

**COMPUTER APPLICATIONS IN VETERINARY MEDICINE**

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**SUMMARY**

Computers have become essential tools in almost every field of research and applied technology. The advent of the micro-computers allows us as veterinarians enter and analyze vast amount of data on animal health, production and administrative responsibilities. Computers in veterinary medicine have been used for veterinary education; veterinary informatics; veterinary practice, research, as well as in agro-veterinary consultancy services. Informatics, which entail using the computer to access information by facilitating the formation of discussion groups; reviewing expert system' type programs such as Bovid and Canid (simulate the decision-making skills of an expert). Several Internet programs such as discussion groups, journals, dedicated veterinary sites as well as E-learning are important for veterinary continuing education. The Internet specialized computer based CD ROMs have become an invaluable source of literature in developing a research methodology as well as getting updated with current research direction and findings. An instructor or teacher of veterinary medicine would also find the computer useful in preparation of lecture materials; exam result computation; student data/records; pooling of exam questions and answers as well as clinical case documentation. Computers could be effective in a good and progressive modern veterinary practice and these include their use for reception services; diagnostic services; clinical services; surgeries and surgical management (laser surgeries); pharmacy and pharmacy management; client information services; field/ambulatory services; hospital management (storing hospital records; analyzing management data; revenue generation, targets and projections; epidemiological data as well as the automation of staff schedules); practice updates; diagnostic imaging and laboratory evaluations of specimens. Computers have also crept into the field of agro-veterinary consultancy services and have been useful here for clinical consultancy; agro-veterinary project design, monitoring and implementation; preparation of presentations as resource persons or instructor; feasibility for agro-veterinary projects as well as epidemiological studies and disease surveillance on farms.

**KEY WORDS:** Computers, application, Veterinary Medicine

**INTRODUCTION**

The computer is an electrical machine capable of receiving, storing, retrieving as well as analyzing data in various forms and media. The advent of the computer has revolutionized virtually all aspects of our lives and they have been in widespread use for over 30 years (Mohammed, 1999). The pace of development in that short time has been remarkable, and the growth in the use

of computers and the power of the machines themselves continues at an accelerating rate

The advent of the new generation of powerful but robust and inexpensive micro-computers means that veterinarians now have ample facilities to collate, enter, check, analyze and store vast amount of data on animal health, production and administrative responsibilities as well as generating reports in the format required for

end-users to aid management decision making (Elder, 1976).

As the technology developed, there has been a subtle change in terminology. We now refer to information technology as opposed to computing or automatic data processing. The change reflects two significant trends: the extension of the basic computer technology to include new and powerful peripheral devices and the development of the computer as a resource for the storage, management and retrieval of information in all of its manifestations.

The combination of these factors has led to the information technology of today, providing vastly more powerful and flexible hardware, and more powerful and sophisticated software than the earlier generations of computer systems. Computers have also opened up a new era in manufacturing through the techniques of automation, and they have enhanced modern communication systems. Computers have become essential tools in almost every field of research and applied technology, from constructing models of the universe to producing weather reports, and their use have opened up new areas of conjecture (Mohammed, 1999). Database services and computer networks have certainly made available to us a great variety of information sources.

A veterinarian by virtue of the training is equipped to undertake the following among others (Schaer, 1985): run a successful clinical practice specializing in large animals, small animal, avian or wild life practice; engage in the production of all types of animals; engage in feed production; operate a functional livestock abattoir; conduct a feasibility study for any livestock or allied enterprise; plan and

implement livestock and agricultural projects; operate a functional veterinary drug business; fit into an integrated rural development expert team; conduct a socio-economic survey; co-ordinate and supervise the implementation of livestock infrastructural projects; conduct research into animal health, nutrition and reproduction; teach a variety of livestock and animal health courses at veterinary schools and Agricultural colleges; design and operate a functional diagnostic laboratory; and serve in security services where animals are used for such duties.

All the aforelisted services could be run more efficiently with a computing system. With the recent introduction of V-SAT communication in Nigeria, any veterinarian can have Internet access without the use of telephone lines. Several Internet cafés are also operating all over the country and Internet access has now been made cheaper and easier.

Though the Nigerian veterinary practice is yet to catch on with the "computer bug", this situation may soon change as more veterinarians are acquiring knowledge on the usefulness of the computer. This projection informed our decision to highlight areas in which this indispensable aid could significantly improve our efficiency as veterinarians.

### **COMPUTER APPLICATION IN VETERINARY EDUCATION AND INFORMATICS**

Information technology (IT) is a buzzword currently in use all over the development discipline. In Veterinary medicine, we are faced with certain special challenges that require some initiative and dexterity to overcome.

The Microcomputer represents the most dramatic and significant development in information technology as it applies to the transfer of scientific information, as well as facilitating access to the very large databases maintained by the major publishers. It enables smaller database (personal, local, regional) to be created and maintained, and hence provides a new medium for improving the transfer process (Nicholle, 1997).

### **The internet**

The Internet refers to the pathway through which information is displayed and/or retrieved via global satellite link through access to a variety of computers all over the world. The Internet represents the most potent link in the information and communication technology. It is the central medium for the integration of information technology (IT) and communication. The Internet has gone through a very interesting history starting with the commissioning of the APRANET by the department of overseas development of the USA in 1969 to the development in 1994 of the worldwide web by Tim Bernard. This precipitated the so-called IT revolution. Consequently, the unique feature of the Internet that makes it cheap and fast, digital and timeless has resulted in its very rapid expansion and adoption globally. Perhaps, the feature of the Internet that makes it rapidly expanding is the Electronic Mail or E-mail (Mohammed, 1999).

### **Discussion groups**

A group of E-mail users can get together to form a discussion group on certain topics of mutual interest i.e. exotic species, marine species, wild life or more general veterinary topics.

### **World Wide Web**

Often simply referred to, as 'the Web' is a more user-friendly way by which to use the Internet. Software 'browsers' such as Netscape or Internet explorer allow the user to find 'pages' of information supplied by other computers. These pages are known as 'Websites'. Websites may contain text, pictures, moving images and sound. Sophisticated indexes (called 'search engine') such as Yahoo, Excite, and Magellan allow the user to hunt for any topic, and look at the relevant Web pages on their computer e.g. if you are interested in Veterinary pathology, there are many pages which you can link up to for continuing education, case challenges, dates of meetings, proceedings of meetings and so on. Some scientific journals also publish their contents and abstracts for access over the web (Mohammed, 1999).

## **PRODUCTS AIMED AT THE VETERINARY MARKET**

### **Animal information management**

This is a project that aims to develop 'Systems' (diagnostic programs) which assist in the diagnosis and treatment of animal disease, record keeping and disease surveillance and helps us to cope with the information explosion. 'Expert system' type programs (Bovid, Canid and Phytex) simulate the decision-making skills of an expert in that area. Canid provides information on the clinical presentation, therapy and management of diseases of dogs. It provides recommended treatments, case workups and an onscreen tutorial. The simple screen interface is menu and windows driven but the main strength of this program is its information content (Nicholle, 1997).

Bovid is the bovine counterpart to Canid. It covers clinical signs, postmortem findings, confirmatory tests and management of cattle disease. Phytox on the other hand allows the user to obtain information about toxic plants, fungi and cyanobacteria throughout the world. As with Bovid and Canid, the Phytox program lets the user undertake case investigations, check possible differentials, clinical signs, and necropsy findings.

### **COMPUTER AIDED LEARNING IN VETERINARY EDUCATION (CLIVE)**

CLIVE is a consortium of the Universities of Edinburgh (lead site), Bristol, Cambridge, Glasgow, Liverpool and London (Royal Veterinary College). The project aims to make computer-aided learning an established and expanding feature of veterinary education in all the sub-disciplines of veterinary science in all UK veterinary schools. Current products include numerous self-test assessments including equine and bovine limb anatomy, renal pathology, lambing, farm animal diseases, orthopedics, diagnostic imaging, veterinary public health, and medicines' legislation, to name just some of the areas. There are case studies and simulations covering many topics, including weight loss, skin lesions, polydipsia, equine respiratory disease and anesthesia. A large number of products have been completed and many more are in the pipeline (Mohammed, 1999).

### **International Veterinary Information Center (IVIC)**

International Veterinary Information Center is a dedicated veterinary computer network, which consists of a central hub of computers, to which veterinary practices; veterinary-related companies, universities

and other relevant users can be linked. In this way it has similarities to the Internet, but with several advantages for veterinary users. The content is strictly veterinary related, making data and services easier to locate, security is much better since IVIC is a closed veterinary network and the service is fast due to utilization of the digital telephone network.

IVIC is a flexible system that can be adapted to suit the needs of a particular practice, and can be incorporated with existing practice management software. It can be accessed by fast modem, but is best run over ISDN, which requires installation of an ISDN telephone line, together with IVIC software and bridging connections (Nicholle, 1997). Several other sites such as the biomed.net, goggle search, and the virtual.com/vetmedicine offer similar services.

### **Electronic mail (E-mail)**

The E-mail allows people to communicate with each other through computer links via the Internet. The advantage of using this medium for veterinarians is that it is instantaneous and has the capacity to have the contents of the mail, such as laboratory results or large amounts of written material available directly to your computer.

This medium is also a valuable tool in establishing a consultation system with referral centers and other specialists worldwide. With this capability in place, it would enable the field veterinarian to get a patient side consultation and provide optimal case diagnosis and treatment. In addition, being able to share experiences with colleagues could enhance friendships between veterinary practitioners.

## **Journals**

Some veterinary journals such as the Journal of Small Animal Practice, Compendium on Continuing Education and the Journal of American Animal Hospital Association publish their contents and or abstracts for access over the web. The contents and abstract of these journals are usually available to the browser whenever the site is accessed. Full articles are however often reserved only to online subscribers. When uncertain of a veterinary website address, a search via the Vet web, Goggle or Biomed. is suggested.

## **Vet web**

The Vet web is a free information service directed at those in general practice. It is a vast indexing site for veterinary information and materials. The Vet web currently indexes about a thousand, seven hundred veterinary sites, which are readily available to the user at the touch of the relevant computer keyboard button.

## **Communication**

Many veterinarians may use the Internet to communicate with their clients. The clients could access information that the practice provides on its website. This would help to educate current clients as well as advertise to potential clients.

Items such as new equipment and services, changes in payment policies, office and farm call hours, contact information, staff biographies, history of the practice, updates on pertinent local events, and emergency services are just a few of the items that should be included on a practice web site. Veterinarians could also send-off answers to simple questions or request further information about the case in a return E-mail. It would be possible to allow clients' access to portions of their animals' medical

records on-line. They could then confirm that their animal indeed is due for vaccinations or deworming and that they should hence schedule an appointment.

## **On-line prescription**

In the case of ambulatory practitioners, time saved by not having to make repeat trips to individual farms to drop off necessary medications and supplies would allow more time for the veterinarian to see additional patients. There would no longer be a huge demand on storage space for patient medications and supplies if the veterinarian could prescribe them through a veterinary practice website. Using this service would allow the veterinarian to have a virtual fully stocked Internet pharmacy for his or her clientele (Kaita, 2002). The prescribed items could then be supplied directly to the client.

## **Other programs on informatics**

### *Life learn*

A company offering a variety of different types of material for veterinary professional development. Available on CD-ROM, CD-I and floppy disc.

Vet stream: Cambridge based company, which aims to provide all the information that a vet practice might need in an up to date form for immediate access at any time. Information is supplied as species-based CD-ROMs, which are updated every 2 months.

### *Veterinary Education and Teaching*

An instructor or teacher of veterinary medicine would find the computer useful in the underlisted areas:

### *Preparation of lecture materials*

Notes could be easily prepared from a pool of information stored or downloaded onto the computer. The use of computerized

'smart boards' would also allow an instructor to instantly access the net or download graphics in the course of a lecture, should the need arise.

### ***Exam Result Computation***

It is now common practice to compute, analyze and store student examination results in computers. The Microsoft Excel program offers the advantage of accurately computing grades and graphically portraying results for easy appraisal of student performance over a period of time.

### ***Student data/records***

Both academic and general data on veterinary students can be stored in a computer system. The computer allows easy retrieval and analysis of this information.

### ***Pooling of exam questions and answers***

With a computing system, it is possible for an instructor or teacher to pool his or her exam questions into the computer (e.g. objective type questions). This could then be randomly selected for any particular exam. This obviates the need to continuously set fresh questions whenever an exam is pending.

### ***Clinical case documentation***

Special or rare cases/specimens can be photographed digitally or scanned into the computer system; it could also be stored in any of the storage devices for future instructions. This would obviously improve the quality of veterinary instruction since students would see more cases than would have been the case during their period of training. Diskettes (floppy or Zap) as well as CD ROMs are suitable for this.

### ***Research***

There is a tremendous amount of information, products and services available to the veterinary industry and the field of veterinary practice on the web. This is an invaluable source of literature in developing a research methodology as well as getting updated with current research direction and findings.

The computer as an instrument for accessing the web obviously gives us the most extensive literature in the relevant area of research. In addition to the web, several specialized CD ROMs such as the Medline and Ebsco gives us access to a world of medical and veterinary biodata. This literature search is invaluable in planning researches and updating ourselves.

### ***Continuing Education***

Several Internet programs such as discussion groups, journals, dedicated veterinary sites as well as E-learning are important for veterinary continuing education.

### ***Publications***

The development of laser printing technology has been one of the most exciting and important components of technology for information transfer. In combination with the software described earlier and in particular with word-processing, it has allowed computer users to produce high quality publications at very low cost. It also provides the capability to integrate normal text with graphics and even pictures.

The use of the computer in the publication of veterinary and other periodicals has **come to stay**. Virtually all articles are typed on the computer, some are edited

using the computer, type set and even printed using computer technology. Furthermore some of these publications are posted on the web and accessed all with the aid of the computer. In addition to periodicals, veterinary books and manuals are also produced using the computer. Some notable books such as the Merck's Veterinary manual are now sold as a CD Rom in addition to the regular hard copy.

### ***Library Services***

Library services can be more efficiently provided when such libraries integrate their services into a computer network. This computerization of libraries has led to the development of "Virtual libraries". These refer to libraries where books have been replaced with computers or computer terminals and access to information could be so simplified that the touch of a button launches you into an orbit of information.

The virtual library concept is achieved by an integration of Internet accessibility as well as the provision of periodicals and books on appropriate computer storage media. When library services cannot be fully computerized, computerizing the catalog system alone would remarkably improve the services of such libraries.

### ***Seminars, Conferences and Workshops***

The MS power point is becoming a "must have" in scientific presentations. Presentations of veterinary material using this media improve the quality of presentation by allowing the presenter highlight significant points as well as inclusion of graphics in such presentations.

## **COMPUTER APPLICATION IN VETERINARY PRACTICE**

There are several areas where computers could be effective in a good and progressive

modern veterinary practice and these include reception services; diagnostic services; clinical services; surgeries and surgical management; pharmacy and pharmacy management; client information services; field/ambulatory services; hospital management, practice updates and continuing education as well as internet services (Schaer, 1988).

### ***Reception services***

#### **Record and data storage and retrieval system**

Clinic Records (patient data, client data, medical data etc.) can be obtained and stored in the computer. This information can be easily accessed whenever required.

### ***Perception of value and personal caring***

When clients walk up to the reception area desk and are effectively called by name and identified as being in your computer system, this gives the client a very good feeling with regard to your organizational ability, as well as their being a member of your team. To have the ability to generate a sheet of paper summarizing the pertinent information about each client so that this information can be sent with the client file into the examination room is another extremely important function of any good computer system.

A good software system will have a part of the system that allows you to enter what is done on a daily basis to a hospitalized patient. They are entered in a systematic manner so that no services rendered are ever-missed, and these services appear on a client's final invoice in a very methodical line and item basis. You will always increase the perception of value of a client when you allow the invoice to show them exactly what you have done for their animal while hospitalized in your practice.

***Fee sensitivity elimination***

We, by our nature are prone to giving away services, not charging for services rendered or placing ourselves in a compromising situation when it comes to charging clients. Once a computer system has been instituted in your practice and the fee assigning process has been computerized and removed from your hands, revenue generation improves since the computer does not share our emotions and sympathies.

An effective computer system will also have an estimating system that is easy to use. These pre-created estimates would quickly show a client the estimated charges in an emergency situation.

***Inventory profit center***

By having automatic drug mark-up percentages in the computer and by being able to control the price per unit that is charged to a client via the computer system, inventory becomes a profitable affair (Hassan and Hassan, 2003).

***Clinical Services***

Practice management software benefits the veterinary practitioner in many ways. Ready access to patient records, rapid entry and look up of clinical findings, easy invoicing and monitoring of revenues, inventory management, rapid search and sorting of data, reminder and recall maintenance and integrated word processing are just some of the software functions that assist the successful practitioner. Many of the packages also give you the ability to produce these data very time-effectively so that you have a summary of what has been done medically on each patient prior to entering an examination

room (Hassan and Hassan, 2003).

***Clinical diagnosis guide***

Several programs designed to assist practitioners in the diagnosis and treatment of animal disease, record keeping and disease surveillance are also now available in the market such as Vet stream, Canid and Phytex (Hall *et. al.*, 1980; Mohammed, 1999).

***Computerized clinical guidelines***

This is a sequential guide on the approach of emergency situations such as automobile accidents, shock, surgical emergencies etc. The computer system sequentially guides the practitioner on both the evaluation and management of these cases. Once an entry is made, this information is analyzed by the computer, which immediately gives instructions on the next stage. This program allows hospitals and clinics to harmonize several clinical routines.

***Referral Services***

E-referral services refer to referral services via the Internet. This can be explored by veterinarians since pictures, clinical briefs as well as radiographs could be sent anywhere in the world for an expert opinion.

***Surgeries and surgical management***

***Surgery***

Computer guided laser surgeries e.g. ophthalmic and cardiac surgeries are common practice in human surgeries. With the increasing need for proficiency in veterinary surgery these may sooner than later become common in veterinary practice.

***Pre, intra and post surgical monitoring of patient***

Computers have been programmed to monitor various parameters of the surgical



patient such as the temperature, pulse, respiratory rates as well as cerebral activity. For the continued or protracted monitoring of intensive care unit patients the computer has proven to be very useful.

### ***Diagnostic services***

Computers are now invaluable in several medical and veterinary diagnostic services, which include: diagnostic imaging: computerized tomography, medical ultrasonography, magnetic resonance imaging, electrocardiography and radiography; laboratory diagnosis such as hematology, clinical chemistry and other biochemical analysis (Christensen, 1979).

### ***Pharmacy and pharmacy management***

#### ***Therapeutic data***

Software companies have developed many different packages to help us in the everyday functioning of our practices. The ability to access a drug formulary, which gives us dosages, applications, etc. of various medications that are available to us, is an excellent information tool.

When a rare disease is encountered, the veterinarian could have an easily accessed library to check on the latest in diagnosis and therapy.

### ***On line prescription***

E-shopping for non-POMs is fast gaining ground in developed veterinary practices in Europe and America. Once a prescription has been given, it is sent to the veterinary pharmacy through the net, which undertakes the delivery. This would certainly obviate the need for veterinarians to store a large consignment of drugs (Kaita, 2002).

### ***Pharmacy records***

Records of drugs, prescription and dispensing, drug interactions,

pharmacokinetics and side effects of drugs can all be stored in the computer and easily retrieved when required.

### ***Client information services***

#### ***Practice website***

Several veterinary practices around the world have dedicated websites of their practices. Clients can freely access these sites and hence make a selection of practices based on the information garnered. Examples of practices on the website are Blackburn's veterinary services, Waterkloff animal hospital and the Palmerston Veterinary Group among others.

#### ***Reminder Systems***

Via the E-mail, a veterinary practice could more efficiently run a reminder system as well as inform clients of product updates, services etc. Whenever desired, cases for a particular service (vaccinations, deworming and or checkup) on a specific day could be recalled on the computer. The computer then organizes a reminder, which could be sent to clients via the E-mail (Hassan and Hassan, 2003).

### ***Field/ambulatory services***

#### ***Remote surfing services***

This computer integrated system allows a veterinarian in a remote location to browse the web, send E-mails, make referrals as well as make an online prescription from such a location using a portable V-sat system (details in <http://sat.com>). Several other computer aided services that could be useful to field veterinarians include the E-mail referral, On-line prescriptions, E-shopping as well as the E-consultancy services.

***Hospital management and records***

***Management data***

The effective production of management data is definitely one of the best uses of computerization in veterinary practice. To actually know what is occurring in your practice on a daily, weekly, monthly and year-to-date basis is extremely useful when it comes to totally controlling your practice. This is best achieved when your operational data has been entered into a computer system (Schaer, 1985).

**Revenue generation, targets and projections**

This is an important function that a computer could be put to in a veterinary hospital. From previous data as well as desired goals, targets could be set and the progression or otherwise towards the attainment of the target could be easily appraised with the computer.

**Epidemiological data**

Epidemiological data such as mortality rate, morbidity rate, prevalence rate, population/demographic data as well as summaries of medical data, which allow you to review various types and number of cases that occurred on a monthly and yearly basis in your practice are also available to you. Once data are gathered on a national basis, demographic studies can be accomplished which should assist in the control of disease outbreaks (Emanuelson, 1988).

**Staff schedules**

With a computing system, clinical duties, leaves, call etc. could be automated.

***Call duty services/ computerized paging system***

Modern clinical services have computer programs, which selectively page the most suitable personnel in event of an emergency. Once the history and clinical evaluation data are entered, the computer identifies a suitable doctor and pages him or her. Whereas this service is still within the ambits of human medical practices, it is envisaged that in the not to distant future it would be a reality to veterinary practices.

**Interactive discussions/discussion groups**

***Interaction and learning***

On-line presentations and discussion, literature (medical and research publications), education of clients, conferences (on-line), medical informatics (application of computers to health care, and includes knowledge, representation, acquisition, storage, retrieval and manipulation to support medical reasoning, decision and learning) are all feasible with the computer system (Mohammed, 1999).

**COMPUTER APPLICATION IN VETERINARY AND LIVESTOCK CONSULTANCY SERVICES**

The Livestock Sector in Nigeria is indeed facing a lot of challenges. These challenges range from inadequate resources to lack of capacity within the sector. This has been further compounded by the problem of access to relevant data for planning. Population pressures, new policies and new disease challenges demand greatly improved information if livestock services are to be run with a high level of technical and economic success. Fortunately, the advent of new generation of micro-

computers means that veterinarians can now enter, check, collate, analyze and store vast amount of animal health, production and administrative data and to generate reports in a format required for a range of end-users to aid management decision making (Martin *et. al.*, 1982). Areas of computer use in agro-veterinary consultancy services among others are:

- Clinical consultancy.
- Agro-veterinary project design, monitoring and implementation.
- Preparation of presentations as resource persons or instructor.
- Feasibility for agro-veterinary projects as well as Epidemiological studies and disease surveillance on farms.

An assessment of the use of computers in veterinary and livestock consultancy services hinges on the use of the database and its management.

### **Applications**

Computers by themselves do not provide a solution but must be an integral part of a carefully designed system for the generation and use of animal health information. The so-called spreadsheet programmes are used on a vast number of microcomputers throughout the world. It is based on the traditional accountant's financial spreadsheet. This software enables quite a number of complex tables of numerical data to be setup and to be used for complicated calculations and analysis. Even more widely used today are many varieties of word processing software packages. In addition, another category of microcomputer software package that is in widespread use is the database management system (dbm). We do realize that database management is an area that is a bit tricky to even the regular computer user and this presents challenges as well as opportunities

for the livestock sector. Note however that, the use of computers along with databases will only be useful and meaningful if the source of the data is of high integrity.

There are a variety of programs for the creation of database that are in-built into modern day computers as part of the "office for windows" software. Depending on the specification of the computer these usually are Microsoft Excel and Microsoft Access. Other less frequently employed programs for manipulating database are Microsoft Money, Microsoft Works and D-Base as well as the Peachtree Accounting software (Mohammed, 1999).

### **Microsoft Excel for Windows**

This program is part of the office for windows software. It is the most commonly used program for the production of spreadsheets. It has so many features that enable the user to create meaningful database that can be updated from time to time. It assists in solving practical day-to-day problems such as balancing a check book or turn in an employee expense report. For the Veterinary Consultant or Livestock manager it enables him to do the following:

- Create farm records.
- Create production records.
- Create animal health records.
- Create culling records.
- Create regional records.
- Modeling.

### **Access database Software**

Essentially, Access is a database Management system (dbms). Like other programs in this category, access stores and retrieves data, presents information, and automates repetitive tasks (such as maintaining accounts payable, performing inventory control and scheduling). It comes as part of office for windows software.

## CONCLUSION

There are many quality products designed specifically for the veterinary and livestock user. Since they have different aims and purposes, direct comparisons between products are not always possible and it may well be that a practice or individual would decide to take up several products. Since Information technology is a rapidly evolving field, it is tempting to wait and see what comes along. The problem with waiting for future developments is that, this is a field which is continually improving and so there is never a final point at which one can make a definitive evaluation of what is available. What is certain is that if you wait long enough, you will eventually be left behind.

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