Background to Research

The Karpin report (1995) identified several management skills that were lacking in Australian managers. Even before Karpin however our research was attempting to determine how well decision support systems (incorporating intelligent agents) could support line managers by providing Human Resource management (HRM) advice. The application of systems to support structural change can provide data, information and knowledge to where it is required and when required. Although organisational change strategies may be initiated for specific outcomes, they may have limited success by themselves. A Learning Organisation (LO), that requires a systems approach to learning and sharing knowledge, can enhance the overall capability of the organisation and ensure any gains made through interventions such as TQM can stimulate a culture for continuous improvements. Such a culture includes: external orientation to link with others to help with strategies; free exchange of information through well designed systems across organisational boundaries; information and knowledge management with groupware and intelligent agents (Lotus notes, GSS & Resmumix or CHAOS); valuing people for ideas, creativity and imagination, where views can be challenged; openness and trust encourages people to speak out; and, learn from experience where making mistakes is tolerated provided lessons are learnt.

Reasoning behind the use of Knowledge Based Systems (KBS) in behavioural areas of decision-making is based on applying an order that once elicited can be replicated to an ill-structured situation to ensure consistency. Such a structure can avoid the problems associated with heuristic reasoning being influenced by biases or too much information causing implicit favourite responses to be selected for. A structured approach imposed by the KBS will mean that users can improve their decision without seeking too much information (overload) and then running the risk of being unable to distinguish the relevant importance of the data to be assessed. **Intuitive model** often is used to justify an argument against a well researched proposal that is hard to argue against, however if the reasoning supporting the decision is able to be unpacked (from distilled experiences) can support rational choices. Over dependence on rational analysis may be a way to procrastinate. Various approaches can be used for decision making, which may not always be the most appropriate. **Implicit favourite model** used to simplify complex decisions when all alternatives are not considered but, instead a favourite one is waited for (to confirm the already preferred option). **Satisficing model** settles for a 'good enough' solution based on

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1. Expert Systems are taken to mean rule-based systems that rely on a form of deductive reasoning to make inferences based on information gathered from a user interacting with the system, and are considered to be Knowledge Based Systems which have embedded expertise that produce results similar to recognised experts.
limiting criteria, highly visibly alternative, bounded rationality (simplify problem), compare choices to current state. **Optimising model** selects the best alternative from a logical and objective analysis of all criteria to maximise value (no ulterior or mixed motives- buying a car for reliability or image).

KBS can keep track of the available data that is useful for the final decisions without placing too much weight on 'noise' in the system such as 'halo effect' or 'negative data'. Assumptions for this research include that the ES would assist the users to improve the convergence of decision with others, and that the control over the standards required will be improved as reliance increases that users would learn to rely on the ES the more they used it and accept it. Thus we expected that the Experts would agree more and still improve with ES, while managers would agree less and improve with ES, while the two groups (managers and experts) would converge if they relied on ES (for data input and for final decisions).

**Knowledge Based Systems enhance Organisational Behaviour**

Business use of KBS technology in the past appears to be directed to those areas that have a direct impact on the 'bottom line' profitability of organisations. However, areas of (Organisational Behaviour OB) that have been largely ignored so far in KBS research may yet prove to have potential for an even greater impact on profitability by improving efficiency.

Although the behavioural areas of management are where management is most vulnerable and sensitive to criticism, their potential for improving productivity should be open to investigation. Some of these areas are: the quality of decision-making, development and retention of expertise, and the devolvement of responsibility and authority 'down the line'. A review of the literature provided evidence to support the contention that management is avoiding the implications that KBS may have on the processes of OB. The reasons for this may have nothing to do with the acknowledged need to address how productivity can be improved. A review of the applications that have been developed locally in Australia and overseas has demonstrated that there are deficiencies in the research development and deployment of such technology.

HRM is one of the behavioural areas that has been largely ignored for KBS projects. This is despite evidence to show that normal decision-making, relying on human judgement of less experienced managers as illustrated by recruitment and selection for example, is notoriously unreliable. Little work has been done in the OB field to support an attempt to build an Expert System (ES) to cognitively model decision-making in the field of management. Therefore, a prototype was built and then trialed with some practitioners to see how a rule based ES can assist them to do their jobs better (within the HRM domain). The ES (to be known as CHAOS) should also be able to maintain control of the recruitment and selection process to make it fairer, non-discriminatory, and more reliable throughout the organisation.

The use of KBS technology will be expected to produce a more robust method of selecting people for jobs to which they are suited. This exercise illustrates the potential of KBS to empower staff further down the line by providing expertise to naive managers without necessarily losing central control of the processes involved in decision-making. To achieve this an ES was built with the assistance of line managers who need to recruit staff from time to time (but this is not their main job). This prototype was then reviewed by some expert practitioners from industry such as an 'executive recruitment consultant' and 'human resource manager' as well as TAFE.
CHAOS\(^2\) (an KBS with embedded expertise is referred to as an ES) The modules that were included are described below and as the diagram indicates some of these had direct (intuitive) links to other modules, while others could be entered directly at the more experienced users discretion:

* Introduction Menu to explain the options available;
* Overview of legislative requirements and record details of panel members and candidates;
* Records of details relating to previous assignments that can be used as a guide;
* Job Analysis to determine the requirements of the job and the qualities of the ideal candidate;
* Job Description prepares details of jobs in standard format based from previous step;
* Person Specification explains the qualities of the individual required to do the job;
* Advertisement preparation based on standard successful formats from data gathered so far;
* Assessment Method based on critical items from Job Description and Person Specification;
* Interview Structure setting out the important items to be covered based on all the above steps;
* Decision stage based on an algorithm devised to use weights (input by the user or defaults);

The decisions and recommendations for further action are produced automatically from scores;

* Letters of follow up that are generated at different stages or stored at the discretion of the user,
* Reports that regularly required such as details of the job, the person, and the organisation in preparation for the interview; as well as summaries for management to review at a later stage for 'equal opportunity purposes'.

The options (Modules) available to the User in CHAOS are shown in the Main Menu below

![Diagram of CHAOS modules]

The results of the trials with practitioners and experts using a case study approach indicated an increase in reliability of decision-making between experts and managers, and an increasing reliance on the ES to provide more of the input as users familiarity with the system increased. The responses from a questionnaire about acceptance of the system supported developing the system for training and support of managers. The research also highlights further opportunities for KBS to act as assistants to management for improved decision-making, even if not making the final decisions. The success (as measured by the agreement of managers with each other and with the experts) of this research therefore indicates potential areas in OB for further KBS development.

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\(^2\)CHAOS is a mnemonic that stands for Computerised Helpful Advice On Selection, and represents the concept of CHAOS theory that underlying order is discoverable in seemingly random events and can be replicated to produce order from disorder. With imagination this principle can be applied equally well to behavioural sciences as well as to physical events.
Conclusions and Recommendations

However it is apparent from this study, that there are many lessons for organisations to use to their advantage if they take up the challenge of employing KBS technologies. Some additional points worth that could be taken into consideration for the future are the following:

- Better algorithms for control of invalid reasoning such bias and stereotypes
- Other methodologies such as Neural Nets and Case Based reasoning
- Training tool as well as advisory system
- To be developed for groups as intelligent agent for GSS
- Intuitive guidance through processes adapts to user
- Accepted by users (will management relinquish power)
- HRM to sponsor and manage KBS for best affect on OB
- How to overcome such blocks to power shifts.
- How can management view technology more favourably
- Need more research into how technology can assist change
- And how can OB specialists manage the process for greatest benefit to productivity

This research has shown the decision-making in OB areas can be improved and therefore opens up many other management areas for consideration as suitable for the development of applications; while, the specific application of a specialised product such as CHAOS has the "..potential to revolutionise recruitment and selection" (Fontaine, 1995). Thus there appears to be many opportunities for KBS development and the findings from this research indicated HRM must be considered as an interesting potential source of applications. HRM can also assist in the deployment of the final products to ensure that Organisational Behaviour issues are considered. Some projections about the future directions for HRM with respect to technology and organisational change by Walker (1987, p.111), include the management of data to all employees who "...will be treated as share owners, partners and members of management because, in reality, very often they will be all three." This view suggests many possibilities for Expert System applications, and foresees the integration of data bases inside and outside the organisation becoming part of HRM to be used by all staff. Systems like CHAOS will need to be sponsored by HRM and assist in many areas that affect organisation behaviour.

References:

de Bono, E., "Parallel Thinking from Socrates to de Bono Thinking" Penguin, London 1995
Wyatt, D. "Intelligent Systems will support decentralised HRM", HR Monthly, August 1996, p24-25
Intelligent Systems Support for HRM

creating a Learning Organisation Culture with the aid of an Expert System

KNOWLEDGE MANAGEMENT

- Data - unprocessed facts and figures
- Information - provides meaning to user
- Knowledge - procedural and declarative
- Expertise - usually domain specific
- Systems - systems thinking, information systems, group support systems, knowledge based systems, expertise systems

- Wisdom - the ability to apply knowledge and is based on: Memory, Learning, Intelligence, Ethics

OUTCOMES of Decisions:

- HRM should embrace IT with OIl
- HRM should have knowledge, computer skills, industry restructuring and devolution of power
- Avoid mistakes through good preparation
- Behavioural decision making implications
- Decision making and authority down the line
- Apply AHP to DSS/SSWSS future
USEFULNESS of KBS according to Users of KBS

OVERALL SYSTEM
- Overall Desirability of System
- Increasing Confidence in Decision-making
- Improved Quality of Decision-making
- Managing Actual Recruitment and Selection

SYSTEMS' MODULES
- Rating of Modules
- Rating Importance of Modules

IMPLICATIONS FOR USE OF ES
- Aid to recruitment and selection decision-making
- Training aid
- Help in assess the validity of the data
- Help to identify potential training areas

Conclusions and Recommendations

Users relied more on the ES
Managers were optimistic about its acceptance
Experts were sceptical about devolving power
HRM can apply KBS to assist OB and OD
Many more opportunities in HRM

"... enormous potential..."