Amiga Alternate History, What If decent management ?

The Amiga was always living a start/stop inconsistent life under Commodore, beset by poor management and lack of strategy, what if that never happened.

Amiga 1000 progress meeting, 1985. Much of the custom chips are in final development and testing. Over at Commodore West Chester plans were being made for the product. They decide to set out a clear 10 year plan the key strategy being;

A & B teams
Using outside firms for non-core R&D
Long-term Vs short-term developments
Tick & Tock product introduction of products

Previous generations of computers had shown that a product lifecycle would be around 5 years, with a peak at around 3 years and then a tail after that. So it was necessary to plan out the following lifecycle;

1985 - 1990, Generation A
1990 - 1995, Generation B
1995 - 2000, Generation C, etc

Of course its not possible to accurately guess the technologies that would be available in the future, but certain trends are very clear, the price of semiconductor memory drops each year and microprocessors become more capable and more complex each year.

The current position in 1985 was an Amiga 1000 with the following specs;
256k of RAM
7mhz 68000 CPU
Kickstart 1.2 in ROM
OCS Chipset

The Los Gatos Amiga team supplemented by some additional members from Commodore projects was split into A & B teams to focus on short term and long term projects, these were initially listed as;

Short Term
A500 games machines / home computer
A2000 workstation / business computer

Long Term
ECS Chipset
+Models to introduce mid-life upgrade

These were to be based on a cost reduced and more integrated A1000 chipset / schematic, but with different PCB layouts and additional functionality for expansion in the A2000.

The Long Term team was to focus on the mid-life ECS chipset and peripherals for the A2000 machines.

The software teams were also split into A & B teams with different focuses.

Short Term
Kickstart / WB stability
.1 releases for minor functionality updates

Long Term
ECS support
Zorro Peripherals support

The Amiga 1000 was ahead of its time but sales were slow, supporting a new operating system with new hardware was always going to be difficult. But sales were good enough for the planned A500 reduced cost games machine and the A2000 big box business machine to be introduced to the market.

These did not provide any new chipset features and so resulted in two very similar models which were;

The Amiga 500
512k chip RAM
7mhz 68000 CPU
Kickstart 1.3 in ROM
OCS Chipset

The Amiga 2000
512k chip RAM
7mhz 68000 CPU + separate CPU slot for accelerator updates
Kickstart 1.3 in ROM
OCS Chipset
Zorro II expansion bus

The Zorro II expansion slots sprang forth a new range of expansion cards for multimedia, audio, graphics, TV and other uses.

The Amiga 500 was a huge hit and sold millions around the world as a games machine that also had very strong multimedia capabilities. The Amiga 2000 was also a strong seller and a very profitable one for Commodore due to its high price.

Commodore decided to provide some peripherals for the A2000, but to ensure the core teams were not impacted to much they were outsourced in the detail design, these cards where;

The A2620 68020+68881 accelerator utilising the 1984’s 020 CPU from Motorola
The A2090 SCSI controller using a Western Digital SCSI controller

Both these peripherals were often shipped pre-installed to provide a ‘workstation’ experience and compete at the high end in business environments.

During this time Workbench point updates had been provided up to 1.3.4 and provided much needed stability for applications and developers.

By late 1987 after two years of work the ECS chipset was ready and as planned plus ‘+’ models of the existing products were going to be introduced with the upgrade. The ECS chipset was designed to be 100% compatible with OCS and was in fact not a major upgrade in functionality, must mostly provided extra screen modes for workbench and colours for games.

Kickstart / AmigaOS 2.0 was released at the same time to support the ECS functionality.

The following plus models where made available in mid-88;

Amiga 1000+
1mb chip RAM
7mhz 68010 CPU + separate CPU slot for accelerator updates
Kickstart 2.0 in ROM
ECS Chipset
2x Zorro II ‘low profile’ slots

Amiga 500+
1mb chip RAM
7mhz 68010 CPU
Kickstart 2.0 in ROM
ECS Chipset

Amiga 2000+
1mb chip RAM
7mhz 68010 CPU + separate CPU slot for accelerator updates
Kickstart 2.0 in ROM
ECS Chipset
4x Zorro II ‘full height’ slots

The bump to the 68010 only provided a minor performance improvement, but laid the foundations of proper MMU and virtualisation support. AmigaOS 2.0 did not use this feature. The main aim was to provide a compatible product range ECS+010 as a standard platform for developers.

For marketing the product range was now;
A500+ for games/home use
A1000+ for games/semi-professional use
A2000+ for professional use

The A & B teams where now swapped with the following goals;

Short Term
Zorro peripherals

Long Term
New graphics architecture
Next gen machines
RTG/RTA OS support
MMU/VM OS support

It was clear that a large ‘next generation’ jump would be required in anticipation of improvements on other platforms; Atari, Macintosh, Sun/HP workstations and of course PC’s. To remain competitive an aggressive 24 month (late 1990) schedule was planned.

In the meantime the prior usage of outside firms to produce Amiga branded peripherals was expanded upon, whilst the majority of the core team worked on next-gen activities.

The following peripherals were released for Zorro II Amigas (A1000+ and A2000+)

The A2630 68030 + 68882 accelerator utilising the 1987’s 030 CPU from Motorola
The A2091 SCSI controller using a Western Digital SCSI controller
The A2088XT/A2286AT IBM PC compatible emulator cards
The A2232 RS232 expansion card for industrial applications
The A2060 Arcnet and A2065 Ethernet networking cards
The A2300 and A2301 genlock cards

These cards whilst not providing a huge amount of revenue are important to the higher margin business users and enable more sales of higher end machines into commercial applications.

The next generation Amiga’s would be based around the marketing named AGA chipset, this would push above planned SVGA and SNES / Mega Drive 90’s consoles.
Following the pattern established with the ECS plus machines the chipset and base CPU would be common across the whole range.
The increased popularity of the CD ROM and the extra amount of storage capacity available opened the possibility for games usage and a dedicated games console was planned based on a common design.

Some of the new technologies introduced where;

68030 - The 030 was quite new at the time so could only be made standard in the lowest clocked and thus cheapest variant.
IDE controller, for Hard Disks and CD ROM’s, although SCSI was retained in the high end models.
Zorro III slots, which provided 32bit addressing and data transfers.
AGA chipset, which provided enhancements to colour palette (24bit), screenmodes (SVGA), colour depth and memory layout, offering both chunky and bitplaned modes.

As all schedules do, there was slippage into 1991 but that year the following products were made commercially available.

Amiga 600
2mb chip RAM
16mhz 68EC030
Kickstart 3.0 in ROM
AGA Chipset

Amiga 1200
2mb chip RAM
16mhz 68EC030 CPU + separate CPU slot for accelerator updates
Kickstart 3.0 in ROM
AGA Chipset
2x Zorro III ‘low profile’ slots
Pizza Box form factor with IDE CDROM and HDD onboard

Amiga CD32
2mb chip RAM
16mhz 68EC030
Kickstart 3.0 in ROM
AGA Chipset
Console form factor with IDE CDROM onboard

Amiga 3000
2mb chip RAM
16mhz 68030 CPU + separate CPU slot for accelerator updates
Kickstart 3.0 in ROM
AGA Chipset
4x Zorro III ‘full height’ slots
Desktop and Tower options with SCSI CDROM and HDD onboard

With a clear base platform of 16mhz 030 and AGA graphics both games and application developers could build next generation titles around.

Kickstart / AmigaOS 3.0 also provided a number of big ticket items;
Re-Targetable graphics and audio to allow the Workbench and applications to work with the growing number of 3rd party graphics and audio cards.
Networking support for TCP/IP applications, file sharing (Envoy).
CDROM filesystem support for both audio and ISO9660

This was a major release and considerably upgraded the capabilities of the platform the A & B teams roles again swapped and objectives were set as follows;

Short Term
Updated peripherals
Continued OS updates for RTG and Networking

Long Term
3D Graphics evaluation
CPU architecture review

The now established practice of providing updated peripherals was again followed producing;

The A2640/A3640 68040 accelerator utilising the 1990's 040 CPU from Motorola
The A2386AT IBM PC compatible emulator card

Other peripherals were not updated for Zorro III as they would not have utilised the ZIII interface and the ZII interface was compatible.

Amiga OS 3.x releases would be made available providing updates to all the new functionality introduced.

Longer term there were two main elements, the first evaluating the trend for 3D graphics and the second for future CPU architectures, it was seen by many that the Motorola 68k range was not progressing as well as the Intel x86 range, the 040 was hot and frequency limited compared to the 486.

To compete against challenges in the market it was decided to offer a minimal upgrade to plus '+' modes to increase the base memory to 4MB, made possible by the fall in semiconductor prices.

The 1993 models consisted of;

Amiga 600+
4mb chip RAM
16mhz 68EC030
Kickstart 3.1 in ROM
AGA Chipset

Amiga 1200+
4mb chip RAM
16mhz 68EC030 CPU + separate CPU slot for accelerator updates
Kickstart 3.1 in ROM
AGA Chipset
2x Zorro III 'low profile' slots
Pizza Box form factor with IDE CDROM and HDD onboard

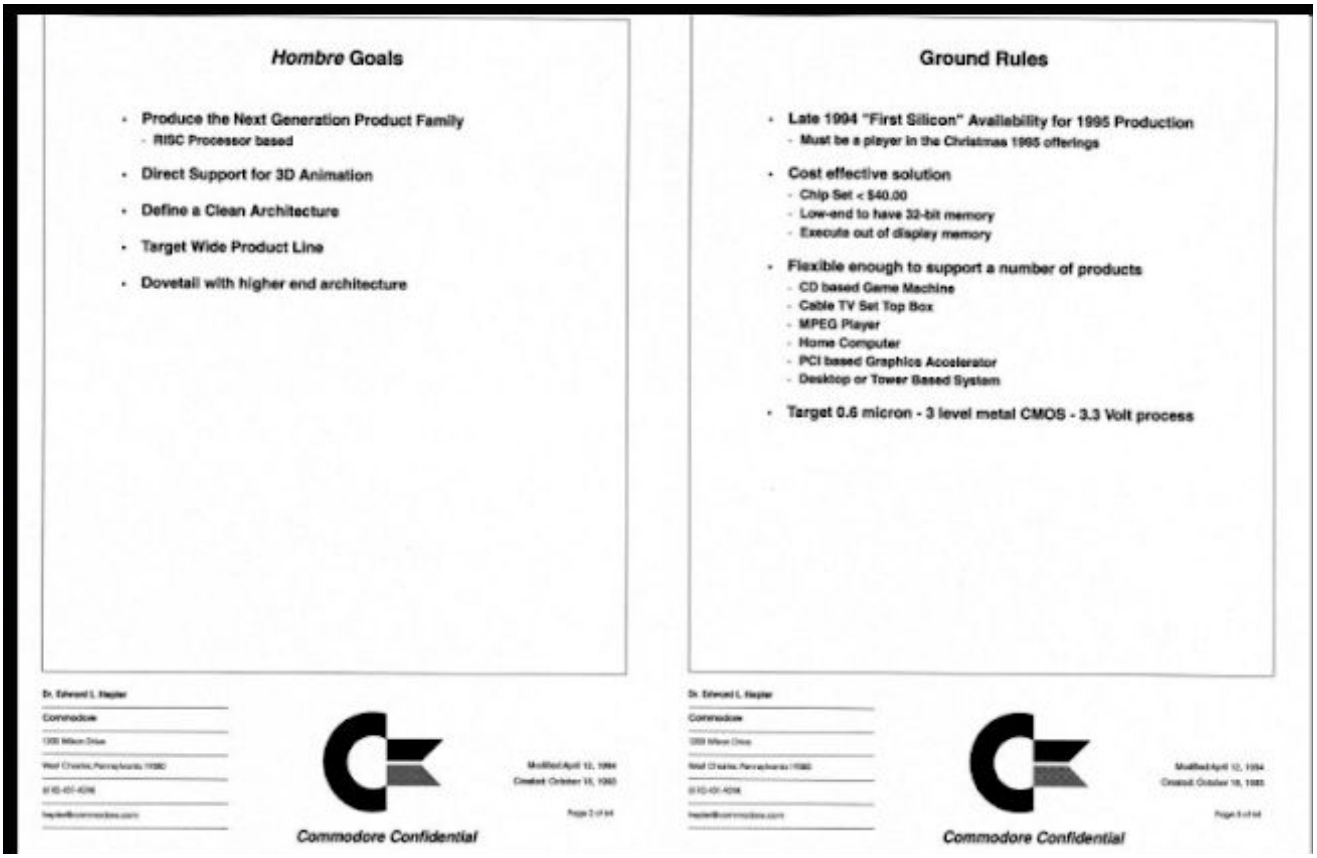
Amiga CD32+
4mb chip RAM
16mhz 68EC030
Kickstart 3.1 in ROM
AGA Chipset
Console form factor with IDE CDROM onboard

Amiga 3000+
4mb chip RAM
16mhz 68030 CPU + separate CPU slot for accelerator updates
Kickstart 3.1 in ROM
AGA Chipset
4x Zorro III ‘full height’ slots
Desktop and Tower options with SCSI CDROM and HDD onboard

This would provide time for the next generational leap to be available, this would be quite a departure from the 1985 Motorola architecture.

It was proposed to drop the Motorola 68k architecture and replace it with a HP PA-RISC core with graphics and IO functionality grouped around it.

Taken from https://archive.org/details/Hombre_201808/



Observations

- Rendering is different for photorealistic imaging versus real-time animation
- Various levels of detail required
  - Some portions of image relatively stable over many frames
  - Other portions change on a frame-by-frame basis
  - Only application (programmer) knows for sure
  - Trade-off detail with computational requirements
- 16-bit pixels are good enough
- Multiple playfields are useful
- Software Developers either want *many* sprites or none...

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Modified April 12, 1994
Created October 18, 1993

Hombre Implementation Strategy

- Select a RISC architecture to base the system upon:
  - Business/Competitive Issues
    - Number of other implementations using processor family?
    - Would we be playing into the hands of a competitor (or potential competitor)?
    - Are there complementary systems to fill out high end?
  - Performance Issues
    - Code Density
    - Support for graphics operations, etc.
    - Support Chip(s) required (cache) to achieve performance
    - Bus Size required to achieve performance
  - Implementation Issues
    - Ease of implementing Integer Core with other functions
    - Ability to add customized instructions
  - Cost Issues
    - License fees?
    - Chip costs
- Integrate RISC Integer Core with key system functions
- Build 2 or 3 chip low end system

Use commercial RISC chip as add-in performance enhancer with low end, chip-set based system as intelligent peripheral sub-system

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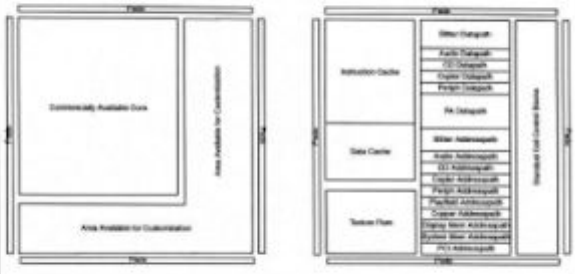
Why an Embedded Processor?

- Reduced Chip count should produce a reduced cost.
- Desire multiple simultaneous memory access paths:
  - Graphics Update
  - Blitter, other DMA access
  - CPU fetches

Why Design our own core?

- Ability to add instructions for graphics
- Easier to "mate" to other functional units
- Ability to control aspect ratio and positioning of blocks



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Why PA-RISC?

- Performance is very high compared to other RISC processors at similar clock rates.
- Code density enhanced by:
  - Powerful instruction set
  - Nullification
  - Atomic modification of addresses during load/stores
- SFU instruction expansion capability
- Demonstrated Low Cost Implementation
- Growth Path for future enhancements
- HP's operating system availability
  - UNIX
  - Windows/NT
- HP has a line of PA-RISC workstations which complement Commodore's offerings
- Development Tools available
  - GNU Tools available via ftp (we already have them...)
  - HP has its own software development tools
  - Can use HP workstations as cross-development platforms

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The AmigaOS software group faced a large number of challenges that needed to be overcome;

Reduction of assembler code to allow common 68k/HP-PA codepaths
Switch to GCC compiler and assembler to allow common 68k/HP-PA builds
Hombre chipset support
68k software emulation on HP-PA for applications portability

The previous AmigaOS 3.x effort on RTG/RTA provided the foundations for this but it was still a major effort, components like the 68k emulation core being purchased in as software licences.

To mark 10 years since the original 1985 Amiga 1000, the following products were introduced based around the new Hombre chipset.

Amiga 800
4mb VRAM + 4mb DRAM
50mhz PA/50
Kickstart 4.0 in EEPROM
AGA Chipset
Keyboard form factor with IDE CDROM and HDD onboard

Amiga 1400
4mb VRAM + 8mb DRAM
50mhz PA/50 + separate CPU slot for accelerator updates
Kickstart 4.0 in EEPROM
Hombre Chipset
2x Zorro IV ‘low profile’ slots
Pizza Box form factor with IDE CDROM and HDD onboard

Amiga CD64
4mb VRAM + 4mb DRAM
50mhz PA/50
Kickstart 4.0 in EEPROM
Hombre Chipset
Console form factor with IDE CDROM onboard

Amiga 4000
4mb VRAM + 32mb DRAM
50mhz PA/50 + separate CPU slot for accelerator updates
Kickstart 4.0 in EEPROM
Hombre Chipset
4x Zorro IV ‘full height’ slots
2x PCI slots
Desktop and Tower options with SCSI CDROM and HDD onboard

One can only imagine the impact this would have had on the market, although the problems with 68k legacy game and application compatibility would no doubt have caused problems.

There would also have been a need to maintain AmigaOS 4.x for 68k as well which would have caused a drag on development effort.