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## ATLAS: Aims and their realisation

The provisional specification drawn up for the Harwell Atlas is for a
large-scale installation costing a little over £2½ millions.  If this is
approved the computing laboratory in which it is sited will have one of the
most powerful machines in the world – possibly even, the most powerful, for
there are indications that Atlas may turn out to be a better machine than
its only rival, the IBM Stretch.  Thus this laboratory will have a most
serious responsibility, that of ensuring that the best possible use is made
of a major scientific asset; and as the fields of application of mathematics
have been widening and diversifying with rapidly increasing speed since the
digital computer became an accepted tool – that is, over the past 5 years – we
cannot predict what will be the most important problems to be put on to the
machine in 5 years time: therefore the laboratory must be prepared for
anything. I want to give here my views on the way the laboratory must be
staffed if this challenge is to be met.

In the collaborative scheme, which seems to have been accepted, the
laboratory will have to provide various services for a variety of customers,
who will belong to Universities, Research Institutes, Government Departments
and the A.E.A.;  these are:-

1.  Time on the machine

2.  An operating service, including all necessary data-preparation

3.  An agreed set of programming languages and the necessary input
    systems; this includes such things as FORTRAN compilers

4.  Teaching in programming

5.  A pool of knowledge of numerical mathematics (a term to be interpreted
    very broadly), always kept up to date

6.  An intelligence service for treds and developments in programming,
    in all parts of the world

7.  A similar service for uses of big computers

8.  To an extent not yet clear, the actual writing of programs for
    customers.

This will require the following staff groups:

   (i)   Engineers for maintenance – almost certainly Ferranti staff

   (ii)  Operators and any necessary clerical staff, controlled by a
         machine-room manager

   (iii) Program-advisory staff for general day-to-day services

   (iv)  Expert program-advisory staff, able to deal with the most
         sophisticated problems; including people who know all about the
         inner workings of the compilers and other master programs.

   (v)   Mathematicians and mathematical logicians, including some of
         very high grade; most, but not necessarily all, to be interested
         in numerical aspects.

In addition, to keep the whole group in good health and to counter any
tendency towards "computation for its own sake", there should be close contact
with users, and therefore –

   (vi)  Applied mathematicians working on a variety of problems: these
         could provide the programming service (8)

(vii)  Researchers working on their own problems.

I feel very strongly that all these people should be together in the
computer building; computation brings one into contact with all kinds of
people and a balanced group is necessary to give the right climate.  I am
strongly opposed to the suggestion, which has been hinted at, that the lab-
oratory should confine itself to operating the machine - items 1 and 2, that
is - and leave everything else to the users; this would be disastrous to the
success of the project and is equivalent to a suggestion that the new
synchrotron should be run by a group made up of the maintenance engineers
and a few clerks to keep the books.

The size of the group - excluding the maintenance and operator teams,
which can be settled on straightforward considerations - will need some
discussion; it should not be too small, for there must be plenty of scope for
interplay of minds; and a fair rate of flow through the group should be encour-
aged by having several posts for Fellows or Research Associates.  I would
suggest something around 30-40.  A very much more serious subject for discussion
is the future of the Harwell computing group: does this become part of the
new organisation or does it become just one of the customers?  The first
alternative leads to difficult problems of control and responsibility, the
second will cause a serious decline in the health and status of the group.
The question will have to be resolved quickly, for there is a very great deal
of work to be done, in all fields, in setting up the installation and this will
not go well unless the final outcome is clear from the start.  I favour the
first course, with some very hard thinking to decide the form of organisation
which will meet the undoubted difficulties.

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