a board that managed the running of the entire technate. The board would have as its head the Director of the Technate. However, in keeping with the holonic approach to the organisation of the technate, the top level structure of the technate would not form a central point of control. The board and the top level sequences would act as communication and coordination structures for lower level holons and insure that the overall direction of the technate meets the goals of technocracy. The higher level structure may also manage continental wide projects that the lower level structures of the technate find too large.

The next level down in the system would act in a similar manner to the top level sequences. So, the Sequence of Research, for example, would have a structure composed of a number Sector Sequences of Research. Each Sector Sequence would have responsibility for communications and coordination of lower level holons as well as managing projects that the lower level holons find too large. The Sector Sequence would have a structure composed of area sequences and area sequences of zone sequences each working in a similar manor to the top sequence. The director of the lower level sequence would have membership of the higher level sequence and would operate as a facilitator and interface for the lower level sequence for which they direct.

Each member in each sequence would have expertise in the operations of that sequence. A person becomes an expert through study and experience. They would have knowledge in technocracy as well as other fields that relate to their field of expertise. For example, a medical technician (a combination of a general practitioner / medical doctor and heath, fitness and nutrition expert) would not only know how to cure a person and how to prevent illness, but they would also know about management and perhaps even psychology and architecture in so much as it effects health. So an expert would not only specialise in their field of interest but would also multi-skill to some degree.

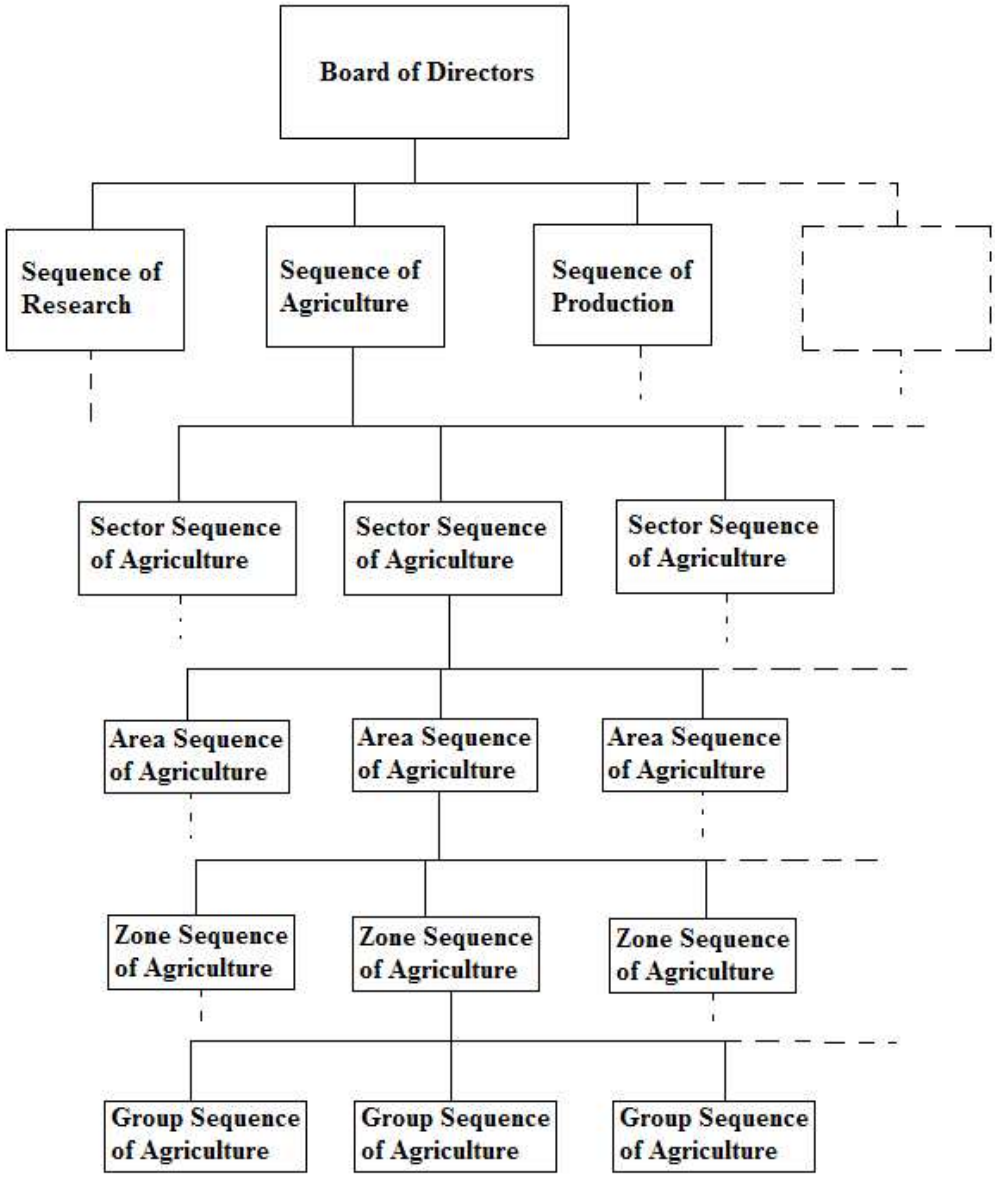

Figure 20.2: An incomplete view of the logical organisation of a technate

Figure 20.3: An network of urbanates

One possible view of a technate

A combination of peer review and some objective assessment, such as exams which could form a point system, would form the means for appointing experts to their positions. The process should have the characteristic of openness, as technocracy aims to put the best person in each position based on skill. The process has to have openness about it so that everyone can see that they had selected the person fairly and because the person becomes the best person for the position. Openness also avoids, as much as possible, any attempt to fiddle or corrupt the system. Once a person has obtained a position their peers form the only ones who can remove them, for only their peers have the expertise for making technical judgements on how well a person has performed in their position. Peers can only remove a person form a position for technical reasons, not, for example, because of their personal life.

The technate would aim to engineer the system so people would want to do things. The technate would achieve this through education and construction of the environment. For example, to achieve the technate goals, the education system would train people to work in fields that they have an interest in, so that they would obtain occupations

that they would enjoy. As much as possible, the technate would try and automate all of the dangerous and less attractive positions, so that people would not have to do those tasks. The technate would aim to minimise the working hours as much as possible to say, for example, 16 hours a week where people would work 4 hours a day. Hopefully, the citizens of a technate would understand that we could maintain a high standard of living but they would also have to put in some effort for the technate to achieve that standard of living.

Chapter 21

How would this become real?

We can state that one of the biggest problems facing the technocracy movement as: how to go from here to there? Technocracy, on the one hand, has an analysis of the current system that says we can class it as wasteful and unsustainable. We see evidence of its damage to the environment; based on the false premise of infinite growth with finite resources. We can consider our current system as not only doomed but also as giving us no advantage for our long term survival. On the other hand, technocracy offers an alternative system that has the potential to offer a high standard of living that balances the needs of nature with technology, a system that has consideration not just about the short term, but also about the long term. However, the early technocrats did not have much of a plan to bring a technate into existence.

We could see the lack of an implementation plan as one of the reasons that technocracy failed to maintain its momentum in the early 1930s. Essentially the basic idea centred around waiting till the current socioeconomic system collapsed then the technocrats would come in at the last moment with a plan for a replacement system that the people would then vote in.

We can find a number of flaws with this "phoenix model", with the main one that the system, at the time of its collapse would not exist in a state from which we could build a technate from. Also, when things start to get tough, people voting for a rational system would appear less likely than it does now.

In the 1930s technocrats tried other solutions such as taking the political path, in the form of a short lived technocracy party in the US. However, the political approach also has its problems. Politics, essentially, has the characteristic of manipulating people's opinions. It does not really have the characteristic of dealing with physical reality, only with what opinion people have about reality or otherwise (which would have the

characteristic of more likely wrong than right). On the other hand, we can define technocracy as science applied to society. As such we can class it as more a *technological* than a political system, and more rational than opinion based. Therefore, we would not really see a political approach as appropriate. However, we may have the need for some sort of cooperation with political entities to complete the transition to a technate.

Some tried revolution as another method. However, this approach failed to gain much in the way of support from the type of people who we would need to run a technate. Technical experts tend not to have the characteristics needed for the revolutionary type.

We should also bear another point in mind; any socioeconomic system has the attributes of a large and complex system and as such, it does not respond to sudden shocks well. Therefore, we would not consider a sudden change to the system as a wise move. A gradually approach would have less pain for people. The implementation of technocracy would need a radical change to our society which may take generations to complete. Thus, we can say technocracy has a more evolutionary, rather than revolutionary, characteristic.

So what then for implementation? How could a technate come into existence? Building up the system from the ground up would form one possible way. We could begin with building a skeletal structure first. Building communities made up of various people who have an interest in technocracy would form the basic plan. In some ways this would also form an experiment in technocracy so it would also give the opportunity to iron out any problems that we would encountered in a technate.

Each community would aim to have some degree of self-sufficiency, but not full independence nor isolation from other communities. Indeed, we intended that the communities should link up together and pool their resources as much as they can. This interconnected network of communities would form a proto-technate. If we could build it up across Europe (or, even, the World), it would become a skeleton, ready to add flesh to when Europe as a whole moves over to a technate. We could introduce a full technate.

We could base the initial communities on eco-units. They would also have some business associated with them, which the inhabitants would run as a cooperative. Internally, the inhabitants would manage each community as much as possible along technocratic lines. For example, experts in the management of food production would run the food production. The inhabitants would use energy credits for the allocation of goods within the proto-technate. So, for example, the members of each community could allocate energy credits to the production of certain foods or goods. Members could purchase goods that they could not possibly produce in the proto-technate externally. The inhabitants could distribute the goods based on equivalent energy credits or each inhabitant

would have an equal share of the money spent and uses that for goods distribution.

The inhabitants would use direct democratic principles to run the people side of the community, so that each inhabitant would have the right to vote on any decisions that the community makes on non-technical issues.

Each community would seek to fulfil its needs as much as possible locally to minimise its energy usage and environmental impact. If the community did not have the able to meet its local needs, then it would seek to meet its needs through other communities in the proto-technate starting with local communities. In this way, the proto-technate would achieve as much as possible, goods production and distribution within the proto-technate. If that did not meet the proto-technates needs, then communities would purchase goods from out side the proto-technate. Thus, we would find the proto-technate embedded within the current socioeconomic system but would have the attribute of running internally in a different way.

To buy goods, the proto-technate would also need a source of income, and here the cooperative business units would come in. Each member would have a requirement to work for the cooperative business for a small part of the day (something like four hours a day for four days a week). The cooperative business units would produce goods for internal consumption within the proto-technate and, also, for sale external, thus generating a source of income for the proto-technate with which to purchase goods it could not produce. How much goods and services the proto-technate could produce internally would depended on how large the proto-technate became and how many members and communities where part of the network. The larger the network, the more it could achieve.

The businesses that a technate could support could include anything from food production, to recycling scrap metal, to renting out holiday homes and conference facilities (so long as the business has the environmentally friendly attribute).

From the skeletal network the proto-technate would need to move to a technate. The proto-technate should serve as a demonstration of what we could achieve and how the system could work. It should form a model that shows the rest of Europe that we have a viable alternative to the current system that other people would want to implement. This may need some political will power to achieve the final transition to a moneyless, environmentally friendly, sustainable technological society in a post carbon World.

In addition to all this, the proto-technate would need to initiate its own education system, since governments developed the current education system to support the current socioeconomic system. The education system, in the current price system, trains people directly or indirectly to think in terms of maximising the own selfish gains and working

with money. We have a need, therefore, to change the education system to teach people to work within a technate. As technocracy has the concerned with skills attribute, we will need a skills based education balanced with a good knowledge base, so that the people in the technate will find themselves able to understand what skills they need for a job, and to give them the ability to work in a goal oriented fashion.

Chapter 22

What does “holons” and a “holonic society” mean?

The concept of a holon forms one of the central ideas proposed for forming a technate / proto-technate and even for The Network of European Technocrats, which promotes technocracy in Europe. This chapter outlines what the term holon means and how a holon could form the building block of a future society.

Holons

The word “holon” comes from the Greek “*holos*”, meaning “whole”, and “*-on*”, meaning “part”. The word captures the idea of a holon forming an entity in its own right, but also forms part of other entities and other entities form it. For example, a cell in you body falls under the classification holon. We can study a cell as a cell in its own right. It has inputs and outputs and a definable boundary. However, a cell also has the “made up of other entities” property, such as DNA, RNA, and mitochondria. We can study each sub-part of a cell as entities in their own right too, yet each sub-part of a cell has the property of composition of other entities, such as molecules. Molecules, in turn, have atoms forming their composition and atom have sub-atomic particles forming their composition and so on. At each level we can study each part and sub part as entities in their own right but each part has sub-parts which we can also study as entities in their own right.

We can also go the other way, and see that cells group together with other cells to become parts of organs; those organs form parts of the human body, each person forms

part of a society, and so on.

We can find many other examples of this part-whole relationship in the World around us. Ants, for example, exhibit such a characteristic. As an entity in their own right, we can study the ant; but, they also form part of a society. Trees and forests as well as people and cities form other examples. More artificial examples would include software agents used in Distributed Artificial Intelligence and even the humble subroutine in a computer program.

Characteristic of Holons and Holonic Systems

In addition to the part-whole characteristic, holons have a number of other characteristics

1. Each holon has the autonomous attribute. That means that each holon carries out its own activities without direction of other holons yet it still forms part of a system and contributes to the overall functioning of the system in the general case.

2. Holons naturally form distributed systems. This follows on from the autonomous attribute.

3. Task orientation. Each holon has a simple task to perform and concentrates on that task. The system accomplishes large scale tasks through the combination of a number of holons, either through combining them together to form a larger holon, or through cooperation or competition between holons.

4. Bidirectional information flow. As holons do not act independently but as part of a system, their actions affect the whole system and the holons below. The holons at all levels thus provide information regarding aspects of the system and the sub-parts of the system. This information flows between different levels.

5. Emergent properties. As holons interact the sum of their actions could become greater than the action of the individual holons. Examples could include ant hills, where a number of ants cooperate to construct; yet, no single ant would have the capability to achieve the construction alone. The construction of cities forms another example. The present shape of many of the Worlds cityscapes does not result from a centralised plan, but results from the organisation and interaction of a number of people and organisations yet order structures do emerge from those interactions.

The advantages of holonic systems

Holons have a special interest in complex, large and/or distributed systems. Distributed systems based on holons have a number of characteristics that give it advantages over a centralised system.

1. Scalability. As each holon has the autonomous property, it can run with very little knowledge of other holons. Thus we can add more holons to the system, in general, without affecting the holons already in the system. As we add more holons to the system, a natural holarchy may form. Thus a system can start with one or more holons and grow from there. For example a human being starts as one cell that divides and grows too many cells, eventually forming organs along the way, ultimately end up with a fully developed human being.

2. Robustness. Robustness also comes from the autonomous nature of a holon. Just as we can add holons, we can also remove them without, in general, affecting the function of the remaining holons or the system as a whole. For example, the human body can lose many cells without even noticing it. The body can even survive the loss of a substantial portion of the body, such as a limb.

3. Simplicity of control. As each holon has a simple task to accomplish they only need a simple control mechanism, which becomes easer to understand when compared to a centralised control system.

Disadvantages of holonic systems

Although a holonic system can have a number of advantages over a centralised, authoritarian system, they do also have a number of disadvantages.

1. Tragedy of the commons. The autonomous attribute can lead holons to consume shared resources without consideration for others, and end up taking more than their fair share. This could limit the ability of other holons to work and even bring an end to the common resources, for example, a farmer who allows a cow to eat all the common grass, preventing other farmers from grazing their cattle.

2. Losing their way. We can see another problem with the autonomous attribute. Autonomous holons could conduct activities that do not contribute to the overall

goal of the system. They could even conduct activities that go contrary to the overall goal. Cancer cells would form an example of holons that have gone out of control, and become a danger to the system as a whole.

An holonic structure for NET and a future technate

Peak oil could mean that future societies need to localise to reduce energy consumption, as future societies may well have less available energy than today’s society. However, climate change could mean that future societies would need a high level of cooperation to handle an increasingly hostile World. This could mean a social structure that has both the "composed of parts" and the "networking" characteristics. This would represent a different form of organisation from our current nation centric, centralised system. Holons represent a different way of governing systems that has the characteristics of networking and composed of parts. Thus a holonic structure represents a possible future form for society.

For this to work we propose the following holarchy.

1. individuals
2. groups
3. zones
4. areas
5. sectors
6. technate / proto-technate / NET

The author intends the proposed structure to form the foundations for a technate/proto-technate but as an experiment it should also form the structure of NET. Thus, the top holon becomes the technate/proto-technate but also NET.

Individuals form the basic building blocks of societies, and each individual has their own goals and objectives as well as their own skills and interests. Any social structure should take this into account, and the author hopes that the holonic structure would allow people to utilise their interests and skills to achieve their own desires in such a way as to contribute to the whole structure.

To achieve this, individuals form groups, where each group could have a specialist interest, such as research, medical or food production among others. Individuals who have skills and interests in common with a specific group could join that group. However, not all groups would have specialist interests, and some groups would have a more mixed membership. This could depend on the size of the group and the number of members (say, for example, in the case of members of NET in one town).

The group has goals and runs projects. The goals of the group have compatibility with the overall goals of the technocracy, and the projects run within the group contribute, in some way, to the group and, thus, to the implementation of technocracy. Some projects, however, may have the "too large for a single group to undertake" property. To handle this, groups can form zones, where zones act in a similar manner to groups; instead of individuals composing the group, groups form the basis of zones. Zones cooperate with each other to fulfil the zones goals. Those goals, like the goals of groups, have compatibility with the goals of technocracy, with the significant difference of larger scale.

Again, like zones, areas form the next level up in the holarchy and run larger projects. Areas compose sectors.

The technate / proto-technate or NET forms the final layer of the holarchy. This layer runs large scale projects over the whole of the operational area of the technate, and has goals in accordance with technocracy's goals.

Thus the whole system becomes a gestalt. One composed of individual, goal orientated parts that use projects to achieve their goals. As each part links up with other parts in the holarchy and through cooperation the system achieves the overall goals of the technate.

Control and direction in the holarchy

As each group, area, sector etc. can act autonomously, the system has the potential to develop some problems, as noted above. Some of the holons could end up repeating work that other holons have conducted, and other holons could conduct work that does not contribute to the whole.

To prevent such problems, we propose a hierarchical structure that lies on top of the holarchy. This overlapping structure would have the following goals:

1. Maintain direction of the system

2. Act as a communications channel to facilitate cooperation between holons
3. To ensure efficient utilisation of resources, thus preventing unnecessary repetition of work.

The proposed structure would follow the classic Technocracy Inc. sequence structure with a board at the top, which acts to direct the whole system. A number of functional sequences would then form under the board, with the director of each sequence represented on the board. For example, the structure could have functional sequences for health, research, manufacturing, mining, recycling, energy, transportation, space, etc.

Each sequence would have a sequence for each holon. The Sequence of Research would have a number of Sector Sequences of Research below it. Each sector sequence would then have area sequences below it, and the area sequences would have group sequences below it. Each sequence at each level would have a director. For example, the Sequences of Research would have a Director of the Sequence of Research and the various sector research sequences would have various Director of Sector Sequences of Research, and so on for, zones, areas, and groups.

This means that an individual would both have membership of a group and a sequence, as well as working on a project.

The roll of the directors

The directors of each sequences has overall responsibility for ensuring that each holon contributes to the overall goal of technocracy. Thus, the directors at each level have to approve each project, and can cancel a project if that project has wandered away from the goals of technocracy. The director can also cancel a project if it conflicts with another project or request that the project team modifies the project. For example, if two holons attempted to do the same project. However, once a project has started, and so long as it remains compatible with the goals of technocracy, the director has no control over the project in keeping with the autonomous nature of the holon.

Each project would have a project manager. The project manager has responsibility for running the project, which involves the allocation of resources, time schedule, tasks, etc., and runs the project without any external interference of the directors, as long as the project remains within the goals.

For projects that involve cooperation or coordination between a number of holons, the director has the responsibility of ensuring communications between each holon. For

example, within an area, the Area Director must ensure that all holons have adequate communications to enable them to conduct their projects. Thus, the sequences act as a communications channel for each holon.

Goals

Goals become the most import attribute of the above structure. Goals give direction and purpose to the system. Technocracy has the top level goal of:

The highest standard of living for the longest time possible

To achieve that, sequences and holons may have other goals, but those goals must contribute to the overall goal. For example, the Sequence of Research could have the goal of conducting an energy survey, and may run one or more projects to achieve that goal. However, the goal of the energy survey also contributes to the overall goal of technocracy in that it establishes the resources available, and the energy required to build a sustainable society that has a high standard of living.

Chapter 23

What about the “people side”?

So far we have talked about the technical side of a technate. However, a technate also has a people side. People form a very important part of the European technocratic plan. Actually, people form the centre of the plan, everything else revolves around people and providing a good standard of living for all the people forms the main purpose of technocracy. However, mostly we have not talked about people but about the technical aspects of a technate. The technical aspect of a technate exists to deal with technical system, such as production plants, transportation, heath and education. The people side, however, deals with the non-technical side of a technate. All those issues that we have no technically right answer to and involve decisions of morality, culture and beliefs.

This division between technical administration on the one side and direct democracy on the others means that a technate could not have the classification of a state nor a nation. An area of operation forms the best definition of a technate.

The law and punishment

The people side has an urbanate as its basic building block. An urbanate consists of about 10 000 people. These people can decide on the governance of their urbanate. They can elect a council to decide on laws and then the people vote to accept those laws. In other words, the governance of an urbanate forms a type of direct democracy where no law passes without the direct approval of the people.

Once the people have voted to establish the laws, the enforcement of the law falls to the police. The police would not come under the control of the legislative council, but

would form part of the technical side of technate. The same would go for the punishment of law breakers and for the judiciary system. In each part of the law enforcement system, peers would appoint people to their respective positions (as for any other part of the technical side of a technate). This would mean that the judiciary would not have courts with a jury of 12 people as in the system common today. Instead, experts for defending and prosecuting a case, as well as experts in evaluating legal arguments, would evaluate each individual case. The procedure would have the same openness characteristic as for other aspects of a technate.

The legal system in a technate would use punishment as a last resort. A technate aims to develop a positive environment for people to develop themselves. People develop partly in response to the environment. Through the creation of a positive environment people would have the opportunity to develop themselves and would have less probability of turning to crime. For example, the provision of housing and other basic needs as well as having no money would give less motivation for people to commit crimes. The education system and a working environment that encourages personal development would present people with goals, challenges and opportunities that would mean they would engage in activities other than crime. A much lower crime rate should result.

However, as no system reaches perfection, a small amount of people will engage in criminal activity. The criminal justice system could then use some punishment to correct people's behaviour but they would place the emphases on positive means to encourage people to correct their own behaviour rather than concentrating on punishment. If the situation becomes so bad that no means of correction works or the person becomes a danger to others then the criminal justice system will have the option to remove that person from society and place them in a place of detention.

A confederation of legislative councils

The governing council of an urbanate would form the smallest example of a legislative council, but each urbanate could decided to link up with other urbanates to form a lager legislative council. Such linking up would probably have a basis in a common language or culture. For example, French speaking urbanates could link up together to form a large legislative council of all the French speaking people in Europe (whether those communities happen to have a current location in France or not). Ethnic groups such as the Basque people could link up together to form a legislative council based on a common culture. Such linked groups of urbanates would replace the current concept of a nation and nations would no longer exist.

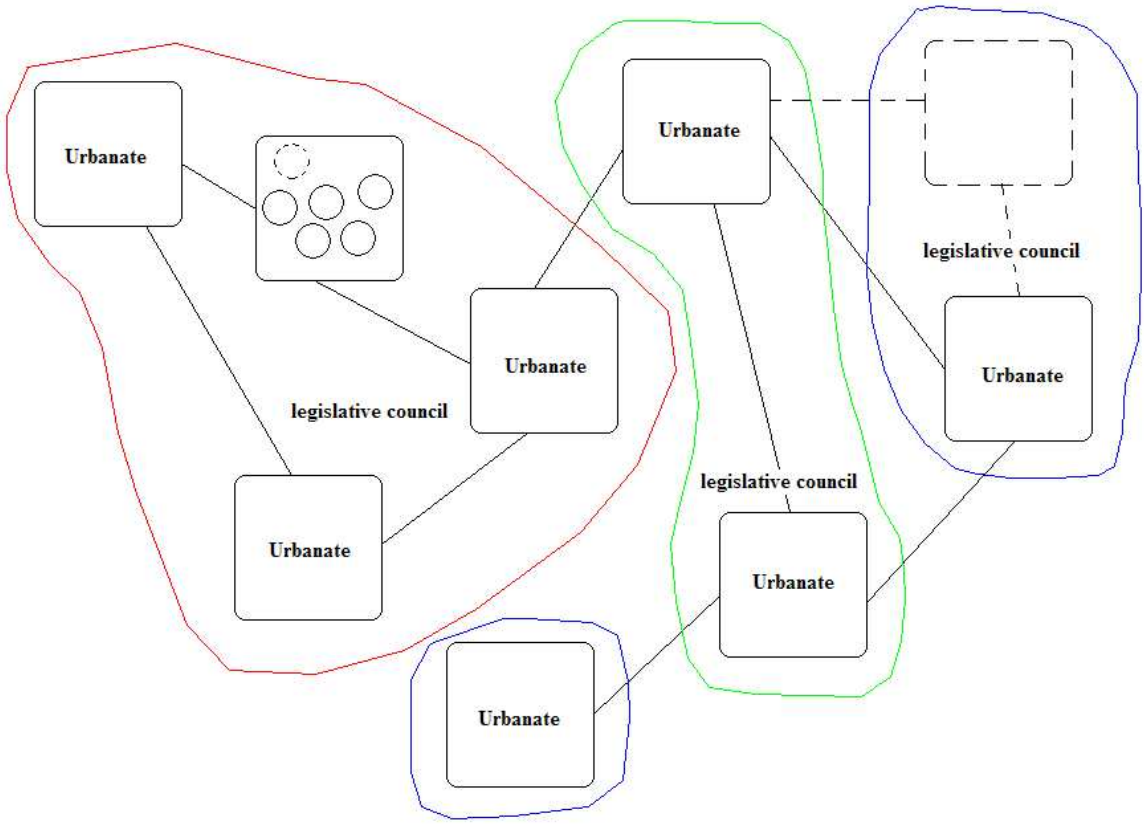

Figure 23.1: Urbanates and legislative councils

Networks of urbanates can form legislative councils, here shown in red, blue and green boundaries. The dashed lines indicate continuation and the circles indicate eco-units that form some or all of the urbanates.

All the legislative councils would form a confederation of legislative councils, which would allow them to cooperate and come to agreements between themselves.

The boundary for the councils

However, the system would have some restrictions. The councils would not enact laws on any issue that effects or otherwise interferes with the technical aspects of a technate. Other restrictions would include having to adhere to a basic set of human rights that would guarantee that individuals would have a right to their life, and a right to choose where they live and whom they could associate with, as well as an individual's right to freedom of and from religion.

Involving the people

Individuals or groups of people can become involved with decisions that affect them. Voting for representatives to sit on a legislative council or becoming a representative would represent some possible options for people to become involved. Also, any law that each legislative council passes has to have a majority of the people voting for the law before it becomes passed.

Whenever the technical side of the technate over laps to the people side there becomes a need to assess what people think. This could happen, for example, when an architect proposes a new building. Assessing what the people's opinions can take a number of forms such as questioners or surveys or people could put their comments in via a web site. The experts will still make the final decisions on technical projects but as the technate aims to achieve the highest standard of living it becomes part of projects that overlap into the people side to take people's opinions into account as part of the design. Or to put it another way, the desires, and wishes of the people become a customer specification for the technical side which the experts attempt to achieve as much as possible. That means that the people may not have all their wishes fulfilled, if, for example, the experts decided that a strong technical reason prevents it. However, if the experts can find a possibility to implement what the people wish then they will do so. It will all come down to the idea of balance; balancing the demands of the people against those of nature and the ecosystem to try and achieve the best possible solution for the people and the environment.

Figure 23.2: Technocracy; the highest standard of living for the longest time possible

For people!

Chapter 24

What about down side?

Technocracy has the goal of maintaining the highest standard of living for the longest time possible. Technocracy then proposes the application of science and rational thinking to achieve this goal. This should then produce a society that balances human needs, on the one side, with those of nature, a society that balances production with demand, and science and technology with ecology.

We can class it as too Utopian

This may sound Utopian and, as it stands today, technocracy falls into the category of a Utopian ideology. Technocracy falls into the classification of Utopian in the literal sense of the meaning of the word (Utopia literally means “no where”), because no area of the World has implemented technocracy yet. Technocracy also falls into the category of Utopian in the sense of a designed society, as technocracy advocates the design of a future society. However, technocracy does not make the claim of forming a plan for a perfect society. In this sense, technocracy does not fall into the category of Utopia because technocracy does have its down side. However, even if you consider technocracy as Utopian that does not mean that we can not achieve such a society.

Limits to family size

A society run according to technocratic ideas would attempt to maintain zero population growth to keep human needs balanced with the needs of nature, and to ensure that the

society can provide for it citizens.

Zero population growth would mean that each couple would have a limit to two, or at the most, three, children. Some people would see this imposing of a limit on family size as one of the less desirable aspects of technocracy. However, the justification for this comes from the fact that no state nor technate could maintain unchecked population growth, as starvation would most likely result as the population would eventually, at some point in time, go beyond the society's (or even the Earth's) capacity to produce food. However, maintaining the population level within the carrying capacity of the Earth conforms to the technocratic idea of balancing demand (in this case food) with production (in this case farming). Education and environment would play an important part in maintaining the population level at a sustainable level, rather than forcing people to not have children.

Limiting choice

Technocracy would also aim for efficient utilisation of resources, and competition represents one of the biggest sources of waste in our current system. Not only form advertising but competition leads to other wastes such as packaging, which has the purpose of attracting customers to buy products, and duplication, where companies duplicate each others work and products. A more efficient society would aim to eliminate theses wastes through having only one, good quality product available. This high lights another downside to technocracy: people would find their choice of goods limited. Instead of a person choosing between 101 different types of cat food from 10 different manufactures they may only have 3 or 4 types from one manufacturer.

Designers and engineers could compensate for loss in consumer choice through making modular products that consumers could then adapt to their own desires, thus maintaining some level of diversity and individuality. Also, the designers and engineers could design some of the products as open source products (such as mobile phones), where the consumer could modify the software running the product as they wished.

No copyright

Allowing consumers the right to modify products highlights what some people may see as another disadvantage of technocracy: the lack of copyright. Processes can have the property of a higher degree of energy efficient if we produced an item once, and we

allow anyone to access the central item than to produce a number of copies of the item. So, for example, people would have access to films or music from a central source, and would download the films or music and make local copies on their own hardware as and when they wanted. They would not need to make permanent copies, as they would have access to the distribution points whenever the wanted. As people would not use money in a technate, we would have no need to copyright material anyway, as artists would not make money from their films or music.

You can't get rich

This brings forward another perceived disadvantage of technocracy. People would not get rich in a technate, as the technate would not use money. Personal accumulation of money could not happen, and the technate would also control the units of production, as technocracy does not allow private ownership of factories and farms. Private ownership of the units of production would conflict with the goals of technocracy, because the technate would aim to balance production and, to do so, would require direct control over production. Instead, the technate would more evenly distribute the resources with every citizen having an equal right to the resources available to society.

Misuse of science

We can see the above as inconveniences for individuals; however, we could find a possibility of a greater danger; the misuse of science. We can describe science as a method for exploring and finding out about the World around us, and it plays a central part in technocracy. But, history has many examples of science misuse and abuse. For example, the Nazis used evolution to justify their racist policies, as did people in the 19^{th} Century to show white male Europeans as superior to women and to people of other ethnic groups. The misuse of science in the former Soviet Union in the 1930s forms another example or the use of scientific terminology in pseudo-science. History has many examples of science misuse!

As science plays such an important part in technocracy and a future technocratic society will have science at its centre, then the misuse of science would have tremendous consequences. What will stop the misuse of science in such a society?

We could see two attributes of technocracy that could prevent a disastrous misuse of science in a future technate. Firstly, we have the openness attribute of science. We

find openness either missing in many abuses of science or brought the abuse to an end. Thus openness forms a vital part of any future technate. Not only must the scientist publish their research, but everyone involved in the technate, from those in positions of power such as project leaders and directors to individuals working on projects, would also need to exhibit openness. They would publish reports, memos, results, as well as reviews for placing people in positions of responsibility. This openness will allow others to check what experts have done and point out where they have made errors thus helping to prevent misuse of science.

The distributed nature of the organisational structure could also help in preventing misuse, as it would mean that no one person would have the power to continually misuse science without others noticing, and any misuse would have its limits. Combined with the openness attribute, others would then detect any misuse or potential misuse, and take actions to stop it.

The problems with cooperation and common use of items

Teams and team work could also represent part of the down side of technocracy. People tend to put less effort in when they work in a team. To some degree we desire this type of behaviour; if we all work together we can all work less. However, this can become a problem if overall we end up doing less work than we need or some individuals do not pull their weight at all.

Other problems with teams include:

1. Group thinking, where in an effort to arrive at an agreement team members suspend critical thinking
2. Group polarisation, where a team becomes composed of like minded people
3. The illusion of unanimity, where team members fail to speak their minds.

Teams can overcome these problems thorough becoming aware of them and through training. Team leaders would need to remain impartial and encourage critical thinking as well as bring in opinions that disagree with the majority.

Common property or getting things for free could also drive undesirable behaviour. People tend not to respect property that they do not feel responsible for nor has cost

them anything. As a technate would rely on common utilisation of things such as transportation this could become a problem in a technate. However, allocating individual responsibilities and making it easy to identify people who use common resources so they have some feeling of responsibility represents one possible way of resolving this problem. The use of energy credits represents another way as it shows that the free goods available in a technate does have a cost and gives some responsibility to people for the way society allocates energy. Localisation resulting form the formation of communities of 200 people could also add a feeling of responsibility.

Lack of perfection

In the end, we will never have a system that we can call perfect. All systems will have their good points and their bad points. The choice really comes down to selecting a system that has the least bad points and the most good points, or at least a system that has some overwhelmingly good points. It also depends on your criteria for choice; do you want to look after your own short term interests or do you consider the long term survival of the species as a worthwhile goal?

Appendix - The fulcrum symbol

NET started using the fulcrum symbol as its logo in 2006. This symbol has at its centre a representation of a fulcrum representing the key idea of balance; balance between production and demand; society and technology; people and ecology. In addition, a fulcrum also exemplifies a simple machine and, thus, also represents technology. We have placed it on a green background representing ecology. The olive leaves to both sides of the fulcrum represent science as we can find them on the coins from Ionia, the birth place of science and philosophy. They can also represent peace. The colour gold represents a hope for the future.

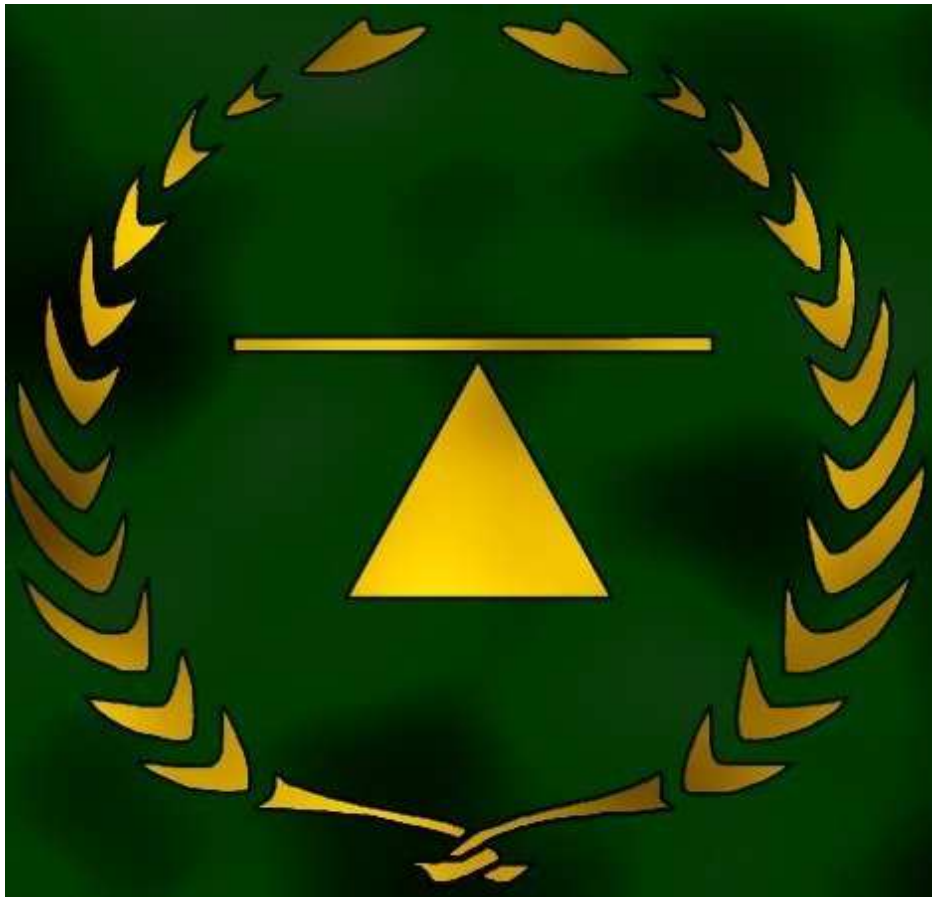

Figure 24.1: NET Fulcrum

Further reading

On the Internet

The Technocracy Movement

http://en.wikipedia.org/wiki/Technocratic_movement

The Network of European Technocrats

http://en.wikipedia.org/wiki/Network_of_European_Technocrats

Buckminster Fuller

http://en.wikipedia.org/wiki/R._Buckminster_Fuller

Monolithic Domes

http://www.monolithic.com/

Operating Manual for Spaceship Earth

http://www.altruists.org/static/files/Operating_Manual_For_Spaceship_Earth_(Buckminster_Fuller).htm

Holon (philosophy)

http://en.wikipedia.org/wiki/Holons

VISA (credit card)

http://en.wikipedia.org/wiki/VISA_%28credit_card%29

Distributed computing

http://en.wikipedia.org/wiki/Distributed_systems

Emergence

http://en.wikipedia.org/wiki/Emergent

Technocracy Study Course

http://spazz.mine.nu/cms/index.php?option=com_content&task

=view&id=48&Itemid=156

Technocracy: Technological Continental Design

http://www.technocracy.org/documents/eTTCD-1.1_Final.pdf

Powerswitch (Peak Oil)

http://www.powerswitch.org.uk

Books

The Best that Money Can't Buy. Jacque Fresco. ISBN-13: 978-0964880672

Technocracy and the American Dream: The Technocrat Movement, 1900-1941. William E. Akin. ISBN 0-520-03110-5

The Technocrats, Prophets of Automation. Henry Elsner. ISBN-13: 978-0815600558

Limits to Growth : the 30-year update. Donella Meadows, Jorgen Randers and Dennis Meadows. ISBN 978-1-84407-144-9

The Demon-Haunted World. Carl Sagan. ISBN 0-7472-5156-8

Scientific Method in Practice. Hugh G. Gauch, jr. ISBN 0-521-01708-4

The Histroy of Western Science. Anthony M. Alioto. ISBN 0-13-388-513-5

Science and its Ways of Knowing. John Hatton and Paul B. Plouffe. ISBN 0-13-205576-7

The Scientific Endeavor. Jeffrey A. Lee. ISBN 0-8053-4596-5

Critical Thinking for Students. Roy Van Den Brink-Budgen. ISBN 1-85703-634-4

Agent Based Manufacturing: Advances in the Holonic Approach. S M Deen (Ed) ISBN 3540440690

Beyond Business Process Reengineering: Towards the Holonic Enterprise. Patrick McHugh. ISBN 0471950874

Emergence. Steven Johnson. ISBN 0-713-99400-2

Emergence: The Connected Lives of Ants, Brains, Cities and Software. Steven Johnson ISBN 0140287752

Emergence: From Chaos to Order. John H. Holland ISBN 0192862111

The Emergence of Everything: How the World Became Complex. Harold J. Morowitz. ISBN 019513513X

An Introduction to Multi-agent Systems. Michael J. Wooldridge ISBN 047149691X

Multi-agent Systems: Introduction to Distributed Artificial Intelligence. Jacques Ferber. ISBN 0201360489

Psychology: Frontiers and Applications. Michael W. Passer and Ronald E. Smith. ISBN 0-07-117991-7

Sociology and the Environment. Alan Irwin. ISBN 0-7456-1360-8

An Introduction to Sociology. Ken Brown. 0-7456-0921-X

Social Psychology. David G. Myers. 0-07-241387-5

Global Hydrology. J. A. A. Jones. ISBN 0-582-09861-0

Principles and Practice of Plant Conservation. David R. Given. ISBN 0-412-61270-4

Green Planet Blues. Ed. Ken Conca and Geoffrey D. Dabelko. ISBN 0-8133-6882-0

The Human Impact on the Natural Environment. Andrew Goudie. ISBN 0-631-19978-0

The Environment and Science. Christian C. Young. ISBN 1-57607-963-5

Ecology: Concepts and Applications. Manuel C. Molles, Jr. ISBN 0-07-029416-X

Principles of Conservation Biology. Gary K. Meffe, C. Ronald Carroll et al. ISBN 0-87893-521-5

Introductory Chemistry for the Environmental Sciences. ISB0-521-48450-2

Environmental Geology. Edward A. Keller. ISBN 0-13-022466-9

Wind Energy Basics: A Guide to Small and Micro System. Paul Gipe. ISBN 1-890132-07-1

A Waldon Two Experiment. Kathleen Kinkade. ISBN 0-688-05020-4

Waldon Two. B.F. Skinner. ISBN 0-02-411511-8

DVD

Future by Design. Directed and Narrated by William Gazecki http://www.fbdthemovie.com/