

The Eternal

Tao



Amiga Active talks to the men behind the new Amiga technology...
...when we can get a word in edgeways.

It is pretty clear after the shortest meeting with Chris Hinsley, Tao Group's founder and Director of Technology, and Francis Charig, Chairman and CEO, that they aren't exactly humourless execs. There's a lot of banter, and a lot of self-mocking. After a slightly longer time, something else becomes obvious about them - they are quite a double act. It's a kind of high-tech corporation version of good cop, bad cop.

Francis is well spoken, with an accent straight from academia and a slick marketing man's presentation. Chris is wilder, scruffier, more enthusiastic, altogether the eccentric English inventor. They aren't exactly opposites though, because each contains a little mirror of the other. Francis belies the marketing man image with a regular stream of (often off-colour) jokes. Chris is clearly a man who knows how to put on the metaphorical ponytail and bring out the hard sell. The pair bounce off each other, and interrupt to finish the other's sentences. Opposites working in harmonious balance, yin and yang. No wonder Japanese corporations love them.

Sometimes you can't help but wonder how much of the fast-talking enthusiasm is part of a cleverly engineered marketing image. They reinforce the message by having the voice of business and the voice of vision talking as one, a sucker punch that's undoubtedly impressive. Whether it is or not, there's a palpable enthusiasm and belief about the pair of them.

Tao have done an incredible job of staying quiet - in the small and relatively parochial UK information technology sector, that's quite an achievement. Many people in the industry imagine them as a "garage operation." A visit to their expensive looking offices housing 60 world-class engineers quickly belies that image. Their funding has come from Japan, and it is quite clear that the Japanese are taking them very seriously indeed.

Tao are suddenly making heads turn throughout the industry. What they are talking about is a more fundamental revolution than pretty much anyone else is offering to the computer industry. Anyone who thought that the new Amiga could not hope to match the revolutionary nature of the original Amiga, think again.

If we had printed everything that was said in the interview, this article would be about three times as long. Having said that, there are also things we can't talk about, like the technology demonstrations (all we can say is that we should be very content with the feel of what we are getting, and the Java engine is seriously awesome), and a few things Tao did not want repeated.

What follows are the words of Tao, pure and simple. There was a lot of material that for one reason or another did not make it, but there's enough here to give a very good idea of the Way of Tao...



Chris Hinsley
Tao Group's Founder and
Director of Technology.



Francis Charig
Chairman and CEO.

On the relationship between Tao and Amiga. How it all began.

Francis: It's not just a business relationship. This one is turning into a personal relationship too. We're all of a kind. We always say this about Tao - we take our work really, really seriously, but we don't take ourselves too seriously. We try to make sure that everything is fun.

Bill and Fleecy contacted us in the second half of last year. I didn't know them from Adam to be totally honest with you. My involvement in the Amiga in the last few years has been absolutely zip, and in early years was just confined to the family buying an Amiga.

First of all you can't take anyone who's called Fleecy seriously, you get this message saying "Hello, my name is Fleecy", and you think he's barmy. I said to Chris that I had a feeling that there was something about it. Fleecy's whole style, within it there's obviously a man who's got "it." Whatever "it" is. I took a lot of care responding to him. I kept getting follow ups, and I thought "God, this is going

The Tao is hidden and nameless,
This is exactly why the Tao is good
at developing and perfecting.

- Lao-Tze, the Tao Te Ching.

on forever." I thought it was worth following up, but it was getting a little frustrating at times.

Then we got Bill on conference call. I wanted Chris in because I wanted his judgement. I had also done some due diligence, just by going to the web and things like that, that showed that Bill and Fleecy were obviously highly respected in the industry. In the conference call it became quite obvious that with Bill, we were dealing with somebody who knew which way was up. And also had more of an English sense of humour than an American one - in other words he had a sense of humour. That meant we felt comfortable from a personal point of view. Chris and I like to build up relationships with people we deal with. We like to deal with people who are good honest people.

I went to people I knew in the States, who had set up a new [venture capital] fund, explained what it was about, got them organised with the Amino people, and financing went through very quickly. Tao can probably be credited with saving the Amiga, from a financing view. We don't have any ownership in them but we are tied at the hip, and you will see that in the announcements that come out between the two companies in the next few months. You go through the companies that are bidding for our time while we are giving priority to Fleecy and Bill, you'd recognise that there is a real high commitment to this whole thing.

"...with Bill, we were dealing with somebody who knew which way was up."

"...most people in the Amiga community, if you present them with a huge great fat cheque, they are not going to walk away..."

► On Tao and the Amiga community. What do they want from us?

Francis: This is a chance for us, in a sense, to exploit the community. The fact is that we recognise that they can write all this good content, and if we give them all the tools, they can in turn exploit our technology to their own needs. There is mutual gain; it is a business. The Amiga community people have been around for 20 years in multimedia, and that makes them the most experienced in the industry. Also there are a lot of blue chips in the film industry, the TV industry, the games industry and so on, with a lot of people who are committed. Some of them may have wandered off, but they've temporarily wandered off, and still have that very strong brand loyalty to Amiga, and are still monitoring what is going on very closely.

They are not like the other community, no names mentioned, where it's about making money, pure and simple, about churning out software as quick as you can. There's no pride in what they do; it's about simply making as much money as they can. Now obviously, most people in the Amiga community, if you present them with a huge great fat cheque, they are not going to walk away from it. The people who are actually developing software content out there have a lot of pride. They want to do it right, and that's their commitment to the industry, but ultimately they would like money and they would like exposure to a much broader base of users than they have currently got.

Bill and Fleecy know the Amiga community better than we do, despite Chris' history, and other people at Tao's history - Chris understands the mentality, but he doesn't understand the exact status right now, and he doesn't have all the access and the contacts. These guys are the perfect people to be our pipeline to the community.

Tao, Amiga and the future - extraordinary times.

Francis: If you could see - it's just extraordinary. The last month and a half...

Chris: Mad.

Francis: ...the world has gone mad.

Chris: Completely barmy.

Francis: We are at the centre of almost every major corporation in the technology industry's radar screen. Java has now become a standard for DVB, the digital broadcast standard, it has become a standard for HAVI, it's becoming a standard for... Everybody



suddenly recognises that they need Java. They need a product that is small, they need a product that is fast, they need a product that can actually do multimedia quickly.... Tell me what else there is apart from us? There is nothing even on the horizon apart from ourselves,

Chris: that was obvious going around CES this year. There was absolutely bugger all else there.

Francis: When people say, "Can the Amiga succeed against the market..."

Chris: Of course it can.

Francis: I mean for God's sake, we're going to be... the Amiga is actually...

Chris: ...is going to drag the rest of the world into the 21st century.

Francis: I mean there is going to be a huge number of our customers who are going to say "My God, there's all this content we can suddenly access. There's all the Java content, and there is all the Amiga specific content." We are going to be the most content-rich environment for multimedia that is out there. There are going to be announcements shortly which we and Amiga are going to be making that will underline this perspective. We will get the global community's attention very shortly in terms of development of content around our content engine.

The people of Tao

Francis: The Japanese love it, the Americans find it quite difficult - I'll say "Well, one of the things we've done with Tao is that our big target is to put together an absolutely world class team of people, and as you can see here today, we have failed completely."

We have the most unbelievable calibre of staff at this company. We've got sixty people - this guy (points to framed CPU diagram on the office wall) Masatoshi Shima - good friend of mine - he designed the 4004, invented the MPU, the microprocessor. At the Transistor 50th anniversary award, which Intel sponsored, Ted Hoff was given the award for the inventor of the microprocessor and he (points at

diagram) was given the award for inventor of the MPU. He was a bit confused because he always thought they were the same thing.

We've had investors say that they have never come across a company our size with so much talent inside it. Everyone in this company has one or more of three backgrounds. They are either a world class games engineer, and/or they have got a degree - when I say degree most of them have firsts - masters, we've got Rhodes scholars, really the cream.

People say "oh he's got a first, he's unemployable" Not true! If they are that bright then you can train them to think commercially. When I first knew Chris, he'd look at some piece of technology and go (puts on an impressive vocal imitation and starts swearing). Now he can be a very smooth salesman, because he understands what people are looking for.

The third area is people from the blue chips, top people, top engineers we have taken on from companies like Fujitsu, British Telecom and Raycor, who give us general systems integration experience. You can't just have youth in the company, however brilliant it may be because there are process issues that you have to get right.

The robustness of Tao's vision

Francis: We have done something that no other company in history has ever done before. We have started from scratch and we have written a complete top-to-bottom multimedia environment. Nobody's ever done that before. And we've always targeted this industry. People have said, "Oh, you've re-invented yourselves several times"...



Chris: Rubbish.

Francis: Absolute rubbish.

Chris: What we were saying six years ago is exactly the same thing.

Francis: We developed this system for consumer products, for running interactive content. If you can run interactive content on these devices you can run anything. That is the most processor hungry environment you can imagine, and if you can get footprint issues, you can sort it out anywhere.

The Tao is hidden deeply in all things, It is the treasure of the good.

- Lao-Tze, the Tao Te Ching.

From day one, we targeted Japan, not the States, because we felt the big new market for products like ours were going to be all the consumer electronics companies. Why, if it had been computer oriented, or machine tools, would we be targeting all the consumer electronics companies in Japan?

Climbing mount Tao.

Francis: I once climbed Kilimanjaro - on the last day, you're climbing up sheer scree - two steps forwards and one step back. You go to bed at four in the afternoon, they get you up at midnight. The reason that they take you up at night is that psychologically, if you can see your progress, it kills you.

If you can't see what is going on you carry on bravely forwards. People are saying "Yep, you're almost there Francis, you're almost there" and of course you're nowhere near. Seven hours later, the sun is beginning to rise, and that's about the time you get up to Gilman's point, which for nine months of the year is the highest point you can get to.

All the time you are climbing, people are giving you the false impression that you are nearly at the top. Thank God someone got me up at midnight to climb the Tao mountain. If we had actually seen from the beginning what we were undertaking, I doubt very much that we would have had the stamina to achieve what we have gone through.

"We've had investors say that they have never come across a company our size with so much talent inside it."

Smaller, faster, altogether better.

Francis: We can put a complete RTOS out in the market place, with complete personal Java, and a whole pile of additional capabilities for 2D and so on, all sitting in a footprint of sub 2MB of native code.

Chris: Yeah, not bytecode. Everybody else says they can get it in 8MB, but that's bytecode.

Francis: Not bytecode. Typically there are people out there who say they can get the libraries in two or three megabytes, but they've got a bloat factor



▶ running JITs of 4-6, plus you've got the operating system on top. You end up with a solution which is taking 16MBs when you get to native code size - that's absolutely typical. We are running in 2MB of native. On top of that, we have all sorts of techniques which give us huge advantages in terms of memory efficiency - not just the footprint but the way that we bind the tools - and we've got advantages in terms of general speed, because we run stonkingly fast.

When you start moving towards interactive content then we just kill the competition. We are killing the JITs on the desktop when it comes to interactive content, yet our system was designed for consumer products, so ours was always designed with memory efficiency in mind.

Multiprocessing across networks of dissimilar processors.

Francis: The Elate system has been designed to be object based, to be very fast, very high performance, extremely compact, binary portable and fully deterministic. The modularity and flexibility is obviously very important for the low-end devices. And it's also been designed to be multiprocessing...

Chris: Which will definitely become more relevant, certainly to the Amiga community as they start getting used to the system. The multiprocessing side will become a really big thing for them...



"We are talking about being able to link together thousands of processors of dissimilar types..."



Francis: This isn't traditional multiprocessing. We are talking about being able to link together thousands of processors of dissimilar types and the system just automatically handles the whole lot for you, and the local memory, shared memory, all the different architectures...

Chris: The traditional problem always was that it was just too damned hard to program. Everything had to be statically compiled for a particular machine, with a particular set of processors - it just made the whole idea of making a shrink-wrapped piece of software that could take advantage of parallel processing completely pointless. You just couldn't do it.

Francis: But we can, and we have patents on this technology. Look at the Byte article from '94. We had this ray-tracer, I was running it on my 486...it runs jolly fast, but the really exciting thing was that I then get a board with 8 transputers in and stick that in. I run my system again, I don't even recompile it, and it takes advantage of all the different processors. It works out if there is an advantage doing stuff across a network as well, because sometimes the comms are so slow it's better to stick to a single chip. The ray tracer became that much faster - a linear growth.

Then we get another board, with 4 MIPS processors. 13 processors, 3 different architectures, and without recompiling it again, the program just ran again that much faster. The program didn't have to know any of this - it was handled automatically. Obviously you can't just take a monolithic program and it will magically turn into a parallel program...

Chris: The programmer still has to think! We're not removing that element of it, but making it much, much simpler to put something together.

The two flavours of Elate.

Francis: The processes incorporated in Elate are incorporated into the hosted version as well. The concept we have of a register based virtual processor with translation and the way that we bind individual tools - individual methods in Java language - rather than entire classes, which gives you memory efficiency advantages and performance advantages - that is relevant to both platforms. As is the multiprocessing - you can still use the multiprocessing even when you are sitting on another operating system.

Chris: The applications that are written for the system don't know anything about the host environment, they don't see that they are sitting on top of another operating system. They can do if they want to, we have APIs that allow that to be exposed, on the understanding that if you do that you are making your software non-portable, of course.

Francis: What we have is this intent product which is our whole multimedia applications layer, and the difference is we're not running it on Elate. We'll be calling through the other operating system to control the device drivers, comms stacks or maybe even file systems or whatever, but that's the only difference. There's a certain amount of marketing to be honest - Elate and intent are exactly the same code in reality, but with Elate we have complete control of the



hardware. What we want people to appreciate is that you run our applications layer on all these different Operating Systems - you have intent for Windows, intent for Linux, intent for QNX, intent for Epoc, intent for WinCE and so on.

Just how portable is Java? The attitude of Sun.

Francis: At the moment a lot of the Java libraries are written in C or C++, which means that in reality the applications are portable, but nothing else about the system is...

Chris: Yeah, the actual Java environment itself is not.

Francis: So every Java implementation you have, you have to recompile for each individual platform, this means that...

Chris: And that C-side stuff is all Operating System specific.

Francis: They should know about the seaside, they've come from Bournemouth (general laughter). The point of Java is that it is portable, but you've got these huge codebases to support, which is why most implementations of Java are completely lacking in robustness. We have just one codebase for all of our platforms.

Also the other big problem with Java is that there isn't behavioural consistency between platforms, because there are different libraries for each platform. We have a single set of libraries. We completely re-implemented all the libraries in binary portable assembler, a huge job. But this has meant that we have a completely binary portable Java implementation for all the different platforms, which gives us footprint advantages, it gives us performance advantages, it gives us robustness advantages and it gives us consistency advantages.

Chris: Java still is - rather than "Write once, run anywhere", it is...

When superior students hear of the Tao, They strive to practice it.
- Lao-Tze, the Tao Te Ching.

Francis: Write once, test everywhere...

Chris: "Write once, test everywhere", that's the situation at the moment. Certainly with the customers we deal with who try to support multiple Java engines, their experience is that they can't just write a piece of code that will run on all platforms, they have to keep tweaking it and messing around with it.

Francis: However I would like to put it on record here - the support we get from Sun is...

Chris: Brilliant.

Francis: Brilliant. And their attitude towards us is brilliant. Some companies have said that they are going to be the next Microsoft, but...

Chris: They couldn't have been more friendly and helpful and co-operative. They've been great, they really have.

Francis: What Sun is trying to do is make sure that there is consistency across the industry. Sometimes they are portrayed as being tyrants because they refuse to open things up which if they did open up...

Chris: Chaos!

Francis: ...would actually mean there would be different versions of Java, and that would remove the entire point of it. In Java you can really concentrate on creativity because you can program five times faster than you can with C. It's more maintainable, it's much faster to generate than C, so why write in C? There are going to be certain instances where you want to write in C or assembler... you might not want to write engines where you need every ounce and every cycle, but for most applications Java is going to be perfect for the Amiga community.

We've got an obligation in the industry to work with Sun and get the consistency, which means that Amiga people can just get on with it - it's about creativity. Whether they are an applications programmer or an artist, they want to be able to create. That's one of the things that I think we can do between ourselves, and Fleecy and Bill, and Sun. Although we don't have to get them intimately involved, because Tao provides the Java side of things, Sun is actually a company that I am expecting to see on our side, and that's good.

"What we want people to appreciate is that you run our applications layer on all these different Operating Systems..."

▶ All those Java engineers who are out there right now saying, "Java is big and slow, I learned it at university and now what do I do with it?" - I'd like to see them come to the Amiga fold and start writing real applications. This is not Francis speaking naively from his office in the UK, I know that we can do it. If you knew what I know, you'd know that we can do it. When I say that, I'm not talking about things that will remain closed for very long.

Transmeta, chips and Tao.

Chris: We have had companies approach us saying that they would like to do the VP processor in silicon, and we keep telling them not to. We've had more than one offer.

Francis: More than one? We've had eight...nine... ten offers?

Chris: Well, it's not two...

Francis: It can't be through hardware - I mean Transmeta say that they give the best MIPS per watt of any company that's out there...

Chris: It might not be as good as an ARM 11.

Francis: ... but it might not in two years time. I can't afford to find myself totally tied into that piece of hardware. If you have an extensible virtual platform like our own, that doesn't matter. Let's say you come to 64 bits at the hardware level, we'll take advantage of that. We've got something that is so truly flexible that we're not tying people in, and that is being recognised.

*Putting the right things in the box.
Ensuring hardware compatibility
across multiple architectures.*

Chris: You want people to build machines, sourcing components, putting a box together and selling it like with PC clones but in a much more open way. They

Chris: Yes, you can't have everybody monkeying around with the API!

Francis: Yes, but because of the way Elate is based you can actually bind whatever tools you like into the kernel, but the core kernel that everybody gets as standard and that you write to and the Java engine sits on top of is in our control. And the translators - because we have to ensure that the translators are all of the highest standards,

Chris: And run all the test suites.

Francis: And run all the test suites, so that if somebody writes something you can rely on it working on all the different platforms. Over time that may open up, but for that we would have to have a far more extensive test suite that anyone can use.

*Tools at our disposal: Tao and Digital
Content Heaven.*

Francis: If you look at the intent multimedia toolkit, Digital Content Heaven, you've got the 2D library provided by Tao, and there's no question that it is the best in the world. We've got the 3D that is being integrated into it from Criterion - in our opinion they are the best in that class as well, they are certainly becoming the industry standard...

Chris: Well it's no accident that they got chosen for Playstation 2 and Dreamcast.

Francis: And shortly we should be announcing our audio layer as well.

"It's very similar to the Gimp in that respect, but I think Photogenics is even better."

Chris: We have device drivers that do sample mixing and so forth at the low level and virtualise the sound hardware, but there is a whole pile of things you can do on top of that, score players and things like that...

Francis: We are going to provide a standard 2D, 3D, audio engine, Java, C, C++, VP which should be stonkingly good, the best. However we'll also be publishing the information we need to allow people to plug in what they need.

Chris: You've got to have that minimum set of libraries there so that people at least have a foundation to write to. If they then want to use third party libraries and things then fair enough.

Francis: And I'm expecting those applications to be written in VP, in binary portable assembler, where people can really take advantage of the very high performance, minimal footprint, try and get every last cycle out of everything that they do. Which is what of course the Amiga community is all about.

Impartiality is kingship.
Kingship is Heaven.
Heaven is Tao.
Tao is eternal.

- Lao-Tze, the Tao Te Ching.

*Efficiency in coding. Photogenics vs.
the Gimp.*

Francis: True story actually. Chris rings me up one day and he's not tearful, but he's distraught, so I ask what's the matter. He's written a method, it was actually a very complex Java method...

Chris: It was actually a polygon drawing...

Francis: ... and I asked what was the matter with it, and he said that it was 2.5 KB in size...

Chris: That's the biggest subroutine I've ever written!

Francis: What we've done is we've managed to get people in the company to think in the same way.

**"We will be making available to companies
example source code, full documentation, APIs..."**



Chris: It [Transmeta] looks like a very interesting chip, but it's just a chip as far as we are concerned. But all this is missing the point. The consumer electronics companies do not want to be tied to a particular piece of hardware. They've been there, done that with the whole Intel thing and they don't want to be there again. They want to be able to move their software to any hardware they want.

Francis: They want to be able to say to Mr. Arm or Mr. PowerPC, "I can use a PowerPC..."

Chris: "I can use an x86 for this..."

Francis: "So unless you do it for x bucks, I'm going to go somewhere else."

Chris: "So drop your price or I'm going to walk."

Chris: Their [Transmeta's] pitch is "use our hardware and change anything else on top of that," whereas our pitch is, "use any hardware you want and your software stays the same". Now which is the better pitch?

don't have to get their CPU from Intel or be on the bad boy's list by getting their processor from AMD. Buy any processor you want, put this stuff on it, stick an Amiga badge on it and sell it as an Amiga machine.

You can write device drivers that are binary portable. We have drivers written on the PC which run unmodified, straight out of the box, on a PowerPC piece of kit. The CPU side is irrelevant, the interrupt structure is irrelevant - the kernel and the VP system virtualise all that.

Fleecy and Bill are intending to do an awful lot of the device driver work.

Francis: We will be making available to companies example source code, full documentation, APIs - we don't want to be doing this ourselves. We are world class in about 3 or 4 areas, and we are sticking to those areas and being creative in those. To write device drivers for us misses the point of what this company is about. We shouldn't be doing it, we should allow other companies to. Like printers - I want to get to a stage where Canon, HP and the other companies are writing device drivers for the printers themselves.

Chris: If someone was to build an Amiga box, all they need from us is to understand how they do what we call a "PI" port, which is the Platform Interface Layer. We'd quite happily give them example code for how to do one of those, then they could just pick all the bits themselves, and put the platform together themselves without us really being involved except to make sure that the test suite runs. We want to open it up so everybody can build things.

Francis: The only things that we are 100% in control of is the core kernel...



Andrew Korn **A**

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