Fully Integrated Systems for Clinical Development in the 
Pharmaceutical Industry 
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ABSTRACT
The power and flexibility of computer software and 
hardware grow and grow every year, yet the 
applications used within the pharmaceutical industry 
have not reached the potential. Rather than new 
applications letting us realise our dreams, they 
concentrate more on the trivia while purporting to 
deal with the global concepts.

INTRODUCTION
Over the past 10 years I have been actively involved 
in the development, review and selection of 
applications in the clinical area (clinical data 
processing, data entry / RDE, administration and 
drug safety), this presentation will concentrate on the 
clinical data processing functions but is applicable to 
the whole area.

The goal for clinical data management applications is 
to provide a seamless integration of staff and 
functions in order "to gain product license approval 
(NDA / PLA) ".

Many people will consider that they have an 
"integrated" system, so we should recognise that we 
are only talking about the highest level.

Levels of integration

\[
\begin{array}{c}
\text{Highest} \\
\text{Complete - a change in the "host" will} \\
\text{always be reflected in all parts - on a} \\
\text{continuous basis} \\
\text{Batch Transfer} \\
\text{Lowest}
\end{array}
\]

There is also a horizontal, matrix level of integration 
between departments or others involved in the 
process.

CURRENT SITUATION
The industry is faced with using multiple systems in 
order to meet our needs. The typical suite of 
applications within most companies consist of one or 
more data entry applications, a database and one or 
more systems for reporting and analysis.

The failings of such a position are all too soon 
realised. Even if the highest level of integration is 
reached it will prove impossible to maintain over a 
long period. The reasons for this are that the rate of 
change within the industry of both applications and 
standards are so great that you would either

1. have to freeze all upgrades at the level at 
which you achieved integration.

or

2. upgrade an application and lose the 
integration due to changes in interface 
between applications.

or

3. wait until all applications reach the same 
level of compatibility again.

or

4. have to move to paper based systems when 
confronted by new functions outside of the 
defined limits of the "system".

The first position can be seen within many 
companies, it leads to dissatisfaction and frustration, 
users are probably still working with terminal 
emulation and have not graduated to "windows" 
products. The computing staff are fighting a continual 
battle to maintain ageing hardware, as there 
applications are not maintained on more recent 
operating system or hardware, and to obtain new 
staff with knowledge of these ageing systems.

The second situation may initially lead to satisfaction 
among the users that they have the latest upgrade / 
release (or even bug fixes) or are able to switch to 
some PC "windowed" software, that offers the latest / 
greatest salvation for their problem. However, the 
plus side of the upgrade may soon be lost when the 
loss of integration is releasing, smooth in-line views 
to batch / file transfer

The third option is a "forsake hope", it is unlikely to 
happen, but if you need any more description of this, 
then I suggest that you read one of the "Sharp" 
 novels by Bernard Cornwell. The moving things to 
paper based may seem an inevitable situation when 
dealing with "persons" outside the system e.g. 
investigators, offsite CRAs, etc., but it is only in the 
limited construction of the systems that means that 
these people are left out.

SO HOW DID WE GET TO THIS ?
What led most if not all pharmaceutical companies to 
this situation?

The reasons that have led to this position are partly 
down to management and also by a lack of vision. 
The staff used to specify systems either for 
development or purchase optimise it for their own 
group or function, they are attempting to solve the
problems in their own area, but may in fact create more problems. If the system was linked in with the investigator, you can realise the dream of a paperless contact, but more important than this, you can cut the time down required for responses.

The method chosen may also lead them into the trap of having optimal solutions for each component which overall leads to a sub-optimal result.

The process of selection -
1. the database is chosen first.
2. the data management application features next on the list to sit on top of the database, this will be chosen on a "follow me leader / market leader" basis or sometimes as the optimal solution. The optimal solution is
3. the associated applications - data entry, RDE, CANDA, etc. get chosen next, for either there integration potential to the main application or on a optimal solution basis.

Of course these will all be robust systems that fit into the corporate strategy and that "integrate" at that point of time.

WHAT OPTIONS ARE OPEN

At the current point in time you can only build your own system or hope that someone with some vision comes up with a system that you can use. Some groups are starting to think along these lines in terms of the horizontal contacts of everyone within the process being on one system, but this tends to be as a user interface / communication, but this still leaves us with the problem of multiple products, as a database and analysis tool are still required.

If you start with your own system, where should you start. Most people start at the storage end, and whilst the importance of this can not be minimised, do not be deceived into thinking that only a "database" will meet your requirements. Systems have a structure that can meet the requirements of a Clinical Data Processing system without being a database.

WHAT HAVE WE DONE

Faced with this situation we developed a SAS based system. Our application CDMS covers clinical data processing, drug safety and administration, but with the focus on the clinical data processing we cover data entry (single, dual file, dual key log and dual key override), data cleaning, medical dictionary coding, database replication, reporting, storage, management and administration. All of this is available in a GUI or windowed environment (Unix server and MVS).

The advantages of such a system are:

1. Flexibility
   We are installed in 23 sites across 5 continents on 4 different SAS versions (6.08, 6.09, 6.10 and 6.11) and on 4 different operating systems (Windows 3.X, OS/2 [2.1, 2.11 and 3.0], HP Unix and MVS). Such flexibility is essential for whatever company structure is envisioned from decentralised, merging / acquisitions mode, co-operative venture or maximising use of CROs. All sites are communicating with one another, both across platforms and versions.

2. Ease of upgrading
   Upon the release of SAS 6.11 in December 95, we ported to a production version within 10 days and had resolved all issues within 20 days. Utilising the latest software gives the developers and users a boost, and it helps in the development of staff and the acquisition of staff - everyone wants to use the latest technology.

3. Common System
   Users only have to know one system, a synergy develops only one system is used, and all departments feed into common systems.

4. Backward compatibility
   We can access not only all the data in the system since 1988 (SAS Version 6.03), but also we can use the current functionality of the system to address it, data are always brought forward with every upgrade.

The one key area that we currently have not included is the ability to get out to the investigators, so whilst we have the benefits of vertical integration, we have not realised any benefits of lateral integration, which will give us major advantages.

HOW DO YOU GET OUT OF YOUR CURRENT POSITION

Wait until a fully integrated product becomes available, or choose a product where integration is the goal. Once chosen invest whatever you can to make it succeed, such a solution will not give the users the "best" / "optimal" system, but you can overcome this through 3 key routes -

1. Ownership
   This is true of all systems but is such a key ingredient that is all too often overlooked. Have internal user group meetings - report
problems, work-arounds, discuss future changes / enhancements and user requests. The users must be able to see parts of the system that they suggested - reports, menus, etc.

2. Flexibility in reporting / interface
   This is tied in with ownership. If you can only give the user the company's or developers or "key users" view of the world then they will soon become disillusioned.

3. Vision
   To see beyond the current requirements - integrate the investigation on process

IS IT WORTH ACHIEVING

Most definitely yes, but as with any major system, never underestimate the pain, it is always twice as bad as you thought, but at least the results will be worthwhile.