First dinner

It was a wet night in 1967.
I had been asked to give a talk to some group called the Real Time Club.

It had been explained to me that the members of the Club were busy
and important people,
so I should bring two other speakers
and we could each have 10 minutes of their valuable time.

The venue was an Edwardian house in suburban Ealing.
There were 7 or 8 members,
and with the 3 of us,
that meant the dining room was somewhat crowded.

My 10 minutes would have been about how
computers were going to change the world –
no longer would computers just be used for payroll and accounts.
New small computers that were cheap and reliable
would be connected into the world to control everything
from power stations to medical instruments.

Roger Needham from Cambridge would have talked about
the ways to design computers and operating systems
to be reliable and secure.

My third speaker was Nancy Foy,
a charming American journalist who graced the Club for many years.

At the end of our allotted 30 mins,
we were brusquely asked to leave the room,
because the Real Time Club had important matters to discuss
Some considerable time later we were recalled –
to be invited to become members of the Club.
One of the traditions of the Club had just been created.

Early meetings

The early meetings were also held at Dick Evans' house in Ealing –
I can recall one not long after, which was the farewell to Alan Marshall,
who had been the prime mover in the creation of the Real Time Club,
but was now leaving to go to Australia.
There were perhaps some 30 people present
comprising the Real Time Club and their guests.

The Club soon outgrew its first home,
and the tradition was established of dining once a month on a Thursday
at a restaurant in the centre of London in Fitzrovia or Soho.
We would take over the upper floor of a restaurant like Leoni's or Quo Vadis
and the food and the wine would flow –
as would the conversation.

Our meetings were raucous –
the speaker would be lucky to manage 5 minutes
before the questioning and heckling would start.

Voices would be raised,
rolls would be thrown,
and I can remember at least one occasion when a fight broke out.

By this time, some semblance of order had been established –
We now had a chairman, Stan Gill, from Cambridge -
who had invented the concept of the subroutine,

and, even more important, a secretary –
Mike Plumbe –
who for many years was the Real Time Club
and guided us serenely from one disaster to the next catastrophe.

Early members

The early members of the Real Time Club
came mostly from the software houses.

You should understand that to be successful,
a software house had to be good at writing contracts
rather than being good at writing software.

Following a competition between some members of the Real Time Club ,
I placed a contract to write a Fortran compiler.

When it was delivered, the compiler was slow –
it was a three pass compiler,
but the main problem was that run time system would not work at all –

when I complained,
it was gently pointed out that
I had specified the software should compile in a 16KB system,
but there was nothing in the contract to say
the compiled program had to run in a 16KB system.

This was the first software contract from a new company called . . . . .

As well as the software entrepreneurs,
there were journalists,
the first being Hedley Voysey, to be joined by Chris Hipwell and Rex Malik;

there were academics like Bob Parslow from Brunel
and Peter Kirstein from UCL,
who almost single headedly defined the way the internet works;

there were technologists like Donald Davies from NPL,
who invented packet switching,
civil servants like Brian Oakley and Reay Atkinson,
and politicians like Ken Warren, Eric Lubbock, the Lord Avebury
and Ken Baker, our only ever Minister for Information Technology.

The Post Office

The Real Time Club comprised geniuses and charlatans,
successful entrepreneurs and the less successful.
It had diverse ambitions and even more diverse opinions
But the club was united in just one thing –
an overwhelming hatred of the Post Office.

At that time, you may remember,
the Post Office had responsibility for the telephone system.
The Post Office had outstanding technology in its research labs at Dollis Hill –
after all, it had engineered our first computer at Bletchley Park,
but its management had not progressed since
the Victorian days of Anthony Trollope and Roland Hill,
and they had no understanding whatsoever of the potential of computing.

Now Dollis Hill had developed a 64Kb digital service
to carry multiplexed digitised voice signals.
We wanted just one 4Kb channel of this to be reserved for computers.
We lobbied, we shouted, but the Post Office would not listen.

We even conceived the idea of what is now called a denial of service.
The telephone exchange at Whitehall was antiquated
and only had some 12 lines.
My computer, the Modular One could easily overload the exchange
so we could completely block the business of government.

The publicity for our cause would be enormous.
Fortunately, we had cold feet and the idea never went ahead.
The risk of a long prison sentence outweighed even our campaigning zeal.

We have won

50 years have passed and,
do you know what –

We have won.

If you go on the tube,
90% of the commuters will be doing data entry into their computers –
aka iPhones.

The world is digital.
Telecommunications are digital;
computers are everywhere
– from washing machines to cars,
from satellites to light bulbs.

I am appalled

Am I proud of our achievements?

No, I am appalled by what we have done.

The computer systems on which the whole world now depends

are inefficient,
they are insecure and
they are lawless.

Inefficient

We are saved from acknowledging the inefficiency of our systems
by just two things.
The relentless advance of silicon technology has hidden the issue,
but even more significant is the fact that software is invisible.

If it could be seen, would our software systems match
the perfection of a classical greek temple,
or the soaring glory of a gothic cathedral,
or even the spare beauty of a modern bridge.

No, if they were visible our systems would be seen as
misshapen lumps of software
piled untidily on top of one another in an unstable heap,
propped up here and there by the odd protocol or standard.

But, not only do our systems misuse the hardware,
they misuse the user -

Think of our poor commuters poking with one finger at
a minuscule keyboard and looking at an inadequate display

Do you know, Bill Gates has single handedly
wasted more man hours than any one else in human history.

Insecure

But, worse than this, our systems are insecure.
Our computer architectures are based on 1950s concepts,
our operating systems date from the 1960s
and our user interfaces were innovative – that is, in the 1970s.
Roger Needham told the Real Time Club how to design secure systems,
and yet it is still possible for a virus to cause a buffer overrun
and disrupt an unprotected operating system.

The consequences of all this are just being recognised by the world at large,
after the recent global ransomware attack which disrupted the NHS,
the cyberwar attacks on the American and the French elections
and the recent hacking of MP's information here in the UK.

You know, it is very odd that Joe Bloggs and John Doe
will not entrust their routeing information to MI5 or the FBI
whose role it is to keep them safe,
but yet are happy to send their personal data into the cloud
to be looked after for free by kind Mr Microsoft or seductive Miss Apple
– now why would these companies want to do that?

Even more odd is our own attitude.
Our business depends on information having value.
In the past information has been protected by the fact
that it has been difficult to copy.
(In the middle ages contracts were not even copied –
the contract was torn into two and each party had half)

Laws, like copyright law , depend fundamentally on the difficulty of copying.
And yet every computer from Babbage onwards
has had as its basic instruction the copy command.
The uncontrolled use of that copy command
destroys the value of information.
Yet information is OUR business.

What are we doing?

Lawless

But, worst of all, our systems are lawless.

The ascent of homo stupidens has been based on the use
and the misuse of technology.
Since the first Neanderthal picked up a rock to kill a pig,
we have recognised that technology can deliver both good and evil.
Thou shalt not kill (at least, not your friends)
was the first law to control technology.

Each successive technology has brought its own restrictions.
For example,
your car must obey speed limits,
you must stop at red lights;
your car must be tested each year for roadworthiness.
If you transgress, you are punished.

But we, in our arrogance, have said that IT is different.
Information technology should be free at the point of use,
and the user should be free to do whatever he wants with the technology.

How wrong we are.
Information technology has become the infrastructure of our civilisation.
Civilisation is based on the rule of law.
So law must rule our computers.

To own a gun,
I must have a licence
and even then I can only use the gun for specific purposes.
If I kill someone with a gun, I will go to jail – or worse in some countries.

In information technology, encryption is just as dangerous as a gun.
Its use needs to be controlled –
users should be licenced,
they should obey laws,
like making the unencrypted information
available to the appropriate authorities, in specific circumstances,
like a court warrant.

How arrogant it is of Apple
to argue that the should not be regulated by the same laws
as land line telephones.

How arrogant it is of Facebook or YouTube
to argue that they should bear no responsibility
for the information they disseminate.
These companies need to be regulated by laws which are as strict,
or stricter,
than the rules that govern conventional publishing.

Information as the future

But what of the next 50 years?
I have seen the future and Information Technology works –
the future is information.

Physics

Physics is about the material world – or is it?

Here, I have a system –
a black ball and a white ball, or they could be two quarks.

I separate them; now I have no idea what colour is in my right hand
But, if I look in my left hand, I see a white ball – so I know that the ball in my right hand must be black.
That is the basis of entanglement –
Einstein's spooky action at a distance.

Entanglement is all about information.
Of course the reality of quantum physics is far more complex than this,
but the latest information based ideas of partial entanglement and regret offer a new way to understand the world.

More than 50 years ago, John Wheeler said "It from Bit"
and today it is increasingly being recognised that
information is fundamental to understanding physics.

Biology

150 years ago, a polymer was discovered in the cell.
It was present in large quantities,
but its function was not understood.
It was generally regarded as a structural element of the cell,
and as not bring very important.

In the 1920s, a Russian called Koltsov
hypothesised that there was a giant molecule in the cell,
which contained the information to define the genes of Mendel's theory

By pure logic,
he deduced that this molecule consisted of 2 mirror image strands,
which separated to replicate,
he also suggested that this was the function of the mystery polymer,
and even that the molecule had a spiral structure.
For this, Koltsov was sentenced to death, then reprieved by Lenin
although he was ultimately killed by the Russian Secret Police.

Today we know that DNA is nature's memory stick.
We know that it defines the 18,000 different proteins
that are the building blocks for homo stupidens.
But that represents less than 2% of the information in the memory stick.
For many years it was thought that the remaining DNA was junk –
how foolish,
of course it defines the plan
by which the proteins are assembled to make the human body.

So information is fundamental to understanding biology.

Intelligence

But the biggest challenge we face is
understanding how the human brain works.
We here all accept that the brain is an information processing system –
that is,
it is a computer of sorts,
but how does it work?

The best instrument that we have to observe the brain is the PET scanner,
which has a space time resolution of about 1 millionth
that required to observe the operation of individual cells in the brain.

But even if we could observe the detailed operation each cell,
we do not have the methodology to understand how it works.

To take a simple example, consider two printed circuit boards.
Both contain a microprocessor, some memory and a few peripheral chips.

How, by observing the signals between the chips could I deduce that
one board is a harmless word processor
but that the other controls a lethal cruise missile.
I have no idea.

That is the reason why I have always poured scorn on the idea
that the singularity,
which is the point at which artificial intelligence overtakes
the intelligence of homo stupidens
could happen any time soon.

But I now realise I am wrong.

This is due to a young Japanese computer scientist.
He came from a poor farming background,
and his parents grew carrots.
He decided to help them.

He took some three dimensional pattern recognition software,
and a simple classification program,
and had the computer track his parents as they sorted
the good carrots from the bad.
Within 2 weeks,
the computer system was better at sorting carrots than his parents
who had 40 years of experience.

We do not need to understand in detail how the brain works.
Intelligence is no more than the classification of big data.
The singularity will be with us well within the next 50 years,
and our own Demis Hassibis will be awarded
the most prestigious Nobel prize ever.

The future

The future is information.
The world will see more change in the next 50 years than in the past 500.

The countries that are successful will not be those that tax more,
or tax less,
but those which use information technology to build a stronger economy.

So, I set the Real Time Club two challenges for the next 50 years.

The First Challenge is to put right the problems
we have created during the past 50 years.

The Second Challenge is to make our government understand
the essential role of information technology
for the future success of our country.

I look forward to seeing you at our 100th anniversary dinner –
for we shall all surely still be alive –
although I wonder how many members of the Real Time Club
will be homo stupidens,
and how many members will be robots or androids or cyborgs.

I wish you well.