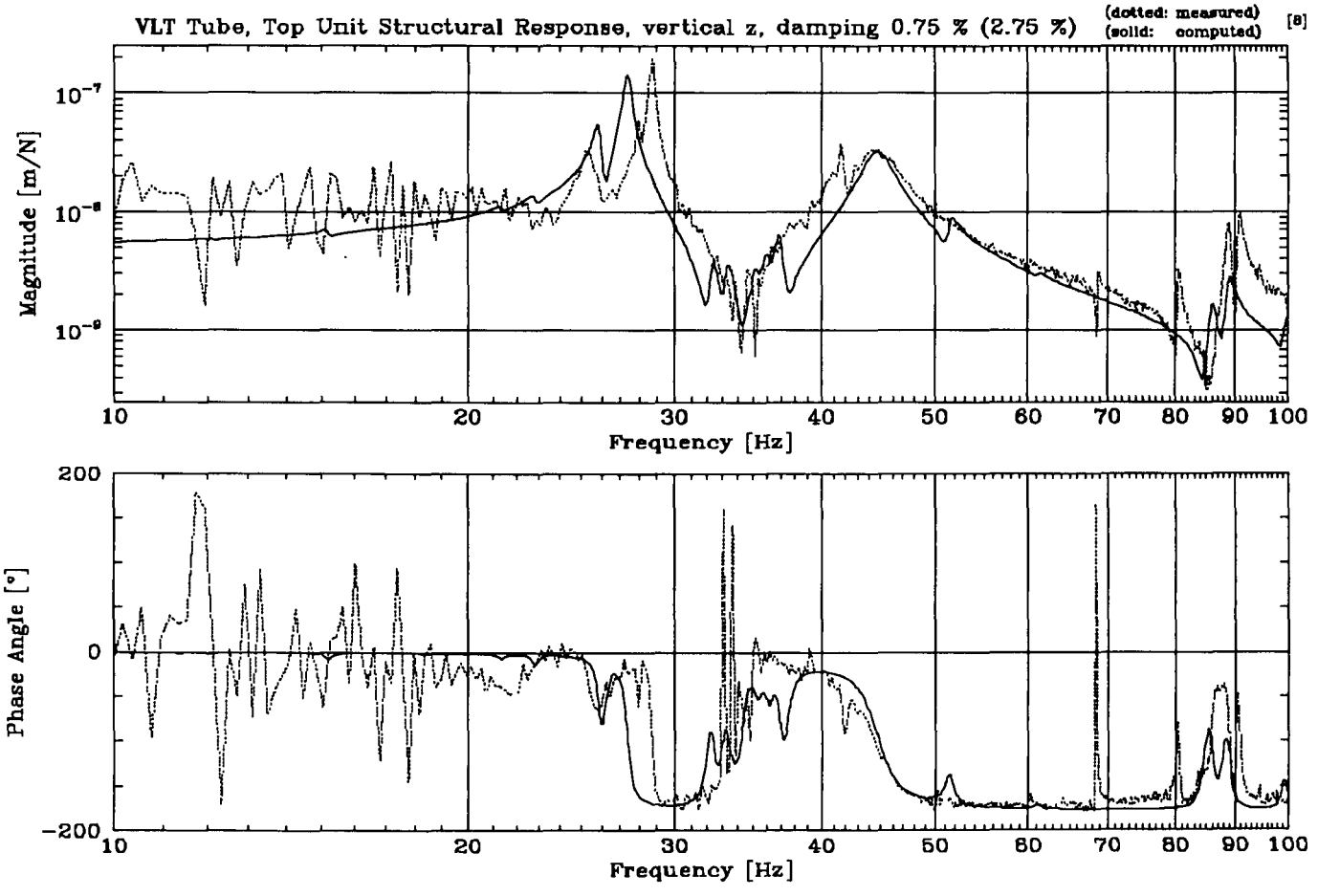


Figure 6: Top unit dynamic performance 0.75% and 2.75 % damping (Koehler, Koch, Quattri).

chopping or tip-tilting. The value specified, and determined according to the interferometric and infrared requirements, were 20 Hz along the optical axis and 26 Hz in rotation. The design calculation had shown better performances (27 and 36 Hz respectively) after the modification of the top ring using a stiffer section.

Last March the tube was equipped with accelerometers, and, using an electronic hammer, the impulsive excitation was applied to the M2 dummy both along the optical axis and the axes perpendicular to it. The results are shown in Figure 5: the dotted line shows the recorded spectrum of the displacement of the M2 dummy. B. Koehler and F. Koch have compared the experimental results with the calculated spectrum, shown in Fig. 5 with the solid line, and have found a very good agreement among the two, which tells how reliable the calculations performed by AES are.

It was very interesting to see that the curves had even a better agreement after having applied a higher damping factor to that mode in which the spiders move on the bolted attachments to the top ring (see Fig. 6).

The fact that the effective damping is the same as the one used in the analysis, and generally used for welded structures, gives an idea of how good the bolted junctions in the structure have been designed and realised. On the other hand, the fact that the vibration modes which involve bolted parts are better damped gives the feeling that the behaviour of the structure during seismic events could be better than the one calculated with the very conservative damping factor of 0.75%.

In the next months, till end of July, the main structure will be thoroughly tested in all its components, and a complete picture of its performances will be available. The start is positive and very encouraging.

Marco Quattri
e-mail: mquattri@eso.org

The VLT Software Review

P. QUINN, G. RAFFI, ESO

A Status Review of the VLT control software was held in ESO, Garching, from April 24–26, 1996. The purpose of the Review was to provide the ESO Management and the Divisions involved in using the VLT software with a quantitative report on the status of the software, close to important milestones of the VLT programme.

ESO representatives of the different "VLT software User" Groups/Divisions were present, including Instrumentation, La Silla and of course DMD and VLT (Software Engineering, NTT Upgrade, VLTI). A team of external Reviewers was appointed from the international scientific community: Drs. R. Doxsey (STSci), Chairman, A. Daneels (CERN), S. Wampler (Gemini) and T. Axelrod (MSSSO). They provided already a number of relevant comments and remarks during and at the end of the Review. A written report will also be forwarded to ESO.

The review had a dense three-day agenda, involving not only the VLT control software aspects but also the Data

Flow software. The aspects considered covered:

– the software development cycle from requirements to implementation

– maintainability, ease of integration and scalability of software

– test procedures, documentation and user's support

– operational aspects

– interfaces between VLT control and Data Flow software

The VLT Control Software

The programme was based on presentations and several demonstrations, as quite a large portion of the software is ready at least in a first version or in a prototype form.

The VLT common software was first introduced. This is by now a well-established product, developed in an incremental way through a series of Releases since 1994, typically twice or three times per year. It contains now an amount of code of about 500 Klines and is distributed to Instrument Consortia and VLT Contractors. In addition, a complete CCD control software package is now available, which is also distributed to Consortia. This is going to be used now both for technical and scientific CCDs.

The part which is becoming more critical now in the VLT programme is obviously the telescope control software, both the subsystem control and the coordinating software. This software is basically the same on the NTT upgrade and on the VLT. It will be tested in parallel during the so-called NTT Big Bang starting in July at La Silla (recommissioning of the NTT with the new software) and with the first telescope structure at the manufacturing site in Milano.

The presentations about the Instrumentation standards used by ESO, but also by the Instrumentation Consortia, concluded the presentations on VLT control software.

It was clear from all this that ESO developments are well aligned with the VLT milestones, although still quite some work has to be done. This was also the subject of presentations covering the telescope integration and commissioning periods, from the point of view of the control software. Looking at planning, while still quite some effort will go into completing the common software this year, more and more effort will be shifted towards telescope control software in the medium range. On the longer run control software for instruments will take more and more effort, although this is to a large extent a collective effort by the Astronomical Community of member countries channelled through the Consortia.

The ongoing training of the Paranal software support team, well integrated with the VLT software development team, was also explained. This is part of the strategy to cope with the software support and maintenance activities at Paranal.

An interesting presentation was given also on the VLT Interferometer software plans, a new potential "customer" of the VLT software standards.

The DMD Data Flow Software

On the final day of the Review, DMD presented an overview of the design and implementation status of the VLT Data Flow System (DFS) (see this issue's article on the DMD for a general discussion of the DFS). The DMD presentation was preceded by a discussion of interface issues between the DFS and the VLT Control Software (VCS). An outline of software needs of instrument developers and operators was also presented.

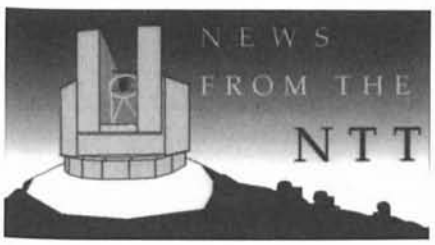
The DMD presentation showed the system breakdown of the DFS into components of the observing cycle from proposal entry to archival research. The concept of Observation Blocks as the quantum of data that flows in the DFS was outlined. Observation Blocks will be passed to the VCS for execution. VCS will request services from the DFS such as catalogue support and archival storage of calibration and raw data. DFS will request site and instrument status data from the VCS so that the short-term scheduling of Observation Blocks can be done to optimise the scientific throughput of the VLT. Since the DFS design process began only in 1995, there is a significant difference in the developmental status of VCS and DFS. Many important pieces of software infrastructure were developed within the VLT software effort before the DFS was defined. Hence there is a critical need for DMD, INS and VLT software groups to work together to define and address the various open interface issues between the DFS and VCS. In September 1995, a Data Flow Project Team was formed with members from VLT, DMD, INS and Science divisions. This team will play a vital role in the successful union of VCS and DFS. The work of the team will be critical in the NTT prototyping programme. By the beginning of 1997, DMD in collaboration with VLT plan to run prototypes for DFS archive, pipeline and scheduling systems on the NTT.

Conclusion

The general feeling was that ESO is well on track both with respect to the technology used and in relation to the next VLT milestones. The effort made by ESO in the NTT upgrade project, used also as a testbed for the VLT and DMD software, was appreciated and encouraged. Still a number of areas exist where the ongoing developments have to be checked and improved. We look forward to the written report by the Reviewers to then start a number of corrective actions.

The VLT software group has been running VLT control software workshops in the last two years, to strengthen the collaboration with Consortia and Contractors. The above Review was clearly not meant to be a replacement for this year's Workshop. This is expected to be held in the second week of September, in collaboration with the DMD and INS Division. Invitations will be sent out to the VLT partners before the summer.

Gianni Raffi
e-mail: graffi@eso.org



The NTT upgrade project has the following goals:

1. *Establish a robust operating procedure for the telescope to minimise down time and maximise the scientific output.*
2. *Test the VLT control system in real operations prior to installation on UT1.*
3. *Test the VLT operations scheme and the data flow from proposal preparation to final product.*

J. SPYROMILIO, ESO

By the time this issue of the Messenger appears in print, the NTT will be in the big-bang phase of the upgrade. Since this article is being written some time in advance, it is difficult to give you an update on how we are doing with the big bang. Right now the preparations are in their final hectic days. I would, however, like to concentrate more on what we plan to do at the time you will be reading this article.

Big Bang

The first thing we plan to do in the big bang is the re-aluminisation of the secondary mirror of the NTT. This will be done while the old control system is still in place so that we can verify the optical alignment of the M2 unit before removing any other optical element. Following the reintegration of the M2 unit we will start the control system upgrade. This is split into four parts. In the big bang part 1 we shall upgrade the major telescope subsystems (building, altitude, azimuth, M1, M2 and M3) and the adapter rotator on side A (the SUSI side). This work will last until the middle of September and we expect that the re-aluminisation of the primary as well as a number of maintenance activities will also occur during this time. Following this part 1, we will begin to integrate the various subsystems into the NTT control system. At the same time side B (the EMMI side) and the instruments will be upgraded. In this second part of the big bang we plan to have a period of complete system integration of all control functions.

With the end of the big bang part 2 we plan to re-align the telescope and re-aluminise the tertiary mirror of the telescope (which has to be removed in any case for the alignment). At the same time we shall be installing the new CCD controllers (ACE) on EMMI and SUSI. The completion of part 3 will allow us to begin the commissioning phase for the new control system and the instruments. We expect to be doing this during December and January of 1996/97. When we have a global understanding of the control system we shall then plug this system into the VLT data flow system which will handle all parts of observing external to the direct control of the instrument/telescope.

Bringing the NTT Back to the Users

A number of applications having been submitted, we are awaiting the OPC approval for service programmes with the NTT in February/March 1997. Assuming the aforementioned phases of the big bang go according to the plan, we expect that we shall be doing some very limited service observing on the NTT during that period. As was made clear in the announcement of opportunity, this observing is strictly shared risks. As anyone who has commissioned an instrument or a telescope will be well aware, the number of problems that we shall face cannot be overestimated. Depending on the progress with the big bang, a decision will be made on what may be made available to the community during period 59. However, we do want to welcome users back to the telescope before the official end of the big bang in July 1997. This is a critical part of the prototyping the NTT is supposed to perform in advance of the arrival of UT1.

We expect that the NTT that comes out of the big bang will be better than what we had before. The problem discussed in the last issue of the *Messenger* regarding the sensitivity of EMMI has now been traced to the long period between aluminisations of the telescope mirrors and also to the bad state of the RILD mode selection mirror which seems to suffer from acne. A similar problem has been found in the SUSI M4 mirror. Although the latter should be replaced before the big bang, the former cannot be replaced so soon. We hope for a significant improvement in sensitivity for the whole telescope after the upgrade.

What will the NTT Scientific User See

For a start we plan to replace the NTT console for one more functional. Users familiar with the remote control room can expect a similar look and feel. A number of new workstations will be in place both for the control of instrument and telescope but also to provide access to data flow tools such as pipeline and scheduler within the control room. The somewhat uncomfortable situation of having to do data analysis on the same workstation that is taking the data will hopefully be a thing of the past with a dedicated workstation planned for off-line use by the astronomer.

The new control system will come with a new operations scheme, and people who have applied for NTT SUSI service time and whose proposals are selected by the OPC shall be using a phase II proposal preparation tool to specify their observations in more detail. At phase II observing blocks (OB) will be created. These OBs marry targets and observations into a single entity that can be scheduled and executed. The observing blocks will be run by the NTT team in service mode and checked against the requirements before we send the data to the applicant.

We strongly value the comments and suggestions from the community at all times. Moreover, during this rapid prototyping phase, the user community can be most influential and helpful. Therefore, all users of the NTT are strongly encouraged to help us make an NTT that suits their scientific needs.

Comings and Goings

The NTT team composition has been fairly stable over the last few years; but now, as the big bang approaches, some changes have taken place. Pierre Martin has arrived as a new NTT fellow and Stephane Brillant has also joined the team as a student. Also Marco Chiesa and Thahn Phan Duc, both of whom are software engineers, have transferred from Garching to La Silla to be closer to the action. Sadly, Roberto Aviles, one of the NTT instrument operators, is no longer with the team.

Jason Spyromilio
jspyromi@eso.org