The Singapore government has recently committed close to US$5 billion from 2006 to 2010 to further strengthen its research and development (R&D) capabilities. It plans for the biomedical sciences sector to continue to be one of their area of focus.

Singapore had already developed world-class capabilities across the entire value chain from drug discovery, product development and clinical research, to manufacturing and healthcare delivery. Singapore has even moved to further strengthen its regulatory frameworks to ensure that the ethical and legal aspects of the research conducted there is based on international standards.

Taking the lead from these government initiatives, some Singaporean research institutes are exploring ways (through the use of technology) to further strengthen their intellectual property rights protection, knowledge creation and streamline the processes of the regulatory frameworks.

Koios has been working very closely with one of the leading research institute in Singapore on an evaluation project to determine whether an electronic notebook, coupled with knowledge and program management tools, would add value to the research effort and fit into the existing scientific processes. The research institute had already begun to explore ways of capturing their scientific discovery knowledge in more efficient and reusable ways. Already located in an excellent environment, conducive to the exchange of knowledge and collegial interactions, they decided to evaluate a unique, fully web-enabled, electronic laboratory notebook infrastructure—the eNovator product from Koios.

Their initial goal was to concentrate primarily upon the scientific documentation aspects of the solution as an electronic laboratory notebook that would be easy to use for researchers. At the same time, they aim to provide specific advantages for collaboration between researchers. With their commercialization or business development activities, they also wanted to demonstrate the following:
• Multiple researchers working in a collaborative environment and managing research projects

• Research teams to be able to carry out their individual scientific tasks whilst viewing all specific project data and knowledge in searchable and reusable formats

• Interaction with their colleagues in charge of business development to ensure the commercialization and regulatory information requirements flow naturally and with a minimum of effort from the researcher

• Ability to document warehousing capabilities, such as Standard Operating Procedures (SOP)

One of the key sponsors of the evaluation project stated “It was not a matter of if, but when we acquired these capabilities. We needed to rethink our medium for capture of knowledge, processes and digital content to make these data seamlessly available across research domains.”

Like many research institutes, they generate more than a terabyte of data each year. Organizing, managing and making sense of this data is a huge and growing problem. For many types of research, the experimental work is PC based and a paper notebook cannot capture or reflect the work. Even for traditional fields in biology, important results like cell imagery are being captured electronically. The information and precision of data are actually lost by cutting and pasting into the paper notebook. Fundamentally, the traditional paper notebook is simply becoming obsolete.

In November 2005, a core team of six researchers commenced an evaluation of the environment using real research projects; on a purely voluntary basis. The evaluation process included a couple of hours of training. From this point, the researchers were effectively ‘left on their own’, with a minimal amount of support provided on a day to day basis to ensure an independent evaluation.

By the time the evaluation was completed in January 2006, the group had grown to fifty eight researchers and staff, with complete research teams compiling scientific data, sharing knowledge and managing their projects. The evaluation clearly showed significant benefits to the research groups in capturing knowledge electronically, allowing users to collaborate effectively and, in some cases, actually capturing knowledge that was previously not recorded. The evaluation also touched on areas such as internal review board processes (human tissue usage), invention disclosure processes (protection of IP) and program management.

In short, the evaluation was considered a complete success with the senior scientists and team leaders involved delivering a comprehensive positive reaction to the evaluation. This was a very clear message from the researchers to management to deploy the solution across their entire research community.

Some of the researchers also had the opportunity to evaluate new technologies via Hewlett Packard PC tablets in a wireless LAN environment. This allowed the researchers to take the quantum leap from paper lab notebooks to electronic lab notebooks running on un-tethered PC tablets with handwriting recognition software.

From one of their senior researchers: “the tying together of leading edge hardware and applications technologies has highlighted to our scientific groups that there is a need to change our current processes and to further rely on technologies such as eNovator.”
As the research institute grows, the electronic notebook environment from Koios will expand in unison, ensuring that the knowledge captured by scientists, whether local or foreign, is made available and can be transferred to the next batch of Singaporean researchers.

For Singapore, this effort represents an important step to addressing emerging corporate governance issues in R&D. The recent scandal in the stem cell research in South Korea highlights a growing, global and systemic problem. The obsolete paper-based lab notebook is often inadequately maintained and open to abuse. In contrast, eNovator represents the “best-practice” for public funded research with an electronically auditable environment that stands up to international scrutiny. It also helps ensure transparency and reproducibility of the scientific procedures, results and analysis. Furthermore, it decreases the work load of scientists who need to properly document their research.

It has become very clear that the deployment and usage of the electronic lab notebook environment is the key for the research institute to reach its short, medium and long term goals.

In the first year, they will concentrate on helping its scientific staff to make the transition to the electronic lab notebook. However, once this transition is made, eNovator is a mature technology with a variety of additional capabilities that the institute hopes to exploit. The researchers will spend less effort on ‘busy work’ like reporting and report generation. A rich collection of collaboration tools within eNovator will allow the researchers to experiment with new ways of conducting, sharing and managing research which easily fulfill corporate governance requirements. Also, global collaborations will become easier, more secure and more rewarding. The paper based notebook impedes innovation in our scientific institutes and the move from paper to PC will definitely bring significant, positive and, often, unforeseen changes.

About Koios Pte Ltd
Koios is a Singapore based software and consulting company delivering the eNovator solution which improves the productivity, efficiency and transparency of the research and development process. These solutions have a central focus on collaboration, the capture of knowledge in a functional and reusable form and improving management practices.

Koios’ collaborative research solutions treat innovation as a lifecycle involving multiple disciplines and groups, all requiring collaboration and integration to deliver intellectual property to the market efficiently.

Contact Details:
Stephen Breen
VP Business Development
Koios Pte Ltd
Tel:  +65 9634 9875
Fax:  +65 6542 6172
Email: sbreen@koios.biz
URL:  www.koios.biz