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DIGITAL CONFIDENTIAL Document

**I N T E R O F F I C E  M E M O R A N D U M**

**Date:** 03-Mar-1992 02:48pm MST
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**TO:** See Below

**Subject:** LESSONS IN ARCHITECTURE

I suggest you shut down our Intel tower servers and start over with a new architecture.

We have evolved a form of architecture which is not working. In traditional architecture the goal of the building designer is to define and divine the actual needs of the customer and satisfy them, even when customers may think they want something else, the literature says something else and the competition is doing something else. We have developed a new approach today which is that a manager in business for a long time knows everything and can define all characteristics of a machine.

The biggest job in architecting something like a tower is, of course, the industrial design, plastic mold preparation, tooling, brackets, finding corners in which to hide disks, laying out cables, and deciding where to put fans. These operations take many months--sometimes years--and many millions of dollars. Therefore, marketing has to be done in parallel. Code names are given, parties are planned, literature is generated and pitches are made to the customers during development.

Because of the complexities of the mechanical design, it is very hard to trouble-shoot and make the thing work. So often it comes down to the day of the announcement, and marketing and selling without the characterization, testing and demonstrations having been done. Because of the design, it cannot be easily expanded, changed and modified. The investment has been enormous and the pressure to keep going is tremendous.

At this time, someone could easily review what has happened to those equivalent products upon which this was based which have been developed and withdrawn by time, but to which the investment makes it difficult to look at critically.

I strongly suggest you drop all of these towers, immediately build a new one, and get it out quicker than you could by fixing

one of the old ones.

By using a more traditional, obvious approach to architecture, you would become a leader instead of a late follower, and you would have products that are expandable, growable and long lived. would have products that are expandable, growable and long lived.

Step 1: Top level people should do this directly and by themselves, without survey teams and without professionals to find out exactly what the customer needs and wants, as well as their problems, frustrations and pains. Usually, this means the customer wants a lot less than they say they want, and it means it has to be simple, easy to use, very friendly, inexpensive and very expandable.

Step 2: Immediately build an open breadboard to demonstrate the human friendliness, the capability, expandability, and actual ease of installation and ease of use.

Step 3: Characterize it carefully, enough to be sure it does the job thoroughly.

Step 4: Package it up immediately, preferably in a box that is already in production, and ship it with full knowledge that it meets the customer's requirements.

Step 5: Instead of having a party in New York before it has been characterized, wait until the millionth one is sold and have a party in New York to celebrate.

Good architecture should be friendly, lovable, fun, elegant, comfortable and something that makes one feel at home rather than lost and intimidated. Good architecture should grab the enthusiasm of the team making it, building it, selling it and using it. Architecture can use dramatic or relaxed features in order to accomplish these goals. Sometimes, architecture should leave challenges that add excitement and fun, but only with a little danger and little delay.

SOFTWARE ARCHITECTURE

Good software architecture usually means the use of standards and modules to make the whole thing fit together quickly, easily and elegantly. It allows people to grasp the whole view and to see how each one has a part that fits into the whole.

When the whole team sees the architecture of a piece of software, a building, or a piece of hardware and they see their contribution and know where their part fits and how it works, the whole team is enthusiastic and everything fits together.

When the architecture is a mystery in the mind of an artist who

may seem erratic or so much a genius they cannot explain it, it is hard to get people to be enthusiastic and to work creatively and independently.

A building that is built to show the genius of the architect is usually late, way over budget and sometimes a joke. Those that are laid out to give everyone a clear part to play in the construction can often be an enthusiastic success.

The Crystal Palace built in England in the last century is a masterpiece of modular construction built with standard pieces. It is an absolutely huge glass exhibit hall with cast iron pieces and glass panels, and it was erected in an unbelievably short period of time. It is magnificent in scale and magnificent in beauty. We forget the architects name, but we remember the architecture.

VMS is another beautiful piece of architecture. Everyone working on VMS knew of their piece and their part, and, of course, it was a key part of Digital. Every two weeks the operation was shut down and all the code written the previous two weeks was tested, and was not started again until it all worked. Everyone knew how their piece fit into VMS.

Architecture can be the thing which ties people together, give them for which something to work, gives them enthusiasm, satisfaction, and gives them major goals and all the little goals it takes to make their part fit into the rest, or,

Architecture can also be the boring, tedious work of a genius and can limit creativity and excitement.

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