         Illinois' reply to Maxwell's Request for Graphics Information,
                         NIC Document 14925.

This is a reply to Craig Maxwell's (UCLA-NMC) "Request for graphics
information" of 3/7/73. Further details can be obtained by contacting
me directly.

To date, our work in graphics has been primarily centered about support
for several applications groups. To make the generation of beam-
oriented graphics as painless as possible for these groups, our policy
for supporting this type of graphics has been to emulate as closely as
possible the CALCOMP plotter support package on the host machine, but
with NGP0 output. (Presently, before the resulting NGP can be sent to
some of our peripherals, e.g., Gould 4800, it must be converted to
device specifics. With the advent of ANTS MARK II and a PDP-11/45, all
conversions will be handled locally, so all graphics flowing into our
system will be NGP). We find this approach very labor-saving, even at
the present slightly kludgey level.

We also have some grey-scale work taking place on our GOULD and IMLAC.
One group is processing satellite pictures on Illiac and will soon need
grey-scale output, another is producing natural-resource maps, and a
third is generating holograms. No standardization plans have been made
for grey scale work, but if an acceptable standard is established, we
will most likely use it.

A small group, including myself, is currently planning an interactive
graphics system. The system will use multiple hosts, possibly using a
remote E&S machine for rotation, scaling, etc. We have a number of
large hurdles that have to be jumped before we can do anything, though.
Several of these are not graphics-specific, such as process-controlled
FTP, inter-process coordination among hosts, and others. We had
intended to let efficiency dictate the format of intermediate results
shipped via the Net, with standardization being applied where it is
helpful for minimizing effort. Since the system will be highly
interactive and will also manipulate grey-scale data, we will need a
higher level of graphics protocol to handle the user interface. A
"proto-prototype" system is being used now to do some simple
manipulations of meteorological data (e.g., contouring, 3-D plotting)

with an IMLAC passively displaying the NGP0 pictures created. Soon, I
hope to finish an IMLAC program that will handle some interaction with
the mouse/keyset. I have decided to implement the following (outgoing)
commands.

    MOVE beam to mouse position

    DRAW from last to present beam position.

    TEXT at present beam position.

    UNDO the last command (to facilitate freehand drawing and
          backspacing in TEXT).

Other commands may be implemented as needed to do what people want to
do, at least until an adequate interaction standard comes along.

Note that there is implicit in the UNDO command the assumption that
the other end of the line possesses a certain amount of memory and
intelligence. Two possible philosophies for standardizing interaction
are that (1) all "nodes" ("generators" or "users" of data) understand
some set of commands and possess at least a certain amount of
intelligence, and (2) a distinction is made between "displays" and
"computers" (quotes because the line is fuzzy). I favor the first for
its generality, but I suggest that the lowest level of interactive
graphics might want to use the second for ease of implementation with
unintelligent devices, e.g., COMPUTEK 400's. (I do not mean to
imply in (1) that the actual "computer" would not have a larger
vocabulary than the actual "display" --this is inevitable with higher
level capabilities in the protocol).

Since we have almost no local computing power for applications work,
all our graphics computation is done remotely (our work has been
primarily at UCSD (B6700), USC-ISI (TENEX), and UCLA-CCN (360)).
Because we do our work at scattered sites and are basically economic
of labor (pronounced "lazy"), we have a lot to gain by standards and
will be glad to cooperate as much as possible with standardization
efforts.

Steve Bunch

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