Bulletin of the Computer Arts Society   Spring 2011

CHAIR'S LETTER

I've often thought that the Computer Arts Society has two faces, rather like the Roman god Janus who presided over the New Year. One face looks back into the history of our area and encourages the study of its past, a history that CAS has been closely involved with during its 43-year existence. The other face, just as important, looks forward and tries to discern new artists, movements and technologies that will shape the future of the computer arts.

On 12-13 March I was privileged to be part of an event at the Birmingham Thinktank planetarium that was very forward-looking... and backward- and sideways-looking too. This was Fulldome UK 2011 which showcased the emerging medium of fulldome digital animation and interactive content. CAS supported this event that brought together over 100 people across two days of dome-based art, animations, interactive presentations as well as lectures from experts in the field. Additionally a wide cross-section of the public came to see the screenings each afternoon. Through digital projection, the dome is becoming a new venue for digital arts experimentation, as many of the digital artists in the audience agreed. A growing international movement of technologists, artists, musicians and developers is coalescing around this new medium. See http://www.fulldome.org.uk

It's typical of CAS's experimental heritage that we were into domes from the beginning. The computer arts show at Computer 70 featured an innovative artwork that distilled the best of the early CAS spirit: *Ecogame*. This multimedia game was housed in a dome where players used computer terminals in a multi-user simulation where business decisions were linked to social costs. Not only did it feature real-time computer feedback, including interactive graphics, but a system of computer controlled slide projectors presented images arising from the players' decisions, projected around the interior of the dome.

John Lansdown described it as "an algorithmic game created to illustrate the decision logic of computing in management." *Ecogame* was one of the high points of the early CAS, and brought its numerous interests together in wholly new form. As Lansdown explained:

It soon became clear that there would be no shortage of bold and imaginative ideas for the project and all who participated in those early sessions grew very much aware

of the creative potential of the multi-disciplinary group which had formed to design the feature. Programmers, painters, behavioural scientists, sculptors, analysts, architects, electronics experts, composers, all had something to offer and sparked original and often exciting ideas from one another. The atmosphere of these first meetings was indeed euphoric and it seemed that possibilities were endless." John Lansdown, "The name of the game is…? A personal view of the Computer Arts Society's project." *The Computer Bulletin*, Vol.14 No.9, September 1970.

The project created great interest and George Mallen's company System Simulation Ltd, was subsequently commissioned to implement a version of *Ecogame* in Davos for the First European Management Forum in 1971. This later became the World Economic Forum and we believe that the *Ecogame* gave many influential political, business and environmental figures of that time their first experience of an interactive, multimedia, game illustrating serious points about emerging environmental problems.

I would like CAS to recapture this spirit by initiating new projects in the same vein as the *Ecogame*, EVENT ONE, Interact and the others. It is not simply about bringing computer artists together or reaching new audiences: the computer art field now has a plethora of groups and individuals doing that on a regular basis. It is about discovering new ways to engage with the computational medium that also develop ideas floated some forty years ago, but fusing them with contemporary thought and technology. I think CAS is uniquely able to do this by bringing together the past and the future through the broad interests of its members and all the networks they belong to as well.

The Thinktank dome is only one of a series of events that we are planning over the next two years, and I invite all CAS members to get in touch with the Committee to share new ideas that CAS could help to ealise. As Barbara Rose said of the Pepsi Pavilion, another successful dome-based project produced by Experiments in Art & Technology for Expo 70 in Osaka, Japan, it was:

An unprecedented structure with unprecedented capabilities for visual, aural and theatrical experience.

All CAS projects should end up with something unprecedented and challenging that extends the perceptions of all participants.

Nick Lambert

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~~assume~~ if there is any validity in what I <u>have</u> been thinking -

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~~Questions~~ *Metzger*   Could I just lead into my first question, *here* which is that in The

Dymaxion World of Buckminster Fuller' by ~~Marchs~~ *Marks* there is a

picture of research students at the Institute of Design in

Chicago, 1948 testing your ~~Fog Gun~~ *fog gun* - well the question is:

at the time that you produced this idea, were you aware that

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Raw Transcript of an Interview with R Buckminster Fuller
by Gustav Metzger and Alan Sutcliffe
Oxford, March 1970

Fuller:

... [0] I took various actions. But today I've seen becoming into phase and more and more people want to hear, and I assume if there is any validity in what I have been thinking - and it seems to be valid by virtue of the actual projections I made of things that might be going to happen, they seem to be happening right on schedule, and that really tends to accredit me to the (particularly to the young) world; so in as much as they want to know, you have a fundamental responsibility to be sure to give it to them - if you have anything that may be useful at all.

Metzger:

Could I just lead into my first question, which is that in the *Dymaxion world of Buckminster Fuller* by Marcks[1] there is a picture of research students at the Institute of Design in Chicago, 1948 testing your Fog Gun - well, the question is: at the time that you produced this ideal were you aware that this is a kind of technology that fits into the development of space flight: were you concerned about living under the space conditions - in 1948?

F: In 1948? No, nor in 1927 when I conceived of the Fog Gun - shows how the lags go between 1927 and 1948; that's 21 years before I even had a group of students who were interested in trying to do it; and from there on several groups - first the group in Chicago and then students at Yale - and we really demonstrated quite clearly you can clean the skin really effectively with air under high pressure. Water, if you - due to the kinetics (thats the weight of the water) - if you needlepoint it you get so it breaks our skin; but you can get the good air, which has very little weight, under very high pressure and not bruise your skin at all. Furthermore, our skin, as we began to be able to demonstrate, using a microscope making photographs of human skin - we would take a human hand with different types of dirt, we were able to classify different dirts and --?-- which hasn't any dirt; and we had a holding device made by a plastercast of the hand which was held so that it did not move, and we had it on a lathe (this holding thing), and then to have the camera mounted on a microscope, and we were able to make microscope photographs which really raised the dirt on the fingers. Its really like our skin looks like a coral reef – really open coral - and what happens is the air under pressure gets in underneath, and the oxygen gets there and literally it oxidises the top molecules and they simply release, and thats whats going on with the skin anyway; so it simply accelerates the skin surfacing - so this became a beautiful way for your skin to become clean, because, simply, the molecules which are about to release anyway get accelerated by more oxygen, and they all just blow away.

M: Is this kind of technique in use now in the American space programme?

F: I'm not a promoter: you cannot be a scientist and have prejudices and biases - and you can't be a promoter: what you find out cannot be accredited; nor do you really find out very much. So I make findings and I reduce them to practice: I'll make the two [tool], I'll make the experiment, so we know what we're talking about, and then I find that from there on it is not long before emergencies occur and people have to employ what you've found.

M: Well, could I ask you this question, that - again, I've been studying this very interesting book by Marcks, which is the best on ...

F: You just ask anything you want, Sir.

M: Yes. The multiple deck 4-D house, 1927: you have this idea of a Zeppelin[2] carrying this tower, and there is a series of drawings -

F: Yes.

M: Then the first thing it does is to drop a bomb to excavate the site.

F: It makes a crater, yes.

M: Yes. Now, what I was going to ask you is a philosophical question in a sense: the idea of using destruction in the process of construction ...

F: Using what?

M: The idea of using destruction integrally with production …

F: This – this is –

M: In the project.

F: Oh man! In 1927 I wanted to demonstrate a way of doing something - if you know anything about your patents - patent law - you must be able to demonstrate to the patent examiner how you do it. You can't just say, I will in some way or other get something done: you must show a way. I wanted to show a way of delivering a 10-deck building, all completed, by zeppelin[2]. We had – Linoggi [the *Norge*][3] had made a trip - the Italian - to the North Pole just as I was writing (this was the year of Lindbergh's flight[4]). The data on the *Graf Zeppelin*[5] was not published until another year, when she was about to be built. I had been calculating whether I could really take the weights out of a building to such an extent that it might be air-deliverable. I wanted to be able to deliver in the Arctic, where man had not been able to live: I wanted to be able to go to an environment where nobody could exist at the time - with an environment control; make an air-delivery so people could immediately go inside it and not have to - they would not have work to do outside. They would not have to do the installation and freeze to death doing it. So I had finished my calculation of my building and found out what it weighed when the *Graf Zeppelin* data was published, and I found she did have the ability, not only to lift my building, but to cruise to the North Pole. So I then wanted to show how you would make an installation. Now this is in the ice, and to drop a bomb into ice I don't think is destructive, even mildly. I want to demonstrate how you develop a discrete crater, into which you would then lower, and be able to plant like a tree, and go away.

       This would have easily made what they call a soft landing, like a soft landing on the moon today, if I had used legs - if I'd had it come down on legs. But that would have given me a little more weight; I didn't want that. So this was not - I do not consider a bomb destructive *per se*. It depends where the bomb - where it bombs.

M: Well this is the point I was raising.

F: The sun is a bomb, and I don't consider it destructive; our light comes from it.

M: Yes, a point.

F: These are mainly words, you see.

M: Do you think possibly we could go onto computer art, which is – could we possibly go onto the subject of the computer and the Arts, which is, which is the main field in which we are working - Mr Sutcliffe, for example, is working with music; I am more interested in sculpture and graphics.

F: I have quite a number of my students and friends who are engaged in that in various parts of the world; in Japan and America particularly, that I have talked with them about it - and not only the music of course, but with the visual part. In the Los Angeles area too, the father and two sons, who have been extremely ...

Sutcliffe: The Whitneys[6] ...

F: The Whitneys, yes, they are very good friends of mine, and I've used my platform to let people know about them; they're moving forward quite rapidly. But its potentials are very, very great, of course in that: in producing music or graphic.

S: Yes, I think John Whitneys' film *Permutations*[7] is one of the now outstanding achievements in this area.

F: Yes, yes it is.

S: I mean many people have worked in an experimental but not altogether successful way, but I think thats ...

F: Yes. I think John Whitney and I will probably produce something together one of these days; we've been talking about it.[8]

M: What would it be – what would this be, if you do something together.

F: Well, I have a whole new area of mathematical exploration, and I would employ the insights I've gained through mathematics, and the computer would make it quite possible.

M: To produce film?

F: I really - there's not very much we could put on the tape which would elucidate because I would have to go into my whole mathematical exploration to give as a basis of understanding --?-- so I'm just going to say that I have made a number of mathematical discoveries,   and I'm quite confident I've found the mathematical co-ordinates - co-ordination - that is employed by Nature and all her chemical associating and dissociating; and its all rational, and it becomes a very useful kind of mathematics to evolve music. I was thinking really of evolving music in an omnidirectional manner rather than thinking of it in a linear composition as we ... as we think. Notation has been linear, but the music actually is emanating, its going in all directions and ...

M: So you intend yourself to work in the field of computer art soon?

F: We have a --?-- [our brain is a] computer, so we've been at that a long time.

M: This of course is of great interest to our Society.

F: This is why I presume you employ the computer - we've externalised the computer from our brain and it does nothing our brain doesn't do. It doesn't do

anything our mind does, but it does what our brain does: it can be employed as our brain is, to devolve all kinds of extraordinary compositions.

M: And your interest is mainly computer music then?

F: My interest is the Universe, old man, not mainly anything. Mainly the Universe!

M: But I mean if you are actually going to produce ...

F: And by Universe I mean everything.

M: If you are going to produce an output connected with the computer, would it be music or film?

F: I don't do what I consider really very - man has become so specialised that he has everything in categories, and if it isn't in the book he doesn't want to have it in his university, and I don't operate that way; I'm a comprehensivist.

S: Are you thinking that what you might do might be connected with the *World Game*, which is, as far as I know, your ...

F: I just don't know what its connected with: I'm an explorer.

S: Yes.

F: Everything is inter-connected: the whole Universe is, so I've ...

M: Yes, this is one of your great contributions, this; to spread this approach; its most helpful.

F: It all has to do with - much more than aesthetically, this - psychologically, this - the sounds, the persons in this room, the echoes, are all affecting us, all the time. And particularly where, as I am, with hearing aids, because the hearing aids are amplifiers, and my kind of deafness has been brought about by great noises; and I'm afraid our young are going to be in great trouble because they've turned up their music much too loudly. I thought I was so tough when I was young, as young people think themselves, always. I had a better-than-normal hearing, by the rating, for instance, in the Navy[9], and I would not put cotton in my ears as other people did with guns and engines and boiler-shop crashings; and I didn't know that its about a 20 year or 30 year attrition: your nerves get killed one by one, and they die very slowly; and about 30 years later I began - my hearing was going: a number of these nerves have been killed. But if we have a line thatscalled Normal Hearing I would start and have this - these are our frequencies, going this way: I start with the *Queen Mary* whistle[10] about Normal, and from then on I drop off very badly. Then I begin to come back, and just about - I begin - I cross Normal 3 or 4 times, but right at the range where more nearly its womens' voices, or human voices around here, and then I drop off again below the Normal. So theres a sort of a ragged crossing: better than Normal, and very deaf. For me to put speech together - this is just where speech occurs - I have to amplify the very poor ones enough to fill in between the ones I do hear. Well, it means then that all they've made so far is amplifiers: they're not like our eye glasses at all; they're not made for discrete problems. And so everything is amplified, therefore when I'm better than Normal its amplified even more, so it is roaring, and I get all the echoes from all over the place and it gets all washed together, so its an absolutely horrendous noise. A roomful of people speaking at cocktail parties; I wish I could have this put onto a loud speaker so that people

could hear the kind of things you hear: its unbelievable! The doctor said, The human brain is so remarkable, if you will submit yourself [to] having this awful experience for - it will take about two years - gradually, the human brain is so extraordinary, you begin to pick out and discern what it is you need to hear and it will tend to make you overlook what you don't want to hear.

M: Of course this is what the eye does, doesn't it? The eye functions ...

F: So this is what is going on with me, so I am actually able to converse at cocktail parties today; yet even today it is quite awful, but by concentrating on you I find the brain is doing that, and I'm picking out what you're saying and paying no attention to the rest of this row. This tells me then: I speak to you about environment: I'm very very aware of hard rooms; the acoustics of these rooms make a very great deal of difference to these hearing aids. So I'm sure that because young people then do feel tough we're not paying anywhere enough attention to what the sounds are really doing to us - and yet they are doing things to us, that is the point.

     So I'm interested in Art, whether it's visual or sound or soforth, as part of the living environment; and I'll just give you my definition of environment: to each human being, environment is everything that isn't me. Environment is the rest of the universe: all the universe that isn't you; nothing else.

     And – because that's - all the rest is the thing thats going to affect you all the time.

S: Going back to what you were saying at the beginning about having gone through many years of - well, of obscurity: I think its interesting that this is parallel with Samuel Becket[11], who, in a way, is the reason for you being here. I think he also spent many years as an unknown figure, and I believe, also like you, went through a period of, you might say, of silence. You find yourself especially interested in his works; and how did this ...

F: I've only come to know his work since I was asked to do the theatre.

S: Yes ...

F: I met him first with the model of the theatre. I had had, from Francis Warner, Beckets very powerfully expressed desires for the theatre. He wanted to go all the way from classical stage through proscenium to arena and we had the limitation of having to be underground; we couldn't have a fly tower; he had to have a superior theatre, not a compromise. We were able to evolve such a theatre: I had a very fine model made by one of the young men in my office. I presented that to – presented it and explained it - to Beckett in Paris last summer; first time I ever met him; and I had heard that he was not easy to meet; not easy to know. He was both shy and almost deliberately reticent, and I did not hope for a very favourable meeting. So I think it came as a surprise to both Beckett and I that we really liked each other spontaneously.

     He liked the theatre; he wasn't just - he didn't just acquiesce; he was enthusiastic, and because of getting to know the man at first, then I've become interested in his work. I don't have much time just to do what we're doing here now and so forth in my life, to do all the reading I want to: I would like to be reading much more of Beckett - and I will; and in due course see --?-- [plays]. We'll have a little Becket tonight.

M: Is it tonight?

S: Well, they were rehearsing at the theatre.

F: It is tonight.

S: Perhaps you could say something about the *World Game*, which I believe you proposed originally for Expo[12] and it was not accepted - the idea [dome] was accepted but the project wasn't ...

F: It is going ahead ...

S: And – and work is going - I've seen some work going ahead.[13]

F: It is progressing quite vigorously.

S: Yes ...

F: They are really back in there and are installing the building, and will play the game. I mean, they've already appropriated the money and it is actually charged into the computers and so forth. We have a special computer, not as --?-- in Illinois but we have wired connections from it to --?-- in Massachusetts.

S: Yes.

F: The *World Game*: I have been playing it for a great many years - since 1927 - and very quickly my Navy experience taught me about war games and Navy being Ocean, and Ocean covering three-quarters of the Earth, and in fact embracing the Earth, the Navy was inherently "World", whereas Armies are local. They can maybe move from one locality to another, but they think locally, and the Navy must think World. And so the Navy war games; War College, where you have the leading experienced officers who seem to be most given to it: simulating various operations around the World: what would happen if you do this; what would happen if you do that, and I saw that whole War Game was being played on a basis of a big working assumption of all great States that there is not enough to go round - assuming that the vital statistics that Thomas Malthus had - he was the first economist to receive all the vital statistics around a spherical Earth - up to this time great Empires had been thought of as Planar and going to infinity; this was the first closed system; and so Malthus - the first total economic data from the total enclosed system found that man – humanity - seemed to be multiplying itself at a geometrical rate, producing food to support himself only at arithmetical rate. Therefore it was a working assumption that man was born to be a failure; and then right on top of Malthus came Darwin with survival only of the fittest to explain his evolution; and we have man then assuming that theres nowhere nearly enough ground: survival only of the fittest, and we have the two extremes, the great Powers running the Oceans and they had the most information, the best informed, the best equipped to defend themselves, and therefore they were the ones who became most fit and most considerate of all the power means, would survive.

We have Karl Marx reading the same data of Darwin and Malthus and agreeing with the premise that there was nowhere near enough to go round: somebody's going to have to die, and the ones who survive will be the fittest - said it's the workers who understand how to handle the seeds and the chisel, and who know how to work the resources of nature, who are the fittest, and the others - the others are parasites - depending on their capabilities; so Marx then had the worker as the fittest and the great Powers had the great Powers as the fittest, so that we have - all the political considerations are somewhere between them. But I saw in my Navy game - this then was the working assumption of why you had to inventory

everything man had discovered in physics and chemistry, mathematics, and be able to produce them in hitting power and mount them on this - enormous - enormous complex weight on the floatability of a ship; to be able then to have your final showdown between Nations - at - at the sea: whose going to control the great lines of supplies interacting all the resources around the Earth - because of resources being very unevenly distributed, and each and each one having its own unique excellence in giving high performance.

So I said - I see that - I was very excited in the Navy to realise that this floatability of the ship, in contradistinction to the fortress on the land, where man felt that the bigger and higher and thicker and heavier the walls the more secure he was - and incidentally, in my early Navy days this was still - a fortress was still a very effective device. So man on the land, where 99% of humanity are, thought of bigger and heavier, more inert as greater security - and the bigger the bank account, and so forth.

On the sea it was exactly the other way: survival and security was - given a given-size ship, by the displacement principle of Archimedes - two ships of the same size have the same volume whatever their data - whatever the weight of that water is - of that volume - thats all you can float. So given a certain amount of floatability, whoever had on board within that floatability that which gave the most capability for the same weight would be the one that stayed on top, and the other one went to the bottom of the Ocean, and it was all over, and he never told any of your secrets that way. In the Navy everything waited for contact, because nothing was a more highly classified secret than how you get more performance per pound, so if it came to the critical moment - the crucial moment - you'd demonstrate greater hitting power even though it was the same weight of material; and you could hit at a little greater distance with greater accuracy. So, the Navy became the breeding ground for doing more with less. Then out of that Navy "more with less" came the airplane - in fact all the design of the airplane was still done in nautical technology. It was simply the naval architecture went into the sky, with stations, the whole game

So suddenly the airplane dramatised how to do more with less; we went from the airplane engine, the automobile engine before World War I weighed the same horsepower - delivered horsepower. By the time I was doing my 1927 work 14 years after World War I the automobile engine still weighed the same per horsepower; seven pounds; and the airplane engine had gone down to less than one pound - the same reciprocating engine was just demonstrating that when you get sevenfold of the performance per pound - this told me that there was absolutely implicit in the science of the Navy, and particularly in the sky, a doing more with less. We went from wire to wireless; the difference in weight of this communication system was unbelievable; and I would keep framing material to do other tasks, because it could be that we could do so much more with so little that we might take care of everybody, and then Malthus may be proved wrong; because I saw that Malthus had not anticipated refrigeration, and the food that we grow here would never have reached those mouths.

So I think that the working assumption of all the great states, which is highly bureaucratic (in Government you're not supposed to think, you're supposed to follow the rules - and this is true of all the religions and all the ideologies) - so I saw, thinking is just not going on there, and man is going to keep on with this nonsense, but it could be that we could do so much with so little that we could take care of everybody.
The whole raison d'être of the war might readily go, and therefore I said, I would like to take - play the game of war games, of simulated moves in such a way that that I go in for a design revolution where you do more with less: you find out what are the needs of man, what are the trends, what is the resource

inventory; we must know the whole thing. We must see how metals are recaptured and recirculated – recovered - from waste. And I began to study this prodigiously, and began to find - by 1927 I was convinced it was actually possible, a feasible matter, to take care of all of humanity; therefore the war would really be obsolete. So I've been making these simulated moves; and in making such simulated moves you also become, as you do in all planning: what are the highest priorities? Which one will you make first? What are the contiguous effects? What are the side effects of your action? And this calls for more and more of kind of a memory capability and handling complex - thats why the computer comes in in such a big way.

Anyrate, I've been playing this simulated *World Game* very vigorously since 1927, and all my work has been - all my - all the things I've undertaken - whether its a fog gun, or the --?-- any one of these other items - this has all come out of the simulated playing, where I've been operating absolutely comprehensively in terms of the Universe and evolution and rates of change, rates of increase of strengths of tensile going - in the metals, just - during the period I've been playing the tensile strengths of metals have gone up fantastically, from 60,000 to 350,000 pounds per square inch ...

M: Mr. Fuller, may we just come in at this point? This is - what you've just said is quite new to me; that you've been playing the *World Game* since 1927.

F: Yes.

M: May I ask you a specific question? At which point in time has the computer entered your *World Game*? Could you answer ...

F: I've had to play this longhand. I didn't have the computer ...

M: Exactly; but at which point in time - at which year – at which year in your development did you fit into – fit the computer into your concept of the *World Game*?

F: You must realise that, operating as I have on my own economic capability, the monies and so forth that I've had have been very little; I've had to buy time, buy time, buy time. When monies have come into my hand it's really been to buy time: I've had to be sure that my family - my wife and daughter - are eating so that I could keep at work, and not to go out merely to earn a living; I mustn't divert my interest. So that I had to do things longhand. The electric calculator, as something that I could buy, a $1,000 item: I had finally to get that to buy enough time - and it did make possible my ... Excuse me, I'm afraid I'm going to sneeze ...

I did all the calculations - for instance the spherical trigonometry for the geodesic dome longhand, and it took me - two years - I had to buy two years of time to calculate that structure - and no sooner had I finished that calculation than the electric calculator came in.

M: What year are you exactly speaking of just now? Which year?

F: I bought this time to do that between '47 and '49, and the kind of electric calculator that I could buy didn't come in till the 50's. No sooner had I finished doing this longhand then the electric calculator was there - and beautiful tables; the tables of the functions of angles which we had had before World War II were very poor: there were many errors in them. At the time of the great depression we had all kinds of Government work projects, just to get people going at all; and in England, of all things, the British - the English - Navy and the German

Navy collaborated in some - developing mathematical - working on seven-place one-second increment functions of angles tables. Then came a parting of the ways with Germany, and the work could not be finished, and Goering had his – his - the Navy - and then the Luftwaffe took it over, and they completed those tables. After the - after World War II was over it was one of the - the United States in coming into Berlin - one of the things they seized there were these tables; they were called the *Peters Tables* and they - they are - finally are computer refined. In 1951 those tables became available in the electric calculator, and anybody could do what it took me two years; anybody could do it in one hour, so it was really ridiculous. You take the trouble to build your ski-lift, and then suddenly everybodys got ski-lifts: anybody ought to be able to do a geodesic.

I'm sure the reason geodesics were not employed was that it meant that anybody who could see that it might be done was going to have to buy two years, and nobody would buy it. Corporations buy it.

M: Mr. Fuller, as you will know, at a certain point in his life Bertrand Russell announced his belief - am I communicating alright?

F: Who did?

M: Bertrand Russell.

F: Yes.

M: - Announced his belief that we should use nuclear weapons against our enemies. Later he completely withdrew from this idea. Now, I'm now going to refer to your epic poem on industrialisation[14], which I've been studying ...

F: Yes ...

M: - And I'm going to make some comments which are, to some extent, critical - but anyhow, that - or, theres a kind of climax around page 178, where you say,

Industrialisation is the first religion
that is realistically universal.

You then go into a kind of panegyric of the automobile, and - or - I don't know if you remember what is said, because it's quite a long poem ...

F: No, I don't: I wrote it in 1940 and I've ...

M: Yes - you wrote it in collaboration with the Managing Editor of *Fortune*. [15]

F: Yes.

M: Now, if I just run into it briefly:

For Industrialisation needed no succour or support
within man's physical powers to provide.
It needed only precise unveiling,
that its cosmic majesty might
speak silently for itself
to be tuned into by man
through the realistic wavebands
of scientific non-sensoriality.

In this connection
resolving the broadcast
into the limited sensorial band,
it was to be comprehended
that the auto – excuse me - automobile industry
is not an industry
apart from other industries
as, for instance, the watch industry,
the automobile industry is
up to this minute
industrialisation itself
        - and have you put industrialisation in capitals -
developed quantitatively and qualitatively
to its highest contemporary degree.
As such
industry centres around the automobile
as its largest
and most – or - inclusive
per capita consumer - producer
mechanical extensions of USA man
as of 1920 to 1940.

You continue here, and you end this passage by this:

50 million USA - ers
Through this mechanically amplified means
Of the automobile
in dynamic unfoldment
Have imperically acquired good manners ...

In other - I won't quote the whole of this, but throughout this you present the
automobile as a sort of climax of industrialisation. Now what I'm asking you ...

F: You've absolutely missed me, because I'm saying the industrialisation is
simply at this Phase as you call it, of the automobile. It is going through the
spectrum; it's in the red phase; and they latch onto it, going red, orange, yellow,
green, blue, violet; and violet would be something else. It's manifesting itself
in its capability to handle mans ' motion, and to move goods from here to there.
It - really it was first – it was first in watches. It went - it - this is where
the artist, instead of making the end product, making the cabinet, making the chair,
and so on, and - with - you can do that with the limited patronage of a Kane [King],
or a noble or even for a middle class. When it's got to be for everybody, there
are not enough artists to make it for everybody, so the artist makes the tools
and the tools make the end product. Industrialisation is what I'm saying: instead
of the artist making the end products, the artist makes the tools and the tools
make the end product, and the tools are powered by inanimate energy. Do you
understand what I'm saying?

M: Yes, but ...

F: That's the only difference.

M: But what I'm saying really is this: here there is a kind of phase [praise]
of the automobile.

INTERRUPTION: BUCKMINSTER FULLER REQUESTED TO LEAVE FOR ANOTHER AUDIENCE.

of the automobile, but I was simply *meaning* this is where - this is

where it - you now - you now could recognise it. And this is

no reversal at all, but you - I'm sorry that...

Questioner: M   Well, I'm speaking in terms of the revulsion: the present

revulsion against the automobile.

Fuller: ~~Pardon.~~ W h a t ?

Questioner: M   The present revulsion against the automobile.

Fuller: You didn't - the point is, I was not saying - I didn't say it

is the automobile: this is industry itself: industry at that

moment *then* that was doing that. That's all.

Questioner: M   ~~So...~~ Sorry.

Fuller: The automobile's been used in a very careless - *and* it's had - it's

had all kinds of fallouts; but it is no longer what I'm talking

about: Industrialisation is now involving - it's primarily

in electronics: it's in very much bigger things, it's in very

much bigger communications systems.

Questioner: GM   Thank you very much.

Fuller: *Please,* Please, understand that: I was not saying ~~that~~ industrialisation

is the automobile: I said the automobile ~~was~~ *is* industrialisation.

Questioner: GM   Thank you very much.

REQUEST   INTERVIEWER

INTERRUPTION: FURTHER ~~~~ ~~~~ FROM WAITING ~~~~.

CONFUSION OF VOICES: FULLER DEPARTS.

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F: I do have to go, that's right; I've got another bunch. Now, you miss me, sir, because there was no question about it: the real amplification of industrialisation, from something very minor as a watch, suddenly is amplified into something very large, and as the automobile you could really see it; it was affecting all the people - but then it graduates from the automobile into more, and then graduates to - its only - that for - at that time the automobile as an automobile industry is not just a special kind; it is industry itself. But industry itself is simply at that moment in the automobile stage, but later on theres another one. The automobile - I was not in praise of the automobile, but I was simply - this is where - this is where it - you now - you now could recognise it. And this is no reversal at all, but you - I'm sorry that ...

M: Well, I'm speaking in terms of the revulsion: the present revulsion against the automobile.

F: Pardon?

M: The present revulsion against the automobile.

F: You didn't - the point is, I was not saying - I didn't say it is the automobile: this is industry itself: industry at that moment that was doing that. That's all.

M: So ...

F: The automobile's been used in a very careless - it's had - it's had all kinds of fallouts; but it is no longer what I'm talking about: Industrialisation is now involving - it's primarily in electronics: it's in very much bigger things it's in very much bigger communications systems.

M: Thank you very much.

F: Please understand that: I was not saying that industrialisation is the automobile: I said the automobile was industrialisation.

M: Thank you very much.

INTERRUPTION: FURTHER REQUESTION FROM WAITING AUDIENCE: CONFUSION OF VOICES: FULLER DEPARTS.

Notes by Alan Sutcliffe

Neither Gustav Metzger nor I remember much about doing this interview. A recording and a typed transcription were made. Metzger edited this in pencil and gave it to me. It is not known which edits, if any, arose from him listening to the recording. About forty years later I found it amongst my papers. I started to prepare a version with most of Metzger's edits and a few of my own. Then Mathieu Copeland came to see me as he was preparing a book of all Metzger's writings. He copied the original transcript and I believe a version of this interview with Metzger's edits will be in the book. I therefore decided that it would be useful to have a version of the typescript without the edits, for comparison. This is what I have tried to present here, with all the hesitations, repetitions and deviations of the interview, and mistakes from the original transcription, for example, seen in the very first line. --?-- indicates a word or words lost in transcription. There are many missing apostrophes, though not so many in the later part of the transcription, which suggests there might have been more than one transcriber. I hope it gives a good idea of what the interview was like. Fuller was 74 at the time. In a few places I have included Metzger's edit, in square brackets, where this helps to clarify the likely intended meaning. The extracts from the untitled epic poem are laid out with the line breaks marked by Metzger rather than simply as continuous text as in the transcript. Text such as names enclosed in single quotes in the transcript are shown here in italics: there are no italics in the typescript. English spellings were used throughout the transcript, even where American titles and texts were being quoted. The first page and a collage of the last page and a bit of the edited text are reproduced, with increased contrast, alongside this de-edited form. Nothing is known of what happened to the recording.

The interview covers at least ten major topics: his fog gun, prefabricated buildings for the arctic, John Whitney's work, calculation and computation, Fuller's deafness, the proposed Beckett theatre, Navy war games, the *World Game* and world trends, his epic poem on industrialisation, and the role of the automobile. At the time of the interview Gustav Metzger was editor of PAGE and I was CAS chairman.

[0]   Our conversation started shortly before the recording.
[1]   *The Dymaxion World of Buckminster Fuller* by Robert W Marks, 1960.
[2]   Zeppelin is used here as a synonym for airship. See note [5].
[3]   The *Norge* was a semi-rigid Italian-built hydrogen-filled airship that carried out what many consider to be the first verified overflight of the North Pole on 12 May 1926. I do not know who or what Linoggi was or is.
[4]   Charles Lindbergh's flight New York to Paris, 20-21 May 1927 was the first solo transatlantic crossing by plane.
[5]   *Graf Zeppelin* was a large German passenger-carrying hydrogen-filled rigid airship which operated commercially from 1928 to 1937. It was named after the German pioneer of airships, Ferdinand von Zeppelin, who held the rank of Graf or Count in the German nobility. (From Wikipedia.)
[6]   http://www.siggraph.org/artdesign/profile/whitney/nobio_intro.html
gives details of John Whitney's life and work. He was an early member of CAS and showed his films at meetings during visits to London, where a niece was studying. Whitney's son, John jr. also visited.
[7]   *Permutations* and other Whitney animations can be viewed
http://www.youtube.com/watch?v=BzB31mD4NmA
[8]   Fuller and Whitney did not collaborate in the way suggested here. But the Siggraph site in note [6] states that

> … in 1957 (Whitney) worked with Charles Eames to create a seven-screen presentation for the Fuller Dome in
> Moscow, in which the screens were the same size as those used at a drive-in theater.

The 1967 Expo was originally to be held in Moscow but the Russians changed their minds and it was held in Montreal. I do not know whether Whitney's presentation was in the dome in Montreal as part of the American contribution. Perhaps it was part of his rejected proposal for the *World Game*.
[9]   Fuller served in the US Navy from 1917 to 1919.
[10]   Fuller here means the low frequency of the liner's horn, towards the bottom end of the audible range. What follows relates to frequencies increasing through the range.
[11]   In the spring of 1967, Francis Warner, a fellow and tutor in English Literature at St Peter's College, Oxford, had the idea of founding a theatre in Oxford, which would be a foundation for all new writers/musicians/artists/performers/directors of avant-garde, the aim being for them to produce new and experimental work. During the summer of 1967, Warner personally asked Samuel Beckett if the theatre could be given his name. Beckett was happy to agree.
Because of the lack of space at ground level the theatre was to be built below ground at the college. The architects were Fuller & Sadao Inc with Foster & Partners.
http://www.fosterandpartners.com/Projects/0137/Default.aspx
shows the design and a bar of soap signed by Beckett. The theatre was not built.
[12]   Expo 67 in Montreal: see notes [8] and [13].
[13]   While visiting the computer music studio at the University of Illinois at Champaign-Urbana for three months in the autumn of 1969 I was invited to give a talk at the Southern Illinois University at Carbondale by a CAS member there. Fuller was a professor there during 1968. While there I was shown the space in the University allocated for the *World Game*, which was then being made ready for the installation of equipment. Naturally I was told about the *World Game* and this would be fresh in my mind at the time of this interview, six months later.
[14]   The *untitled epic poem on the history of industrialization*, New York,1962, is available second-hand. The first short passage quoted and a different longer extract from later appear at
http://www.nous.org.uk/Epic.html
[15]   Russell Davenport.

In relation to the use of domes discussed in Nick Lambert's letter on the front of this issue of PAGE, note that Fuller proposed that his *World Game* should be housed in his grand geodesic dome that was the centrepiece of the American pavilion at Expo 67 in Montreal. The proposal was rejected. His dome had the Expo site light railway running through it: start at 1m 50s   http://www.youtube.com/watch?v=SyBCksMb3wM
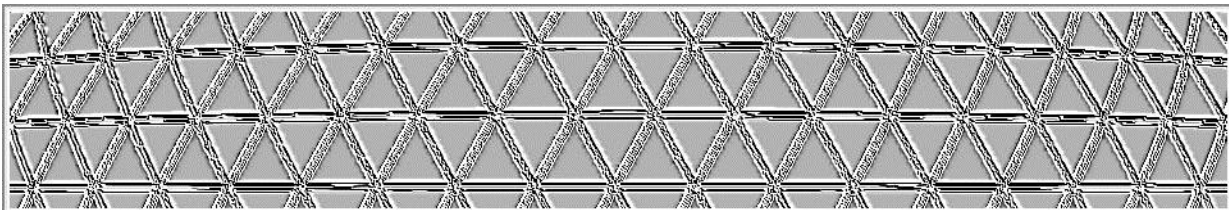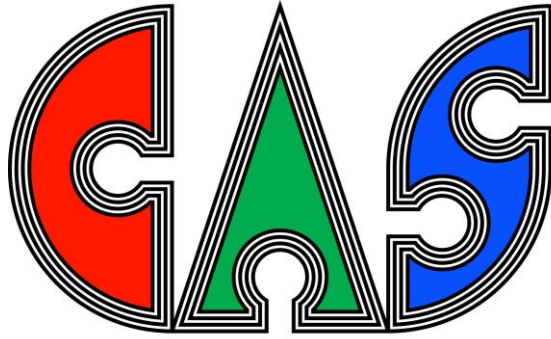
The Computer Arts Society
A British Computer Society Specialist Group

Bringing together artists and technologists
Exchanging techniques and ideas
Formulating needs for support
Helping to get works known
Exploring new forms

ABOUT THE COMPUTER ARTS SOCIETY

Aims

The Computer Arts Society (CAS) promotes the creative uses of computers in the arts and culture
It is a community of interest for all involved in creating, developing, interpreting and understanding the cultural potential of information technology

Membership & fees

Membership is open to all who are interested in the aims and activities of the group
There is an optional annual contribution of £10 (€15 or $20 overseas) for which members receive a printed copy of each issue of PAGE

The British Computer Society (BCS)

The CAS is a Specialist Group of the BCS and receives their support and funding

CAS Website

www.computer-arts-society.org

Publication

PAGE the Bulletin of the Computer Arts Society appears quarterly and can be downloaded from the CAS website

Archiving computer arts

The first period of CAS activity lasted from 1968 until the mid 1980s, and there are significant archives of material from this era, mainly stored in homes and offices of people then active in the group
The CAS worked closely with CACHe, a project in the Art History Department of Birkbeck, University of London, documenting UK computer arts in the years to 1980
This project led to the creation of the National Archive of Computer Art at the Victoria & Albert Museum, under the aegis of Douglas Dodds, Senior Curator of Computer Art

Present & future computer arts

With so many novel and exciting developments in the creative uses of computers in the arts the society will continue its original aims of bringing together those active in this area

EVA – Electronic Visualisation and the Arts

The EVA Conference is an annual event that focuses on the creative use of computers in the arts, industry and academia
Eva is supported by CAS and run through the EVA Committee
http://www.eva-conferences.com/eva_london/2011_home

Collaboration

The society holds joint events with other BCS Specialist Groups and collaborates with other organisations

Education

CAS continues to make students and practitioners aware of the history of computer art, and supports current student practitioners through its lecture series and conferences

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