PICTURE	COMMENTARY/ SYNC
EDGE TITLE SEQUENCE:	**10:00:00**
BLACK SCREEN	
FADE UP - FUTURISTIC MOCK –UP OF OPERATING THEATRE (SMOKE)	**V/O:10:00:22:02** **IS FUSING OUR BODIES WITH COMPUTERS AND TECHNOLOGY TAKING US CLOSER TO CREATING ADVANCED FORMS OF HUMAN LIFE?**
WIDE TRACKING SHOT TO CYBORG	
CU SURGICALLY GLOVED EXAMINATION OF WIRING	
	KEVIN WARWICK SYNC: 10:00:31: *The Cyborg is something that is/ actually part human part machine cybernetic organism.*
CU MODEL ON OPERATING BENCH	
	CHRIS TOUMAZOU I/V SYNC 10:00:37: *We're now looking at the compatibility between/ Electronic systems and biology.*
MS MODEL INSPECTING CIRCUIT CHARTS	**V/O:10:00:44:** **FROM THE TERMINATOR AND ROBOCOP TO STAR TREK'S BORG, COMBINING HUMAN BIOLOGY WITH HI-TECH HARDWARE SEEMS PURE SCIENCE FICTION.**
CU UV SCANNING OF MODEL CYBORG	
CU OF CYBORG TAGGED HAND	
CU OF SKULL X-RAYS	**BUT ARE CYBORGS BECOMING SCIENCE FACT?**
	CHRIS TOUMAZOU SYNC:10:00:52: *The 'bionic man', for example, can now become a practical reality cause the technology is there*
CU OF PRO-DIGITS (OVER-EXPOSED)	
	IAN PEARSON I/V SYNC:10:01:03: *Darwinian evolution has got us the millions of years to where we are today/ But with the new technologies that we are going to have over the next decade or two we'll be able to seize control from Darwin of our future evolution as a species and go the direction we want to go rather than just the survival of the fittest.*
MOVE FROM PLASMA SCREEN CU OF DARWIN AND DNA DOUBLE-HELIX ONTO PEARSON	
TILT UP WITH SHADOW ROBOT ARM	
	KEVIN WARWICK I/V SYNC:10:01:18: *You could even say this is a major technological step that's allowing us to evolve / to take ourselves forward.*
CYBORG RISING SEQUENCE	
TITLE 'EVOLUTION REVOLTUION'	
FADE TO BLACK	
	V/O:10:01:37:

PICTURE	COMMENTARY/ SYNC
	THE FIRST STEPS FORWARD IN ASSISTING OUR BODIES WITH
FADE UP ON MS OF MODEL CYBORG WITH HEART BEATING, TILT TO FACE	**TECHNOLOGY ARE NOT BEING TAKEN BY SOME HUGE SCIENCE FICTION CHARACTER LIKE ROBOCOP**
PAN ACROSS CU	**BUT BY SOMEONE MUCH BRAVER**
	BORN WITH A CONGENITAL DEFECT OF HER LEFT ARM DAISY HARRIMAN FOUND
LONG SHOT, DAISY AND MOTHER WALKING IN CORRIDOR AT NOTTINGHAM HOSPITAL	**EVEN THE SIMPLEST TASKS DIFFCULT – UNTIL NOW.**
	DAISY WAS RECENTLY FITTED WITH THE WORLD'S FIRST BIONIC HAND; DESIGNED FOR A CHILD.
HEAD AND SHOULDERS DAISY PICKING UP PRODIGITS FORM THE TABLE AND INSPECTING IT	**NAMED PRO-DIGITS THE HIGH-TECH ARTIFICIAL HANDS TOOK OVER TWENTY YEARS TO DEVELOP BY BRITISH ENGINEERS AND DOCTORS.**
ESTABLISHING JOHN RONALD	**JOHN RONALD I/V SYNC:10:02:11:**
SUPER:JOHN RONALD, SENIOR PROSTHETIST, R.L. STEEPER	*There is nothing else in the world like a Pro-digit hand that can fit patients with trans-carpal hands/ That's to say the people who have got no fingers or no thumbs or the Distil Section of their hand missing/*
CU OF DAISY OPERATING PRODIGITS	*Daisy's hand works by, she's got a little push button, which is down at the residual limb, she pushed against it to make the hand open and close. One push makes the hand open and the next push makes the hand close/*
DAISY AND OCCUPATIONAL THERAPIST	
CU OF DAISY OPERATING PRODIGITS	
CU OF DAISY	
OT AND DAISY DOING PUZZLE AT TABLE	*The motors and the gearbox are inside the fingers and if you take the cover off, you can see inside there, there is the motor and there is the gearbox and the wires there that give it the signal to make it operate. When they come in to the training school they work with the occupational therapist, which is a very important part of the service/ It's like me giving somebody a car and not teaching them how to drive it*
JOHN RONALD I/V	
CU OF PRODIGTS CHILD SIZE MODEL	
ZOOM TO EXCU OF PRODIGITS STRIPPED DOWN	
TRACKING SHOT DAISY PUSHING PRAM WITH OT	
	A. HARRIMAN IV SYNC: 10:03:08: *She likes to ride her bike, it*

SUPER: AMANDA HARRIMAN,
DAISY'S MOTHER

gives her a bit more balance, erm push a doll's pram that's more balance. And she's just started trying to use a skipping rope, at school they do skipping, so she's, we're trying with that.

JOHN RONALD I/V SYNC:10:03:23:
Daisy's done very well because she was a little bit introvert when she first came to us and its given her more confidence than she used to have, when she first came here **/**
After we'd err fitted the children and we'd logged all the problems, we then thought it was a time to look at an adult

MS JOHN RONALD INSPECTING HAND IN WORKSHOP WITH MAGNIFYING LIGHT

CU REVERSE

BLIZZARD SNOW SCAPE ON LONG LENS

DISSOLVE TO ROSTRUM OF STEVEN BALL'S EXPEDITION

STEVEN BALL SYNC:10:03:46:15:
I was climbing in Alaska, climbing Mt McKinley it's the highest mountain in the USA/ about 4 miles vertically. We were stranded just below the summit in a really bad storm, stuck in an ice hole overnight/
I went off to organise a rescue the following morning… A huge chunk of ice broke away and took me down this ice shoot. I fell for nearly half a mile vertically and I broke both my legs on the way down/
I was stranded out on the mountain for two days. Overnight the temperatures went down to -50 degrees Centigrade and I was affected by frostbite. Frostbite took my left leg below the knee, have my right foot and all my fingers and a small section of the nose. Unfortunately, the only treatment for frostbite is amputations.

STEVEN BALL I/V
SUPER: STEVEN BALL, MOUNTAINEER

ROSTRUM OF STEVE SOLO CLIMBING

ABSRACT SNOW SHOTS

STEVEN BALL I/V

TILT DOWN TO SHOW AMPUTATIONS

STEVEN BALL & JOHN RONALD I/V WORKSHOP SYNC:10:04:37:30
How you doing, all right thank you.
How's things going. It's working well

FADE TO BLACK

TWO SHOT - JOHN GREETING STEVE IN WORKSHOP FOR CHECK-UP
STEVE AND JOHN IN R.L. STEEPER WORKSHOP SHOW AND TELL RE: HAND

JOHN RONALD I/V SYNC: 10:04:41:21
Stephen's hand/
is a more advanced hand to what

PICTURE	COMMENTARY/ SYNC
	we fitted to the children because he's got/
	two electrodes in the palm of his hand/
	STEVEN BALL & JOHN RONALD I/V
JOHN RONALD I/V	**WORKSHOP SYNC: 10:04:51:04**
JOHN AND STEVEHEAD AND SHOULDERS WITH PRODIGITS IN WORKSHOP	*That's you that's fine. And there's the two electrodes working there, that control it. You can see the marks there where they're working quite nicely on you there.*
CU NODDY STEVE	
CU PRODIGITS	**JOHN RONALD I/V SYNC:10:05:00:16**
STEVE AND JOHN IN R.L. STEEPER WORKSHOP	*One of them actually controls the opening and the other electrode controls the closing of the hand/ And this is again operated by the milliamps of electricity, which these little sensors sense when he actually operates the muscles in the palm of his hand.*
CU PRODIGITS	**JOHN RONALD I/V SYNC:10:05:14:05**
	The motors are in here and the gearbox is in here and there's a worm gear there that works on the tooth unit inside there. Now this is all mounted in silicone
CU NODDY STEVE	*and this part of the unique part about it is that it then gives you flexing to be able to flex your wrist which what you would normally do. You've got the two electrodes in the palm of the hand that control it, and of course to get in and out of it you've obviously got to have a zip, to get in and out of it. /You've got your battery in here your lithium battery. And also you've got your electronics in this section here. Then all your cables are built into the actual silicone to keep it/*
	all embedded in it and of course over all of this goes the silicone the cosmetic glove that
CU LITHIUM BATTERY ETC.	*gives it the realistic effect*
CU OF SAME	**JOHN RONALD I/V SYNC: 10:05:57:07**
	It's more important to Stephen than it is for Daisy because he's got two limbs missing and
HEAD AND SHOULDERS JOHN	*so he /*
GV'S DAISY AND STEVEN MEETING EACH OTHER AT CLINIC. (SHAKING HANDS)	*does need something that he can grip and hold things with that he wouldn't normally be able to do.*
	STEVEN BALL I/V SYNC: 10:06:07:06
	I've come to think of Prodigits as a useful tool. People hear the

JOHN RONALD I/V

whir of the motors/
which are very gentle, but it does sound rather robotic/
I don't think that Prodigits will ever replace a normal hand/
because it's a very, very intricate piece of equipment,
but it's getting near to it.

CUTAWAY OF PRODIGITS WORKING

CU OF PRODIGITS

STEVEN BALL I/V

FAST CUT SEQUENCE ON BLACKFRIARS BRIDGE (TO DEMONSRATE MOBILITY)

WS FROM BRIDGE TO BOAT

LS JOGGER THROUGH TRAFFIC

WS VIEW EAST FROM BRIDGE, TRAFFIC IN FOREGROUND

COMMUTERS ON LS

CU OF GIRLS LEGS WALKING

LS JOGGER THROUGH TRAFFIC

MS COMMUTERS THROUGH TRAFFIC

LA OF SAME

CU LA OF SAME

PULL FOCUS ON MAN ON BRIDGE

DISSOLVE TO ESTABLISHER OF BLATCHFORD FACTORY

SUPER: ANDY SYKES
ELECTRONIC ENGINEER, BLATCHFORD

SEQUENCE SHOWING IAN LOGUE ARRIVING IN ANDY'S CAR TILT TO FACE

LOW ANGLE REVERSE

ANDY SYKES I/V

V/O: 10:06:44:00
SOLVING THE PROBLEMS OF BEING DISABLED ISN'T EASY.

EVOLUTION PRODUCES HIGHLY COMPLEX SYSTEMS FOR BASIC HUMAN SKILLS LIKE WALKING OR RUNNING.

CAN WE EVEN REPRODUCE JUST ONE PART OF THE LEG.

ANDY SYKES I/V SYNC: 10:07:02:04
An ordinary leg has up to 50 muscles in and around the knee to help, help the person walk/
Our system by combining hydraulics and pneumatics emulates just a few of those muscles/

It's called the adaptive knee because we feel it actually adapts to the way the amputee wants to walk, so rather than the limb controlling the amputee/
the amputee controls the limb/
Ian Logue has been one of our trial amputees for at least 2 years now/
He has been on both prototypes, and pre-production and now production of units and has seen the evolution of the product over that time.

IAN LOGUE I/V SYNC:10:07:35:19
The control is a big feature for

IAN LOGUE ESTABLISHING SLOW TILT FROM GOOD LEG TO ADAPTIVE KNEE TO HEAD AND SHOULDERS

CU IAN'S ADAPTIVE KNEE

SUPER:IAN LOGUE, TRIALS PARTICIPANT, BLATCHFORD

CU TILT UP ADAPTIVE KNEE

IAN LOGUE I/V

CU OF ADAPTIVE KNEE

IAN LOGUE TRACKING SHOT USING KNEE ON STAIRS

CA INTERNAL ADAPTIVE KNEE

ANDY SYKES I/V

CA CU INTERNAL ADAPTIVE KNEE

ANDY SYKES I/V

IAN LOGUE CLOSER TRACKING SHOT USING KNEE ON STAIRS

REVERSE OF TRACKING ON IAN

PAN FROM BLATCHFORD COMPUTER SCREEN TO LEG PROGRAMMER

this particular prosthetic limb/
It provides assistance it feels safe, stable/
You get the best of hydraulics pneumatics and intelligence.

ANDY SYKES I/V SYNC: 10:07:47:16
This is basically, in essence the adaptive limb. This is the, the shin, and then within the shin you have the control cylinder, which, is both hydraulic and pneumatic, and attached to the control cylinder and to the shin is the knee mechanism/
which literally allows the amputee to bend the knee/
This is basically the control centre, which fits inside the shin/
it comprises of a hydraulic chamber, and a pneumatic chamber/
The hydraulic chamber provides what we call the stance control, which for instance gives you an extra resistance when you are going down the slope, or down the stairs. And then the pneumatic chamber/
basically acts like a spring almost in that depending on the resistance that is set/
it can actually have a very high resistance to swing, which limits how far the leg swings at/
fast walking speed,

V/O:10:08:35:22
MOTION DETECTORS AND MICROCOMPUTERS CONTROL A COMBINATION OF PISTONS SO THEY REACT LIKE MUSCLES AND TENDONS TO CHANGES IN SPEED AND TERRAIN.

EACH KNEE CAN ALSO BE TAILORED TO INDIVIDUAL NEEDS.

IAN LOGUE SYNC:10:08:48:02
You can programme the functions individually/
say for instance for coming down stairs, for walking down a ramp, for a stumble feature or to give you an extra stance support.
And, erm variable walking speed.

ANDY SYKES I/V SYNC: 10:09:03:14
One of our latest products is the Mercury foot/
Which basically comprises of two springs a spring for the toe and

IAN LOGUE I/V

a spring for the heel/
An evolution of that foot is the Mercury sports foot, which not only has an extended heel spring, and extended toe spring but also has an additional shock absorbing spring

CU PNEUMATIC GAUGE
2 X CU'S MERCURY FOOT ON TEST

ANDY SYKES I/V

CHRIS MOON I/V SYNC: 10:09:36:22
I'm a former Army Officer
I cleared mines /
for a charity in Asia and Africa. I was blown up five years ago. As a result loosing my lower right arm and leg. For me, as an amputee user, what is different about this foot is the natural feeling I get when I run. And that's because they've put in a lot of work into making the carbon-fibre/
spring transition very smooth. This is actually. It looks quiet simple but the design that goes into this is huge. They use a computer aided design system, a CAD system similar to the system they use for Formula 1 cars/
The materials here are very hi-tec/
This is carbon fibre, air-frame aluminium and a tungsten cylinder, which contains a shock absorber/
The design behind the spring technology has been very painstaking and that is what gives me this natural feeling/
It feels like a natural transition from heel to toe, to leg lift. It feels like it used to feel when I had a foot/
I think the best feeling of freedom again

TILT SLO-MO HS CHRIS MOON ON RUNNING MACHINE

SIDE VIEW MS

CU MOON'S FEET ON TREADMILL

MS MOON JOGGING ON TREADMILL

REVERSE CU MOON'S FEET ON TREADMILL

CHRIS MOON I/V.
SUPER: CHRIS MOON, TRIALS PARTICIPANT, BLATCHFORD

CU CUTAWAY OF MERCURY FOOT

GV'S COMPUTER AIDED DESIGN WORKSHOP.CU COMPUTER OPERATOR BLATCHFORD

CHRIS MOON I/V

CHRIS MOON I/V

CU OF MERCURY FOOT

CHRIS MOON I/V

V/O: 10:10:44:20
PRODIGITS, THE ADAPTIVE KNEE AND MERCURY FOOT SHOW MASSIVE IMPROVEMENTS IN RESTORING LOST FUNCTION TO THE DISABLED

REVERSE MS IN MIRROR

BUT, ONE LONDON COMPANY IS USING AIR POWER TO MIRROR OUR MUSCLES.

PICTURE	COMMENTARY/ SYNC
CHRIS MOON I/V MS	**THEIR NEW ROBOTIC ARM IS TRULY A SHADOW OF OURSELVES.**
HEAD AND SHOULDERS ON TREADMILL CHRIS MOON JOGGING, TILT DOWN TO FEET	**RICHARD GREENHILL I/V SYNC: 10:10:59:21** *The important part is that because we've used the air muscles and bundled them up in the forearm we can have all the movements, and we've in fact implemented all the movements that the human hand is capable of even the raising of/*
MS DAISY OPENING A SWEET	*The little finger joint here/*
MUSIC AND GREENHILL ESTABLISHER ROBOT ARM ON HIS SHOULDER	*I mean the NASA hand can do 12, the human hand can do 22 and the Shadow hand can do 22/*
SUPER: RICHARD GREENHILL, SHADOW ROBOT COMPANY	*So we've made a hand that, as it were can be taken off, and put somewhere else, so we call it a tele-prosthesis, tele meaning far So this hand can be doing something for you or particularly for someone disabled, somewhere else, far away/*
CU SHADOW ARM RASING DIGIT	*The air muscle which is something that we discovered back in the '80's/ and have developed ever since to do the sort of robotic tasks we need, is extremely simple device. It is simply just a rubber tube/*
RICHARD GREENHILL I/V	*and round it is a piece of braiding that is woven criss-cross braid. If we introduce some air, under pressure, it contracts/ And you will see, very easily, bends a six-inch nail. It does it very smoothly, the movement is just like a human/ And then we just let the air out and it relaxes again, but the nail is bent/*
CU SHADOW ARM AIR MUSCLE	*We can make big ones for big tasks, like your legs or the legs of larger animals, or devices, or we can make little ones, just for little fingers and so on. Just, just like nature, but we can't do it as well as nature, nature is still ahead of as at every step.*
RICHARD GREENHILL I/V	
GV'S SHADOW ROBOTIC ARM	**V/O:10:12:24:13 NATURE MAY STILL BE IN THE LEAD, BUT CYBORG SCIENCE IS CATCHING-UP WITH EVOLUTION.**
GV'S DEMO OF SHADOW AIR MUSCLE	**IAN PEARSON SYNC: 10:12:30:13** *We've suddenly discovered that actually nature has invented a lot of/*
CU DEMO OF SHADOW AIR MUSCLE	

PICTURE	COMMENTARY/ SYNC
RICHARD GREENHILL I/V	*really clever stuff out there, in the three or four billion years of natural evolution. Some of the ideas of nature are so brilliant that we can't help but pinch these things in engineering terms and see if we can use those as basis for new engineering developments.*
MID SHOTS OF SHADOW ARM MOVING **CU SHADOW ARM FLEXING AWAY FROM CAMERA**	**V/O:10:12:37:14** **OUR SENSES ARE ALSO CRUCIAL TO SURVIVAL** **SO HOW FAR CAN WE NOW LEARN FROM NATURE TO REPLACE THIS SENSORY CAPABILITY?**
IAN PEARSON I/V SUPER: **IAN PEARSON, FUTUROLOGIST, BTEXACT**	**CHRIS TOUMAZOU I/V SYNC:** **10:12:57:07** *We've been working in this group in this so-called area Bio-inspired Silicon/ now effectively, what we've been trying to do is to model the physiology of things like the cochlea out of silicon/ The cochlea is the heart of the ear, which when defective results in stone deafness. So, it's not the hearing-aid part of the ear, it's actually the brain of the ear.*
CU'S OF MODEL CYBORG SHOWING EYES EARS AND NOSE ETC	
RAMP TO ESTABLISH CHRIS TOUMAZOU	**V/O:10:13:21:03** **ONE CHILD IN EVERY THOUSAND IS BORN DEAF AND 17 PER CENT OF THE ADULT POPULATION SUFFERS HEARING LOSS.** **PROFESSOR TOUMAZOU'S TEAM THINKS SINGLE MICROCHIP CAN COPY WHAT A HEALTHY EAR DOES.**
CU'S CHIP ON TEST IN IMPERIAL LAB	
CHRIS TOUMAZOU I/V **SUPER: CHRIS TOUMAZOU, BIO-ENGINEER, IMPERIAL COLLEGE**	**CHRIS TOUMAZOU I/V SYNC:** **10:13:33:14** *Sound waves enter the pina or the ear lobe and these sound waves are then converted to pressure waves within the basilar membrane/*
GV'S OF CHILDREN AND ADULTS COVENT GARDEN	*Now, the basilar membrane is a very thin fluid filled tube/ Which effectively takes these sound waves and converts it into pressure waves along it's length/ Now, on the surface we have 24 thousand hair cells and these hair cells are acting as mechanical to neural transducers/ and they're the things that are*
GV'S TEST LAB AT IMPERIAL COLLEGE	

sending the signals to the brain.

V/O:10:14:04:09
INSTEAD OF THOUSANDS OF HAIR CELLS THE NEW COMPUTER CHIP WILL USE JUST EIGHT LOW POWER FILTERS TO TRANSMIT SOUND SIGNALS TO THE BRAIN.

CU TOUMAZOU'S COMPUTER PRESENTATION
CHRIS TOUMAZOU I/V
CU TOUMAZOU'S COMPUTER PRESENTATION

CHRIS TOUMAZOU I/V

CU TOUMAZOU'S COMPUTER PRESENTATION

CU GRAPHIC ILLUSTRATION OF PROTOTYPE BIO-CHIP

CU COMPUTER PRINT CIRCUIT OF MICRO-CHIP

CU BIO-CHIP

CHRIS TOUMAZOU I/V

CU BIO-CHIP
CHRIS TOUMAZOU I/V

SYNC CONTINUES IN ORIGINAL INTERVIEW POSITION

CHRIS TOUMAZOU I/V SYNC:
10:14:11:20
This the silicon chip. This is the bio-inspired silicon device/ that replaces the whole functionality of the cochlea. The chip uses something like a billionth of the power of a light bulb and is only/ 2mm x 3mm in dimension/ So the whole of the processing of the Cochlea, the physiology of the Cochlea is implemented out of low power analogue electronics . We're already looking at retinal implants. Again applying some of the technology that we've been doing for the cochlea, but looking at things either sub-retinal or out-retinal prospects. And the technology is such that we can hopefully allow blind people to see, but with technology that is cosmetically very friendly now. Unlike, the experiments that were reported a few years ago in the press with Steve Wonder for example. There, we are looking at retinal prosthetic device, but with the huge battery pack and huge pair of glasses/

V/O:10:15:13:10
WHETHER WE'RE DISABLED OR NOT, COULD INSERTING NEW TECHNOLOGY INTO OUR FLESH AND BLOOD HAVE OTHER BENEFITS.

KEVIN WARWICK I/V SYNC:
10:15:30:01
I think for years people have been looking at up grading the human body in science fiction yes, but way way back in history can we do something more with what we've got. Up till now, it's been technology on the outside, for example a car to help us go

	faster/ *now we are at the stage of actually taking it into the body.*
LS THROUGH TRAFFIC PEDESTRIAN WITH GUIDE DOG	**V/O:10:15:51:05**
CU ROBOT PULSATING DIODE LIGHTS FLASHING IN READING LAB	**READING UNIVERSITY LOOKS LIKE ANY COLLEGE CAMPUS. BUT THE HEAD OF IT'S CYBERNETICS DEPARTMENT BECAME THE WORLD'S FIRST CYBORG PROFESSOR**
KEVIN WARWICK ESTABLISHING SEQUENCE	**KEVIN WARWICK SYNC:10:16:00:13**
	In 1998 I had a silicon chip transponder/
SUPER: PROF. KEVIN WARWICK, HEAD OF CYBERNETICS, READING UNIVERSITY	*surgically implanted in my left arm, That was there for 9 days which is what we wanted for the experiment. What that did was send out an identifying signal to a computer in my building at Reading and we got the computer to open doors for me and saying hello as I came through the front door.*
WS 2CV ON ROUNDABOUT READING CAMPUS	**V/O:10:16:24:12**
READING CAMPUS FOGGY GV'S	**THE IMPLANT TRIGGERED SENSORS IN HIS UNIVERSITY**
CU CYBERNETICS SIGNPOST	**IDENTIFYING HIM, OPENING DOORS, AND CONSTANTLY TRACKING HIS LOCATION.**
	KEVIN WARWICK SYNC:10:16:38:01
LS OF RESEARCHER THROUGH RED FOLIAGE	*It's probably worse than punching the clock/*
KEVIN WARWICK I/V	*because you've got a choice with punching the clock. Here with an implant you're tracked all of the time. You go to the toilet, you leave the toilet, the computer knows exactly when.*
CU OF IMPLANT	*Physically I hardly felt anything after a day or two, it felt uncomfortable but then it was OK. Mentally it was a big surprise because I actually felt it was a part of me and because I had a computer sending and receiving signals from the implant somehow I sort of felt an affinity with the computer.*
TRIGGERED WALKING SEQUENCE OF WARWICK ON READING CAMPUS	**V/O:10:17:08:15**
	HAVING PROVED THAT IMPLANTED CHIPS CAN TRANSMIT FROM INSIDE THE BODY. THE READING RESEARCH IS GETTING MORE AMBITIOUS.
WARWICK COMPUTER MONITORING SYSTEM	**KEVIN WARWICK I/V**
KEVIN WARWICK I/V	**SYNC:10:17:15:02**
	The new experiment we've been

	working on another implant, again this is going into my left arm. This time we'll have direct connections onto the nervous fibres in my arm, sending signals by radio from the nerve fibres to the computer but also picking up signals from the computer, playing them down on to the nerve fibres.
KEVIN WARWICK I/V 1ST INTERVIEW POSITION	
	V/O:10:17:39:14 **BUT SENDING AND RECIEVING SIGNALS FROM THE NERVOUS SYSTEM MEANS THAT THE NEW PROTOTYPE WILL BE MUCH LARGER**
GV'S READNG CYBERNETICS LAB SOLDERING ETC.	**CU KEVIN WARWICK I/V SYNC: 10:17:46:02** *We are making a connection onto the nerve fibres, a hundred connections essentially and those we have to feed through here and transmit those out. Instead of one signals as from the previous implant we are looking at a hundred signals of my nervous system*
	V/O:10:18:03:02 **WARWICK'S TEAM HOPES TO RECORD ELECTRICAL NERVE IMPULSES LIKE PAIN OR MOVEMENT AND THEN REPLAY THOSE SIGNALS BACK INTO THE ARM TO SEE HOW HIS BODY REACTS.**
GV'S CAMPUS READING EXT AND INT **CU OSCILLOSCOPE**	**KEVIN WARWICK I/V SYNC: 10:18:11:19** *But also can we pick up extra sensory signals, signals like on some of our little robots, ultrasonic signals, can we send them onto my nervous system to give me an extra sense.*
GV RESEARCHER AT COMPUTER **CU WARWICKS ARM**	**KEVIN WARWICK I/V SYNC: 10:18:31:00** *The robots with the white faces we call the seven dwarves, there actually using ultra-sonics to sense the world around them a bit like a bay sense the world. For our new experiment I'll be having a sense just like them. In the future maybe I can have light sensors and even infrared sensors as well. We can look to enhance*

	the human in order to make us sense in all different ways/
	KEVIN WARWICK I/V SYNC: **10:18:58:22** *This robot now is just using ultra-sonic sensors and it's been set up to stay some distance away from me. As I move this way, c'mon .. it follows me just using ultra-sonic signals. There don't be scared Aaargghh*
ROBOT GV'S IN LAB	**KEVIN WARWICK I/V SYNC:10:19:25:17**
CU'S OF SEVEN DWARVES ROBOTS ETC	*With the new experiment it's really trying to push back the frontiers and look ahead. But there are all sorts of medical spin-offs ultra-sound going in as an extra sensory input for me maybe its an extra that's cool but for somebody who is blind it could be used to replace their*
CU SENSORS ON ROBOT	*blindness. To give them the ability to detect obstacles near by so, there are potential immediate spin offs but in the long term who know where it is going to take us.*
CU BTRACKING SHOTY OF DWARF ROBOT	**V/O:10:19:57:03** **WHEREVER WE SEE FUTURE RESEARCH GOING, ONE THING IS CLEAR. CONNECTING DIRECTLY TO THE HUMAN NERVOUS SYSTEM AND ULTIMATELY THE BRAIN IS THE BIGGEST GOAL IN CYBORG SCIENCE.**
	IGOR ALEKSANDER I/V:10:20:08:12 *We know very little about the brain. You must realise that the brain is the most complex machine on earth and that takes a little bit of time to unravel. The people who are doing it are neurologists, and they are trying to discover how the 10 billion neurons that we have in our head actually work together with one another/* *So in order to perhaps try and workout what the brain is thinking/* *by sensing it with some sort of microchip would be enormously difficult*
SHOTS OF MODEL EXAMINING CYBORG THROUGH MAGNIFYING LIGHT	**V/O:10:20:41:12** **CONSIDERING WE FIND IT HARD EVEN UNDERSTANDING PRIMITVE FISH**
CU MODEL CYBORG ELECTRODES ATTACHED TO SIDE OF HEAD	**BRAINS - CONNECTING HIGH TECHNOLOGY TO THE HUMAN NERVOUS**

PICTURE	COMMENTARY/ SYNC
	SYSTEM SEEMS IMPOSSIBLE.
IGOR ALEKSANDER EST AND SUPER: PROF. IGOR ALEKSANDER, NEURAL ENGINEER, IMPERIAL COLLEGE	**BUT IN CHICAGO THE CREATION OF AN AMAZING HALF FISH HALF ROBOT IS ALREADY PAVING THE WAY**
	TAKING A LAMPREY FISH THE RESEARCHERS REMOVE THE BRAIN STEM KEEPING IT ALIVE IN SALT WATER
	THIS DIS-EMBODIED BRAIN IS CONNECTED VIA COMPUTER TO A SMALL ROBOT
CU CHIPS ON WORK BENCH	**ELECTRONIC EYES ON THE ROBOT SENSE LIGHTS, SENDING SIGNALS TO THE BRAIN.**
IGOR I/V	**IN RETURN THE LAMPREY BRAIN SENDS IT'S NATURAL IMPULSE BACK TO THE ROBOT INSTRUCTING IT TO MOVE TOWARDS THE LIGHT.**
(CHICAGO UNIVERSITY PUBLIC DOMAIN FOOTAGE CLEARED) SEQUENCE CU LAMPREY LARVA IN BEAKER	**THE UNIQUE CREATURE IS PASSING SIGNALS BOTH WAYS FROM FISH BRAIN TO ROBOT AND BACK AGAIN.**
CU NEEDLE BEING PREPARED	**SANDRO MUSSA-IVALDI I/V SYNC: 10:21:29:03**
CU LAMPREY LARVA IN BEAKER	*In the cells that we are looking at in the Lamprey, these are cells as I say of a reticular formation, there's a particular structure that is in humans as well. And we hope that by understanding how this mechanism can control a simple robotic device we are a step closer to know how activities from cells in parts of the human nervous system/ can be trained to control artificial prosthesis.*
MS DISSECTION OF LAMPREY	
CU RESEARCHER LOOKING THROUGH MICROSCOPE	
WS RESEARCHER CONNECTS TO COMPUTER	
CU OF ROBOT WORKING DURING EXPERIMENT	
CU READINGS ON THE COMPUTER	**KEVIN WARWICK I/V SYNC: 10:21:58:22**
CU PEAKING COMPUTER METERS	*Other researchers have looked at animal brains, connected them to computers, and seen within the feedback loop how we can change how the animal thinks and so on. What I would like to do is to push as far forwards as humans concern and see how we change how the human operate using the same sort of feedback loops.*
SUPER: PROF. SANDRO MUSSA-IVALDI NORTH WESTERN UNIVERSITY	
	V/O:10:22:20:21 ESTABLISHING TWO WAY SENSORY FEEDBACK IS THEORETICALLY LEADING

	THE WAY TO NEW TREATMENTS FOR CONDITIONS LIKE BLINDNESS OR PARAPLEGIA.
	APART FROM MANY POTENTIAL BENEFITS ARE THERE ALSO ETHICAL IMPLICATIONS TO CYBORG RESEARCH?
HEAD AND SHOULDERS OF RESERACHER IN CHICAGO LAB	
	IAN PEARSON I/V SYNC:10:22:34:10 *We can see millions of opportunities for these new technologies but we don't know what people are going to accept, we don't know what people are going to try abuse and at some point we are going to need a lot of regulation to regulate what people can do with these various things. We don't even know what the capabilities will be but we have to protect the individual against the big brother type of abuse.*
GV'S WS READING CAMPUS	**KEVIN WARWICK** **SYNC: 10:22:53:17** *This is what's technically possible no/* *I believe we need very quickly international legislation and international bodies to oversee what is going on with implants. There are enormous questions as far as privacy of the individual and should you decide if you can have an implant and if not who else should decide. These are vital questions that need to be addressed not only now but also in the years ahead.*
STOP SIGN READING CAMPUS **RE-SUPER:** **IAN PEARSON, FUTUROLOGIST, BTEXACT**	
	V/O:10:23:23:03 **DEBATE OVER FUTURE RESEARCH IS STARTING.**
	BUT MANY SCIENTISTS ALREADY SEE US AS CYBORGS SIMPLY BY INTERACTING WITH TECHNOLOGY LIKE THE INTERNET, MOBILE PHONES AND EVEN MECHANISED TRANSPORT.
	ALTHOUGH TECHNOLOGY IS ALLOWING US TO DO NEW TASKS. WILL WE REMAIN THE SAME PEOPLE AS BEFORE?
CU KEVINS PHOTOS FROM FIRST OPERATION	**IGOR ALEKSANDER I/V:10:23:40:03** *We must retain our biological*

OPERATION

KEVIN WARWICK I/V

drives otherwise our entire raison d'etre on earth will, will change. How much of our systems we can actually replace by artificial, non-biological systems is an open question/ I think you very rapidly would get to the point where you virtually lose/ an individual's consciousness, if you put in too many chips.

V/O:10:24:09:20
DESPITE HI-TEC COMPONENTS IT'S IMPOSSIBLE TO SEE PEOPLE LIKE DAISY OR CHRIS AS ANYTHING OTHER THAN HUMAN BEINGS.

WS SUN APPEARING THROUIGH THE CLOUDS
LS ST. PAULS SPIRE ON DUTCH
WS ST. PAULS

LS GIRL ON MOBILE COVENT GARDEN

BUT COULD NEW DEVELOPMENTS MAKE THEM EVEN MORE ADVANCED THAN THE REST OF US.

WS BLACKFIARS TAXIS, PEOPLE TRAFFIC AND TRAINS ETC.

Andy Sykes I/V SYNC: 10:24:22:09
In the future limbs could be such that you could get a paralympic athletes that actually have to compete on a different level simply because they are better than able bodied athletes.

CHRIS MOON I/V SYNC: 10:24:30:10
It is very difficult to say at what point does a prosthetic become more efficient then a real leg. Will that ever be reached/ I think that the important thing to bare in mind about all of this it that this is about enabling people to achieve their personal best.

CU TOUMAZOU CHIP ON COMPUTER

IGOR ALEKSANDER I/V

V/O:10:24:52:19
EVOLUTION DEVELOPED USING TOOLS TO BUILD EXTENSIONS OF OUR BODY FOR GREATER SURVIVAL.

GV'S DAISY AND OT

CU CHRIS MOON ON TREADMILL TILT UP

SOCIETY HAS LONG IDOLISED PERFECTION IN THE HUMAN FORM AND THERE IS GROWING DESIRE FOR COSMETIC SURGERY

CU SLO-MO CHRIS' FEET

WILL WE NOW WANT TO IMPROVE ON NATURE BY UP-GRADING THE BODY TO INTERACT EFFICIENTLY IN MORE TECHNOLOGICAL ENVIRONMENTS?

ANDY SYKES AND CHRIS MOON WIDE 2 SHOT CHATTING
RE-SUPER: ANDY SYKES, ELECTRONICS ENGINEER, BLATCHFORD

Richard Greenhill I/V SYNC: 10:25:14:19
I think people are accepting the whole idea of robots much more than when we first started about 20 years ago. They are not so

PICTURE	COMMENTARY/ SYNC
	freaked out by it/ *I can imagine myself in a 100 years time being part human and part robot.*
GV'S ANDY AND CHRIS AT BLATCHFORDS ON TESTING	**IAN PEARSON I/V SYNC:10:25:29:12** *We are now living in a very interesting time, over the next 15 years we are going to produce computers which are almost as smart as we are. That's going to force us to start thinking what it really means to be human/* *We've never had to make those kinds of decisions before. We just get on with the business of survival.*
LODON BUILDING SITE SHOTS	
LS CLASSICAL STATUES IN COVENT GARDEN	
WS TRAMPOLINE BUNGEE MOVING THROUGH SAME AXIS	**V/O:10:25:45:02** **UNDERSTANDING TECHNOLOGY IS NOW A SURVIVAL TOOL AND INTEGRATING HUMANS WITH COMPUTER HARDWARE IS FAST BECOMING REALITY.**
POV FROM BUNGEE	
LA OF BUNGEE TRAMPOLINE	**KEVIN WARWICK SYNC: 10:25:53:12** *If we give our selves some of the capabilities that computers and other machines have/* *We can actually step forward and grab hold of more advantages ourselves. So it's a bit like a designer evolution, we can decide which way we go.*
RE-SUPER: RICHARD GREENHILL, SHADOW ROBOT COMPANY	
GV'S SHADOW ARM	**V/O:10:26:18:19** **SHOULD WE BE THINKING LESS ABOUT WHAT'S POSSIBLE IN CYBORG SCIENCE AND MORE ABOUT WHERE THESE TECHNOLOGIES WILL TAKE US AS A SOCIETY AND A SPECIES.**
RE-SUPER:IAN PEARSON, FUTUROLOGIST, BTEXACT	
	CREDITS: 10:26:29:03
IAN LOGUE AT BLATCHFORD WALKING INTO LIGHT	
CU HAND PACES CHIP ONTO CIRCUIT BOARD AT READING	
EXCU PAN OF CHIP	
CU DIODES PULSATING	
KEVIN WARWICK I/V	

TILT UP OF UV LIGHT ONTO CYBORG
CU OF TOE TAG ON FEET

TILT UP OF UV ONTO CYBORG CU OF
CYBORG HAND IN BRACELET

'METROPOLIS' STYLE PASSING OVER
MODEL CYBORG FACE COMING ALIVE

DISSOLVE TO PLASMA BALL
FOR END CREDITS ROLL

Narrator
NATASHA DESBOROUGH
The Edge wish to thank
DAISY HARRIMAN
NOTTINGHAM CITY HOSPITAL
NHS TRUST
R.L. STEEPER
CHAS.A. BLATCHFORD AND SONS LTD
IMPERIAL COLLEGE LONDON
LONDON COLLEGE OF FASHION
READING UNIVERISTY
NORTH WESTERN UNIVERISTY CHICAGO

Special Advisor
DR. JONNY BROOKS-SCOTT

Archive
NORTH WESTERN UNIVERSITY **ENDS**
LTV INTERNATIONAL

Hair and Make-up
JOANNE GATENS

Models
NINA VRANIC
HENNING UHLMANN

Music
QUANTIC
JON KENNEDY
CHRIS BANKS

Graphics
THISFUNCTIONAL

Sound
DARREN ROBERTS

Lighting Cameraman
VLADIMIR TRIVIC

Editor
VLADIMIR TRIVIC

Written and Directed by
DAN FARRINGTON

Series Editor
RON BLYTHE

ENDS