



ICTs: Development Tools for the Future

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A group of business professionals in a modern office setting. In the foreground, a man in a dark suit and white shirt stands with his hands in his pockets, looking towards the camera. To his right, a woman in a white blazer and dark trousers stands with her arms crossed, also looking towards the camera. In the background, several other people are visible, some standing and some sitting at desks, all in a brightly lit, contemporary office environment. The overall tone is professional and collaborative.

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In today's fast-changing and fiercely competitive world, database management and communication systems are essential tools for organizational survival. Where data are underutilized or of poor quality, or else are retained in unreliable storage systems, failures in operation, planning and organizational management are all but inevitable. Therefore, enterprise organization in service businesses- including academic institutions- requires investment in modern and effective information technology and management information systems to support effective organizational management. By effectively using existing information, key corporate processes can be monitored in real-time in order to support timely analysis and operational decision-making. By enabling executives to make timely and accurate strategic choices, a powerful and user-friendly management information system translates into benefits for users, the organization, shareholders and clients/stakeholders. Such systems can also help organizations analyze bottlenecks and focus on innovation to serve new markets, increasing their competitive ability and organizational agility in responding to fast-moving and competitive global market environments.

Nevertheless, introducing a new IT system alone is not enough. In order to maximize the value and benefits of information technology systems to the organization, organization-wide change management processes must be developed and implemented, together with deployment planning, personnel training as well as the detailed framework, access arrangements, security and terms of use. The importance of such processes is frequently underestimated; staff within the organization needs to understand and embrace new systems and sometimes radically different working practices, in order to achieve maximum benefits and the desired organizational outcomes.

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E-learning: Innovation for the Development of National Manpower



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Introduction

E-learning is the result of convergence between education and information technology. Today, learning materials such as slides and videos are produced in digital format and made available to the public through the internet. That allows e-learning to be accessible by learners anywhere, any time. Even though e-learning was originally introduced in schools, its real success is not limited to education. When large organizations began to encounter intractable challenges in training their workforce through conventional classroom-style training, they turned to e-learning as a more flexible and cost-effective approach. E-learning for professional development in the workplace combined information technology with training and personnel assessment. With learning media in electronic formats, courseware platforms

were developed and made deployed on the web using software-based learning management systems (LMS).

E-learning in the workplace typically includes learning assessment and competency tests. In this case, an “*E-Item Bank*” is used to systematically store a database of examination questions. An examination may comprise 100 questions, which could be randomly selected from the E-Item Bank according to specified criteria such as range and difficulty, etc. The LMS also provides educators or employers with analytical statistics such as difficulty index and discrimination index. Computer-based examinations are becoming increasingly popular and are expected to eventually replace paper-based examinations.

Get to know E-learning

E-learning is the application of information technology to the learning processes, based on production of content in electronic format, content presentation on a website running Learning Management System (LMS) software, which itself integrates secondary systems such as instruction media production, enrollment, attendance checks, social network integration, examinations and analytical statistics (Figure 1).

Application of E-learning for learning development

Traditional learning is considered as a passive process, with teachers delivering knowledge through lectures or videos to

learners who typically only receive that knowledge, without much interaction. With large classes and limited resources, educators until recently had few alternatives to this passive and often unstimulating educational environment. E-learning addresses these shortcomings through active learning; e-learners have to interact not only with the content itself, but also with the course leader and their peers e.g. learners could choose, decide and be supported via immediate feedback. Social networks are often used to discuss and exchange opinions among teachers and learners.

Traditional classroom teaching also suffers from the drawback of diverse student abilities and pace of learning. E-learning allows e-learners to repeat their



Figure 1: E-Learning Lesson
Source: Pisairat Satianrungraeung (2014)

lessons in their own time. The system also has the capacity to assess student learning periodically to check whether learners have understood the content. The system will only allow the learner to proceed when he/she has reached a prescribed level of understanding of the previous lessons or training modules.

The demand for e-learning

Large organizations need to regularly develop the abilities and competencies of their human resources. Starting with orientation of new employees, organizations must invest heavily in staff training, along with learning assessment to evaluate the knowledge, skills and performance of each employee. The learning and assessment processes are ongoing, since the workforce needs to adapt to a rapidly-changing social, technological, cultural and market environment. Nowadays, we work in an increasingly international, multi-lingual and multi-cultural workplace with new technologies that radically change the way we work, think and live. Organizations and their personnel must constantly learn if they are to stay ahead of this complex and fast-moving wave to stay competitive and take advantage of new and emerging opportunities.

The early success of e-learning in schools stimulated interest from governments and private organizations, who recognized its many advantages over traditional training methods. Keys among these advantages are the following:

- E-learning is well-suited to meet the needs of large organizations with many employees, especially where

employees are scattered across many branches. In such situations, learners can learn via computers, tablets or mobile phones connected to the internet.

- E-Learning is worthwhile and cost-effective if the same lessons can be used by large numbers of learners.
- E-learning incurs no expenses for meeting rooms, catering or travel. The most important cost element is the production of content in digital format, and the information platform itself. The latter can be reduced where many projects share a common information system.
- E-learning is flexible in terms of the learning period. E-learning is available 24 hours a day and does not affect work time as learners tend to follow the courses in their free time.
- E-learning is cost-effective because electronic media can be used repeatedly and with an unlimited number of students.
- E-learning typically incorporates a process of learning assessment, usually using multiple choice as a format for examinations to facilitate computer analysis. Additionally, students may submit their written assignments online for assessment.

In Thailand, the use of e-learning has been broadly embraced by both the public and private sectors; examples include the Office of the Civil Service Commission, Social Security Office, Office of the Permanent Secretary Ministry of

Commerce, Department of Lands, Comptroller General's Department, Department of Agricultural Extension, Department of Rural Roads, Department of Provincial Administration, Kasikorn Bank, and the Islamic Bank of Thailand.

E-Item banks

Learning, assessment and competency tests are usually integrated into the learning process. Multiple choice examination is a popular approach as the results can be quickly and automatically checked. As mentioned above, organizations may select questions randomly from a large question database stored in the Item Bank which is itself periodically updated with new questions.

After examination, the questions and responses are analyzed to determine key statistics for each question such as their Difficulty Index and Discrimination Index. Such statistics assist in selecting and retaining “good” questions in the database, and removing any poorly formulated or obsolete questions. Question analysis is critically important where a high level of assessment accuracy is required, such as in recruitment of government officers or for certificate examinations.

The Item Bank allows systematic recycling of questions, reducing or even eliminating additional organizational time and cost involved in setting new questions for every examination (Figure 2). Examples of organizations that now use the E-Item

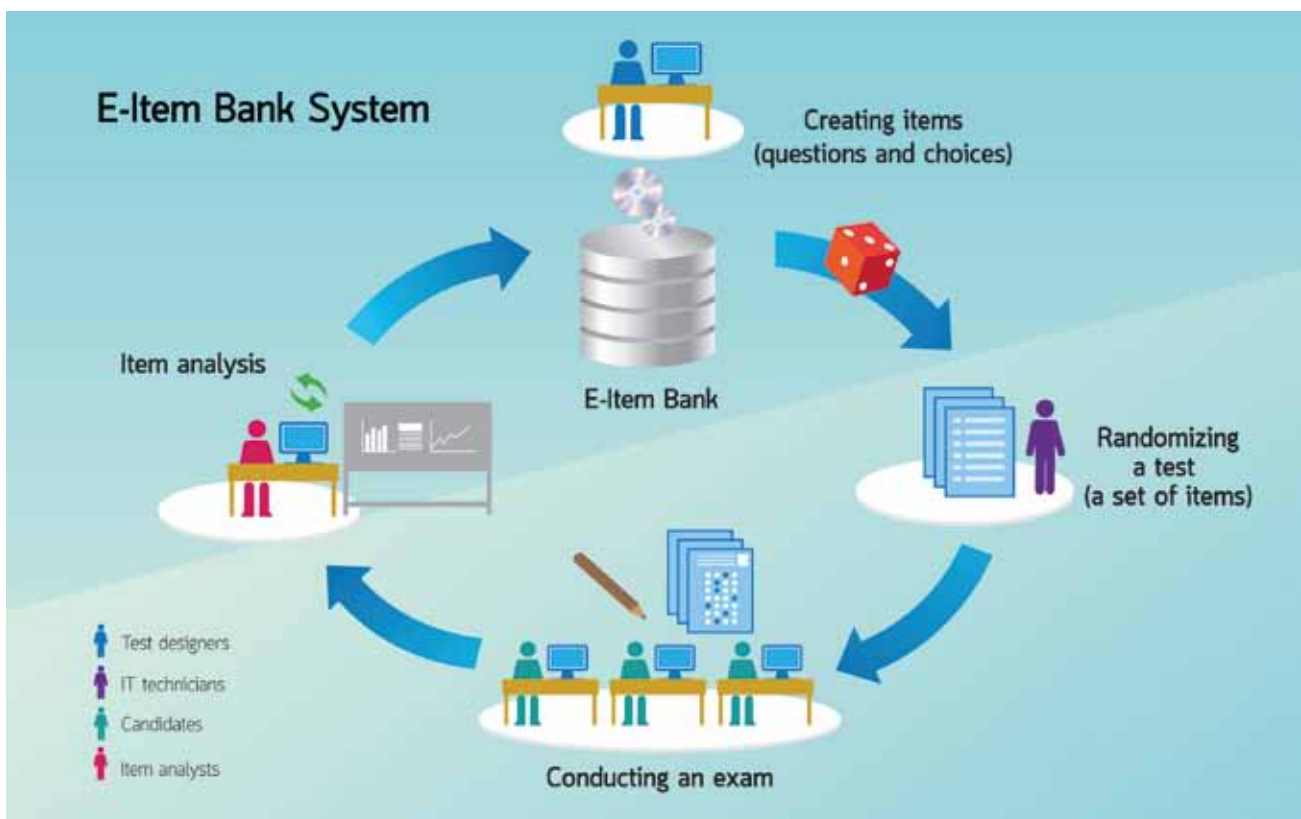


Figure 2: E-Item Bank System
Source: Pisairat Satianrungraeung (2014)

Bank include the Office of the Civil Service Commission, Comptroller General's Department, Saraburi Provincial Treasury Office and the Thai Financial Planners Association (TFPA).

Future and direction of e-learning

Learning is endless. The more the world changes, the more we have to learn. The learning process and assessment will proceed although formats may change. The use of e-learning in schools is optional or may be combined with conventional classroom-based learning. However, for large organizations, e-learning offers a highly convenient, flexible and cost-effective option for human resource development. In the future, we will see a shift from personal computers in accessing e-learning resources towards an increasing use of mobile devices such as tablets or smartphones. This evolution is referred to as mobile learning or m-learning. New learning management systems (LMS) and electronic media will be designed to be compatible with portable devices which have small touch screens.

Conclusions

Compared with traditional training approaches which supports a limited number of trainees, e-learning can

supports a much larger number of trainees and helps reduce expenses, travel time and location preparation. Moreover, once produced, electronic media can be reused and may only need periodic updating. Even though e-learning incurs high initial costs in production of electronic content and platform development, the cost per capita of training via e-learning is subsequently much lower than conventional trainings.

In cooperation with government organizations especially Office of the Civil Service Commission and Chulalongkorn University since 2003 to present, more than 100 Thai-language online training courses have so far been produced. Currently, more than 10 organizations have used e-learning for training, with over 100,000 participants passing the training requirements. For more information, please visit <http://www.ThaiE-Learning.com>

Acknowledgements

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Data Integration at Chulalongkorn University (Phase I)

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Introduction

Effective data management has become especially critical to business operations and competitiveness during this era of 'big data'. Tools for in-depth analysis of massive pools of data have emerged as invaluable assets. In the past, data was created within individual operational units and stored separately according to their respective needs and priorities, as "information silos". No system existed to allow effective data sharing, resulting in lack of good data governance, redundancy, and inconsistency. Senior management typically experienced difficulty in gathering data from these separate units due to the absence of reciprocal arrangements and systems to connect and calculate data to inform high-level strategic decision-making. The issue was exacerbated by the use of different and incompatible data formats as well as inconsistent programme or information systems. Under such a scenario, data integration and information sharing among multiple individual systems was all but impossible.



BIG DATA

Chulalongkorn University is by no means an exception, with operational units independently developing their own information systems without reference to common standards or principles of good data governance. Data redundancy and inconsistency has also been a problem.

The need to address these challenges to ensure effective data integration has never been more evident. In order to solve a problem of this scale, commitment and collaboration from senior management and all relevant operational units will be imperative. Senior management need first to embrace a common vision and appreciate the importance and advantages of data integration. Secondly they must also be ready to embrace radical change, since data integration and information sharing are intricately linked with other problems within the organization.

Data integration at Chulalongkorn University

Chulalongkorn University has set out to achieve information integration in order to study and develop a 'data dictionary'. Integrated models of student data have been created using abbreviations of related units as follows.

1. Office of the Registrar (REG)
2. Office of Student Affairs (SA)
3. Graduate School (GS)
4. Office of International Affairs (OIA)
5. Office of Academic Affairs (OAA)
6. Sasin Graduate Institute of Business Administration (SASIN)
7. Petroleum and Petrochemical College (PCC)
8. Faculty of Commerce and Accountancy (ACC)
9. Faculty of Medicine (MED)

The investigation of student data storage and usage of the study operational units (Figure 1) found that, in each academic term, most operational units independently store student registration information from the Office of the Registrar in a database or as separate electronic files with an addition of information relevant to their respective individual needs. Some units have developed their own information systems for data storage, including the Graduate School

As-is Student Data Storage and Usage

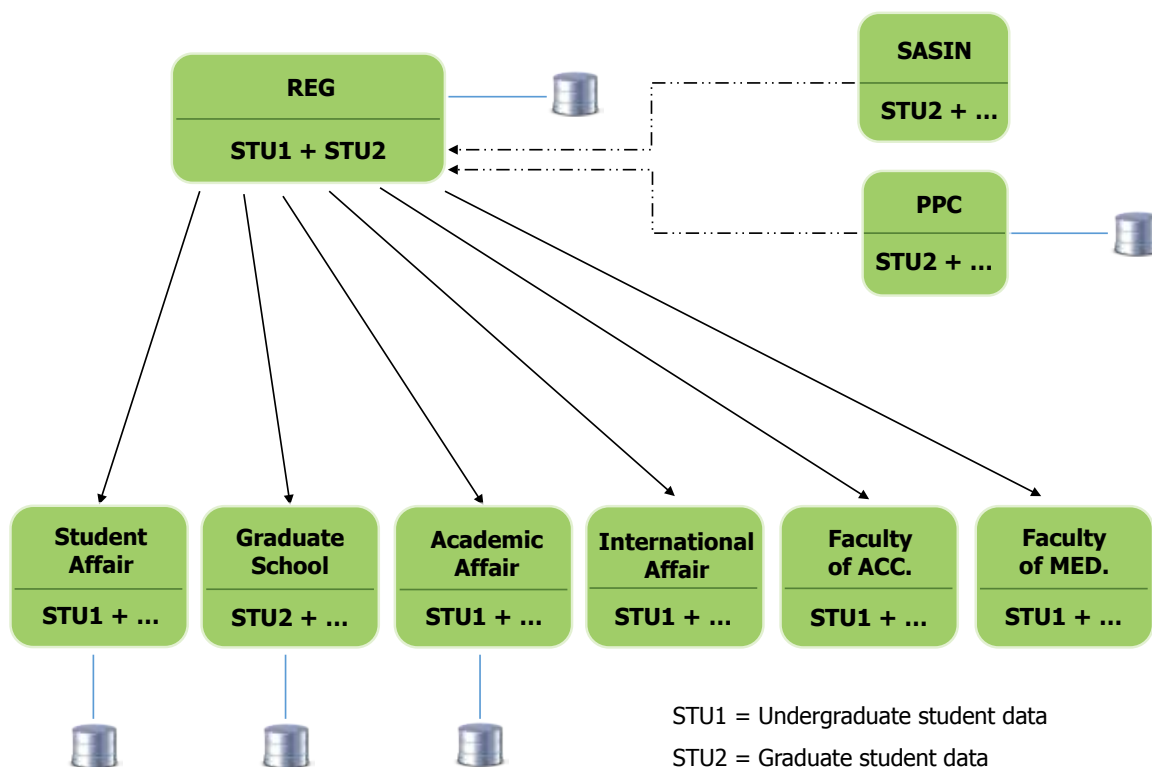


Figure 1: A model image of student data storage and usage of the study operational units

Source: Boonsiri et al. (2014)

(storage of graduate student data), the Office of Student Affairs, the Office of Academic Affairs, and the Petroleum and Petrochemical College. Nevertheless, despite the existence of a data dictionary, some information lacked the required sufficient detail to be useful. Conversely, the Sasin Graduate Institute of Business Administration, Office of International Affairs, the Faculty of Commerce and Accountancy, and the Faculty of Medicine have no organizational databases. Instead, data has been stored in Excel files by individual staff members. Therefore, when cross-unit data is requested, staff will complete a form or create the requested file separately. The dashed line in Figure 1 refers to units with individual data storage systems which do not relate to data from the Office of the Registrar. These units, including Sasin Graduate Institute of Business Administration and the Petroleum and Petrochemical College, only provide the names of graduates in each academic term to the Office of Registrar to create a list of graduates.

Consequently, the results obtained from the study of structure and student data usage in these operational units led to the development of two integrated models for student data (Figures 2 and 3).

The first model of student data integration proposes that, in addition to their existing information systems, the main operational units which provide student information service, namely the Office of Registrar and the Office of Student Affairs, should also be responsible for storing data for real-time access by other units, as a regularly updated central database. This model is especially helpful when dealing with offline data entry, for instance, when students have to make changes to their personal information profiles. At present, students need to fill in an offline request to edit the personal information and submit it to the responsible unit. This leads to delays in updating the system. If students are allowed to edit their own personal information online through the system and attach relevant documents, university officials can then verify, approve and validate the change instantly. In this case, the system must be designed to keep activity log files.

Moreover, this model will alleviate incidence of data inconsistency among faculties and institutions, especially when second-year students change their programme of study. Normally, the process of programme change takes some time as the requested change must be sent from the related faculty to the Office of the Registrar, causing a temporary mismatch between the data stored at these two operating units. The use of the first model helps the faculty to report the change instantaneously through an online system. The change will then be approved and validated by the Office of the Registrar on both the central and individual databases before they report the completion of change back to the faculty. It is important to note that such processes must be executed to acknowledge current business process, data security and privacy, and data quality.

Advantage of the first model of student data integration

1. It provides a shared central database to store data from all operational units within the university that must be updated on a regular basis.
2. It builds data change reliability as the input of student information service staff is required to monitor and approve changes before updating the database.

To-be Student Data Storage and Usage Model 1

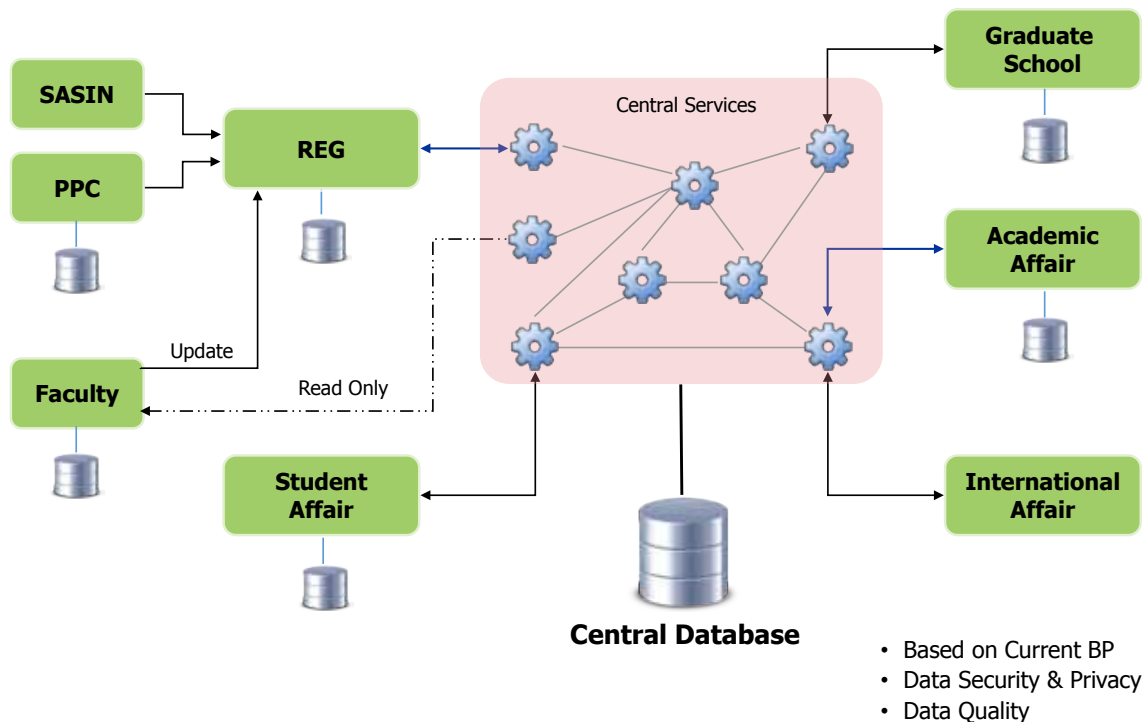


Figure 2: The First Model of Student Data Integration

Source: Boonsiri et al. (2014)

Limitation of the first model of student data integration

A delay in change validation in the central database may occur if the responsible staff does not have the time to verify and make approval of the requested change.

The second model differs from the first in terms of the change procedure. This is to say that the Office of the Registrar can authorize the faculty or any operational units to make online data changes directly through central services. The Office of the Registrar will then verify, approve, and validate the requested change before the data can be updated in the central database. This helps to reduce the workload of the Office of the Registrar and accelerate the change procedure across the board. If the Office of the Registrar needs to keep its own database, it is important to remember to update this as well so to avoid data inconsistency between central and individual databases.

Advantages of the second model of student data integration

1. After extensively determining the scope of access and granting access authorization to other operational units, the request for changes can be made in the central system directly without having to go through the Office of the Registrar.
2. Reduced workload for the Office of the Registrar.
3. Operational units with access authorization can immediately see the change of data.

To-be Student Data Storage and Usage Model 2

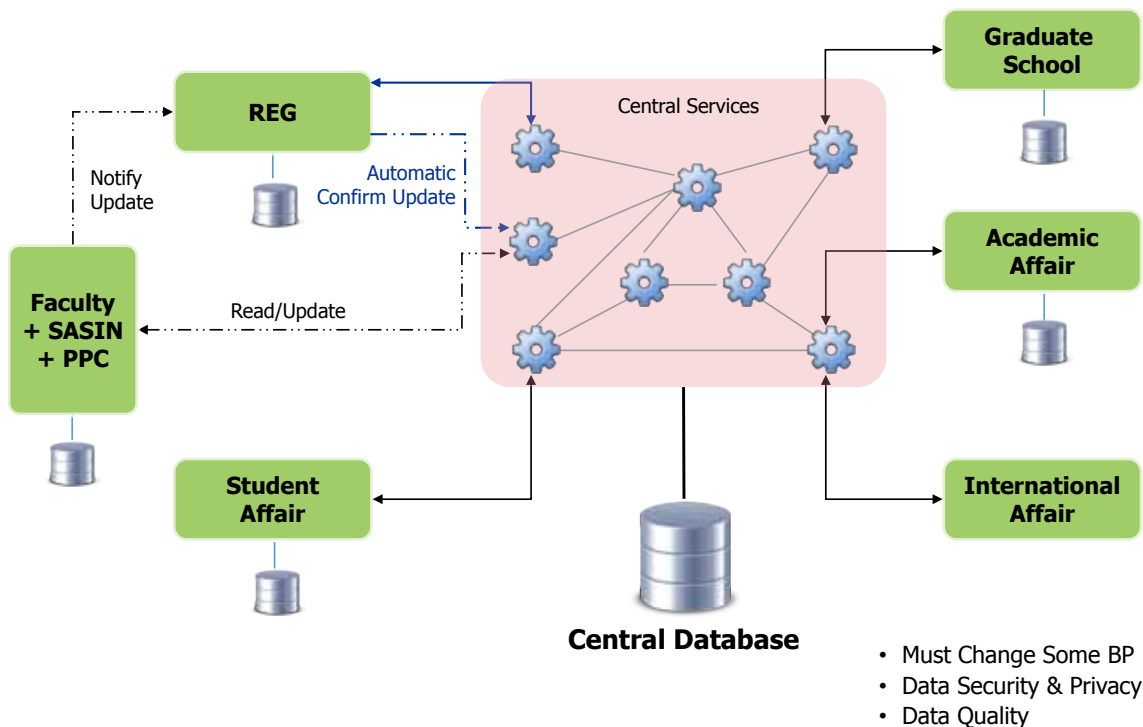


Figure 3: The Second Model of Student Data Integration

Source: Boonsiri et al. (2014)

Limitation of the second model of student data integration

This second method of data integration requires careful determination of the scope of access for all operational units prior to operationalizing this model. If the existing operation process is incompatible with data changes in this manner, the university must make necessary improvements.

Nevertheless, after completion of the first phase of data integration, Chulalongkorn University has assigned a research team to investigate other areas of information needs within the university, ranging from human resources, financial records, finance, accounting and supplies, research data, and physical systems. This array of information is useful in designing standard guidelines for the university, which will form the basis of the second phase of the data integration project at Chulalongkorn University.

Acknowledgement

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UAV Photogrammetry Technology

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Introduction

Nowadays, Unmanned Aerial Vehicles (UAV) are finding increasingly diverse applications, including photogrammetry using digital cameras for image capture and processing. The process can generate three types of output: Orthophoto, Digital Surface Model (DSM) and 3D Model. The use of UAV in photogrammetry is generally limited to small areas up to 1-5 km², depending on UAV type and system components. Since the advent of low cost UAVs, accuracy has improved to achieve a precision of below 10 cm. Users must properly manage the flight plan and require a thorough understanding of the principles, software and data processing process for UAV photogrammetry.

Types of UAV

UAV, commonly known as drones, can be categorized into 2 types for photogrammetry:

1. Multirotor: these are similar to helicopters, but typically have more rotors – in some cases up

to 8 (Octocopter) (Figure 1).

2. Fixed wing: these take the form of a standard airplane, are small in size and require fewer components (Figure 2).



Figure 1: Multirotor type 3/4/6 and 8

Source: Oscar Liang (2015)



Figure 2: Fixed-wing UAV
Source: Geo-matching (2015)

Unmanned Aircraft System, UAS

The Unmanned Aircraft System for photogrammetry (UAS Photogrammetry) comprises



Figure 3: Unmanned Aircraft System
Source: Paparazzi (2014)

4 main components; platform, autopilot, sensor and processing software (Figure 3).

The key component is the autopilot, which includes a positioning unit (GPS) and Inertial Measurement Unit (IMU). Since the pilot control must use a radio remote control link between the ground control station and the aircraft, the user must also use a flight planning program to allow full photographic coverage including overlaps and sidelaps. Once entering the image capture mode, the UAV flight path is determined by the coordinates from the flight plan. Images can be captured automatically by setting a shooting interval, or using the autopilot when the UAV has arrived at the appropriate position. Data such as the GPS coordinates and angle of inclination of the picture are all recorded.



Figure 4: Products from UAV photogrammetry
Source: Vichai Yiengveerachon, June 2015

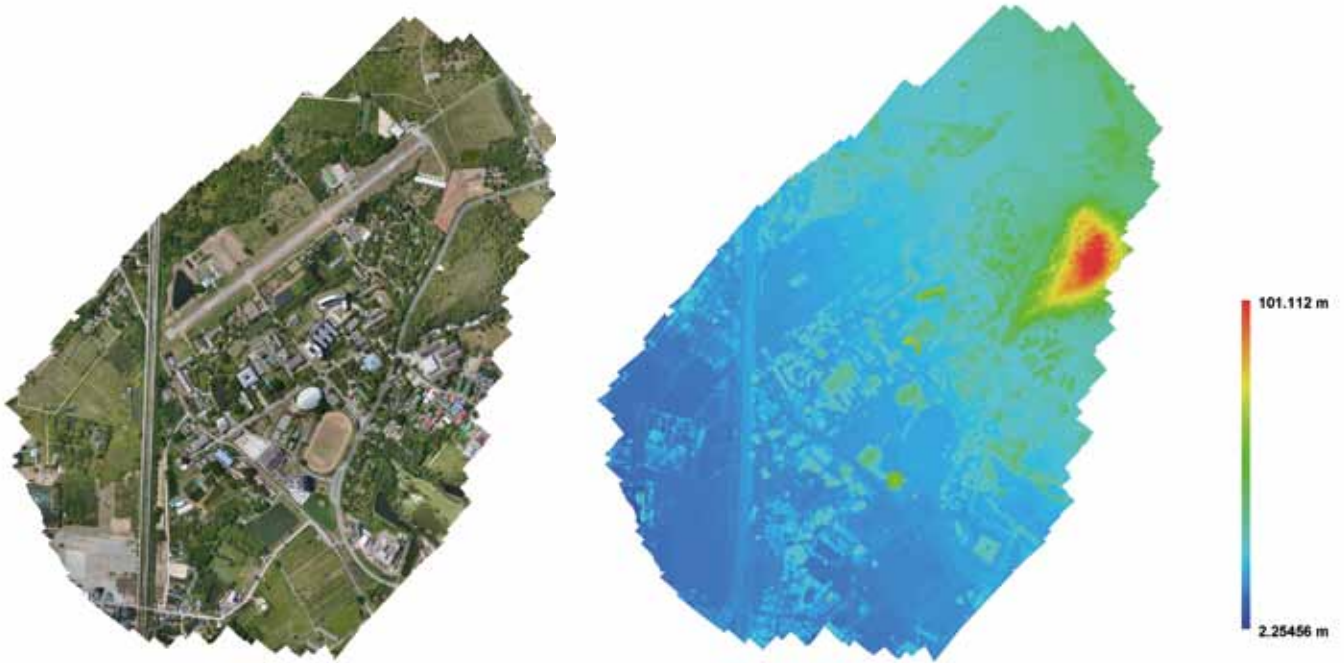


Figure 5: Photo map and DSM of testing area
Source: Vichai Yiengveerachon, June 2015

Products from UAV photogrammetry are as follows:

1. Orthophoto, a rectified photo with map properties, and high level of detail and positional accuracy.
2. Point clouds: a set of 3D coordinates point on the surface of terrain called a Digital Surface Model (DSM). Each point also has an RGB value.
3. 3D model, a three dimensional virtual model created from point clouds with a photo texture.

Flight planning

Flight planning in UAV photogrammetry comprises the following steps:

1. Define spatial accuracy of the products both in horizontal and vertical accuracy results
2. Camera selection and calibration
3. Design and determination of flight parameters such as Ground Sample Distance (GSD), flying height,

overlap, sidelap, block shape and size

4. Determination of Ground Control Points (GCPs).

Accuracy of UAV Photogrammetry

By testing images captured at the private airport of Rajamangala University of Technology Tawan-ok, Bangphra Campus, which covers 1.77 km² (Figure 5) with a Panasonic Lumix GX1 – pancake camera; 20 millimeter focus length for 748 images, 350 meter flight height, 6 centimeters GSD and 6 points of GCPs for processing.

Investigation of 14 Check Points gives a root mean square error (RMSE_x) of 0.45 m, RMSE_y of 0.048 m and RMSE_z of 0.049 m. The linear root mean square can be calculated from the equation:

$$RMSE_r = \sqrt{RMSE_x^2 + RMSE_y^2} = 0.066 \text{ m}$$

at 68 percent certainty



Figure 6: Flooding simulation at Baan NoneSung
Source: Vichai Yiengveerachon, June 2015



Figure 7: 3D point clouds in the engineering design work
Source: Vichai Yiengveerachon, June 2015

At the 95 percent certainty with NSSDA (National Standard for Spatial Data Accuracy),

$$RMSE_r = 1.7308 \times 0.066 = 0.114 \text{ meter and}$$

$$RMSE_z = 1.96 \times 0.049 = 0.096 \text{ meter}$$

A study in accuracy testing of positioning in UAV photogrammetry (Strecha, C. 2011) found that horizontal accuracy is about 2-2.5 times GSD and vertical accuracy is about 2-4 times GSD at 95 percent certainty. Our study agrees well with this.

Advantage of UAV for photogrammetry

UAV photogrammetry is useful for generating supporting data for updating existing maps to GIS, creating thematic maps, management of agricultural and forest area, monitoring environmental change, preventing and evaluating the impacts of natural and man-made disasters (Figure 6).

UAV photogrammetry provides high accuracy, and is therefore ideally suited for engineering design (Figure 7) including calculation of stockpile volumes (Figure 8)

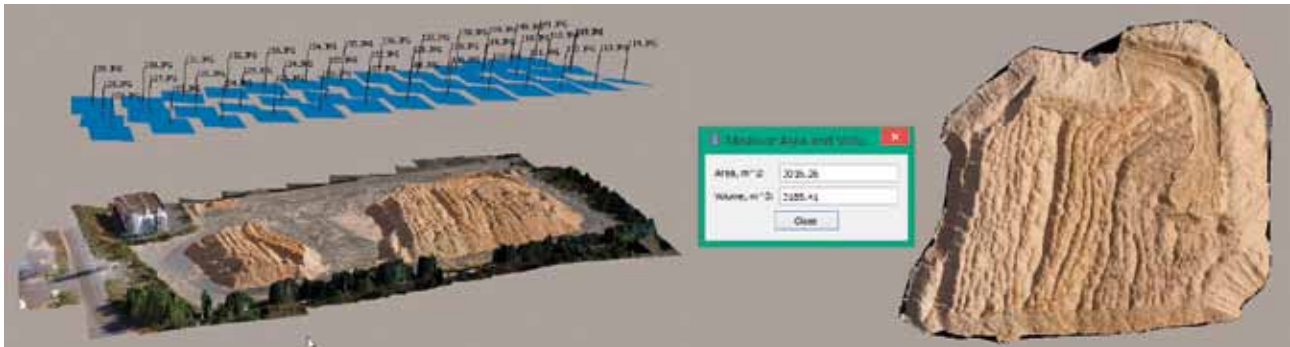


Figure 8: Volume calculation of sand reserves
Source: Vichai Yiengveerachon, June 2015

Moreover, the use of multispectral sensor to capture multispectral images and classify by image processing method can also be used to support smart farming. At the appropriate flight height, higher resolution imagery may be reached compared with that obtainable from satellite imagery. This allows monitoring of plant growth, plant health surveillance, water stress and harvesting (Figure 9). Such information is invaluable in improving efficiency and reducing the cost of farming.

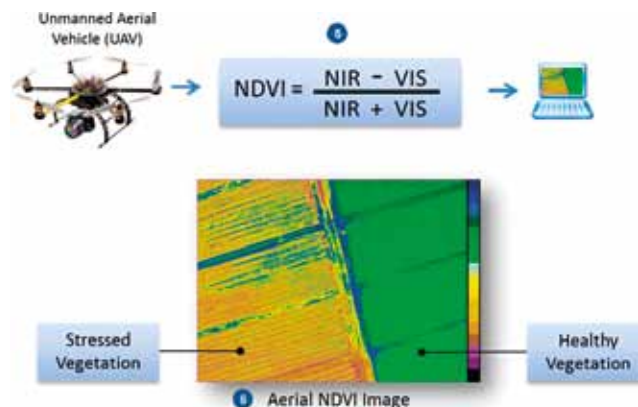


Figure 9: UAV photogrammetry in the farming management
Source: Growlogic (2015)

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Education Management through Geographic Information System (GIS)

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Introduction

The Institute for the Promotion of Teaching Science and Technology (IPST) was established to administer science, mathematics, and technology education in all relevant contexts. The scope of operations includes both primary and secondary education levels, as well as overseeing science and mathematics curriculum at vocational education level. Its primary objective is to promote the progress of science and mathematics education in Thailand to be on a par with other countries at international level. Projects and activities initiated by IPST will be implemented in educational institutions nationwide at both primary and secondary levels, encouraging participation from both students and teachers.

Key performance indicators can be measured from the results obtained from different activities carried out at school level. Subsequently, the information related to IPST's operations will be distributed to the institutions under its purview. As a result, the graphic representation of the organization's operations in the form of maps is deemed useful for officials at all levels, including executives, in order to provide a clear overview of IPST's projects and operations which facilitate strategic planning and policy formulation within the organization.

Rationale for information management

IPST intends to use the overview of their projects' progress and results to improve the performance of both teachers and students. Since its initiated projects have been executed in schools nationwide, the geographic information system (GIS)-a system designed to manage, analyze, and present geographical data-is suitable as a support tool to follow up on the progress of the implemented projects and executive decisions. As a result, IPST has decided to use GIS in education management with an aim to develop an efficient GIS database for the administration of different projects, while summarizing and displaying the operational results and relevant key performance indicators in the form of maps.

Rationale for information management to improve IPST education management

The implementation of projects and activities in schools nationwide is an integral part of IPST's mission to improve the performance of teachers and schools in order to develop an effective approach to manage science, mathematics, and technology education in Thailand.

For teachers, these projects help to improve teaching skills in many ways, for example, through

the use of videos for remote teacher development projects, the science enrichment programs, as well as the initiative to encourage networks for educational development. Therefore, the follow-up and project performance assessment, as well as the recruitment of eligible schools and institutions are imperative to maximize the potentials of teachers and schools to develop the progress of students in the fields of science, mathematics, and technology. Moreover, these projects will optimize the use of available financial resource in the educational management in participating schools. Therefore, IPST acknowledges the needs to conceivably demonstrate and summarize the overall results of the projects implemented in schools nationwide to help improve the efficiency of both teachers and students.

As a result, geographic information system (GIS)-a system used in the administration, analysis, and representation of geographical data-is deemed appropriate as a support tool to evaluate the project results and the impacts of executive decisions made. Therefore, IPST has decided to opt for GIS in education management with a primary aim to develop the GIS database to administer the implementation of IPST projects, and to use the obtained graphic results in the form of maps to demonstrate the progress of the operations and key performance indicators.

Application of GIS in education information management

The institutions' geographical coordinates will be gathered to develop a GIS database which comprises school codes to be linked to the management information system (MIS) and IPST projects and activities. Nevertheless, this web-based GIS is developed to display information about schools in the form of maps according to the type of information that will be displayed, including the level of education, project participation, and the average scores of ONET (Ordinary National Educational Test).

The project performance evaluation to improve IPST's management of science, mathematics, and technology education can be assessed from the information about students' ONET scores. The database will use schools as the master data to link to other performance indicators such as participating teachers and ONET scores. The obtained results will present a quick overview of the projects which help to assess the progress of the operations through GIS. The geographical locations of schools are used to represent information about each performance indicator as well as the summary of comparative geographic information in the form of graphs.

The application of GIS will enable executives to understand the overall operational results of IPST's initiated projects and activities at the school level. Moreover, this system is designed to display each individual school's project results through students' average ONET scores, as well as to show the comparison of annual performance results (see Figure 1-7).

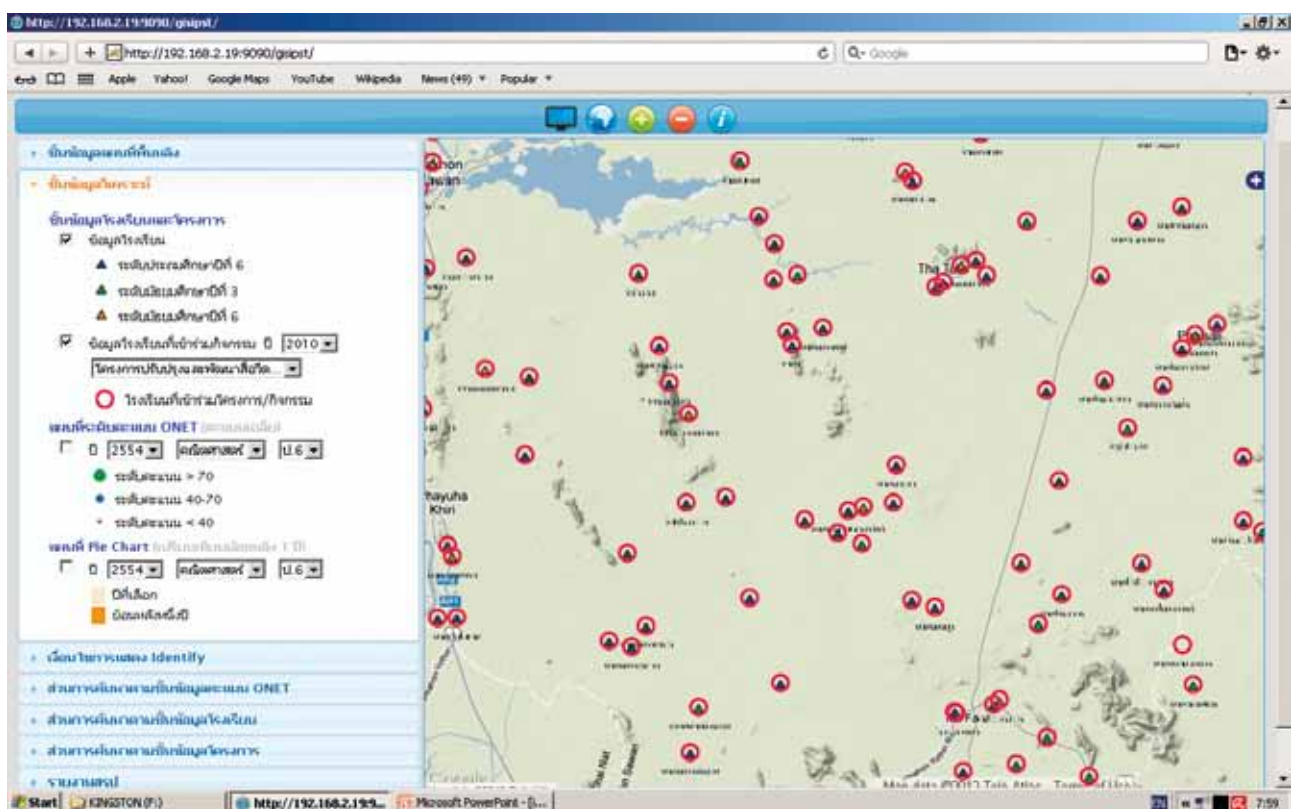


Figure 1: Schools (categorized based on levels of education) and their yearly participation in IPST projects

Source: Chunithipaisan (2013)

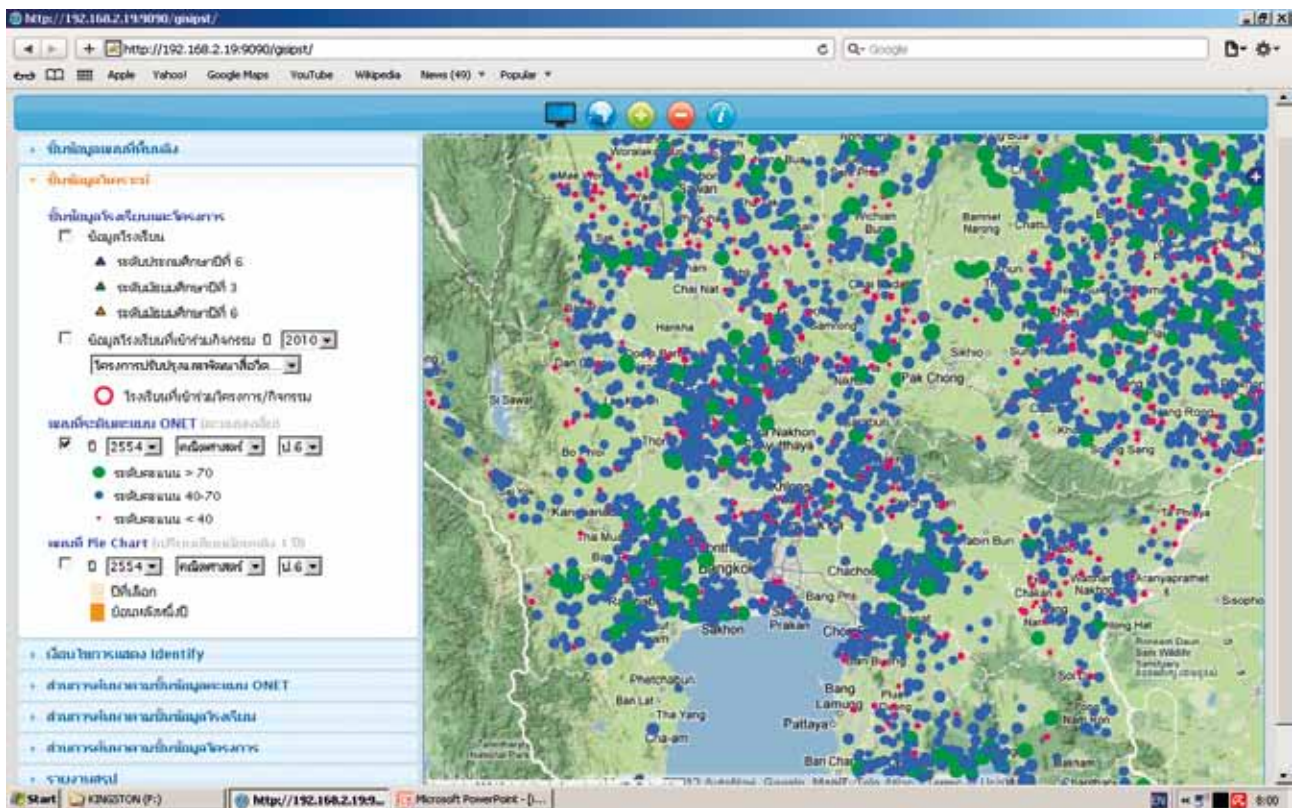


Figure 2: ONET scores by subject, based on year and level of education
Source: Chunithipaisan (2013)

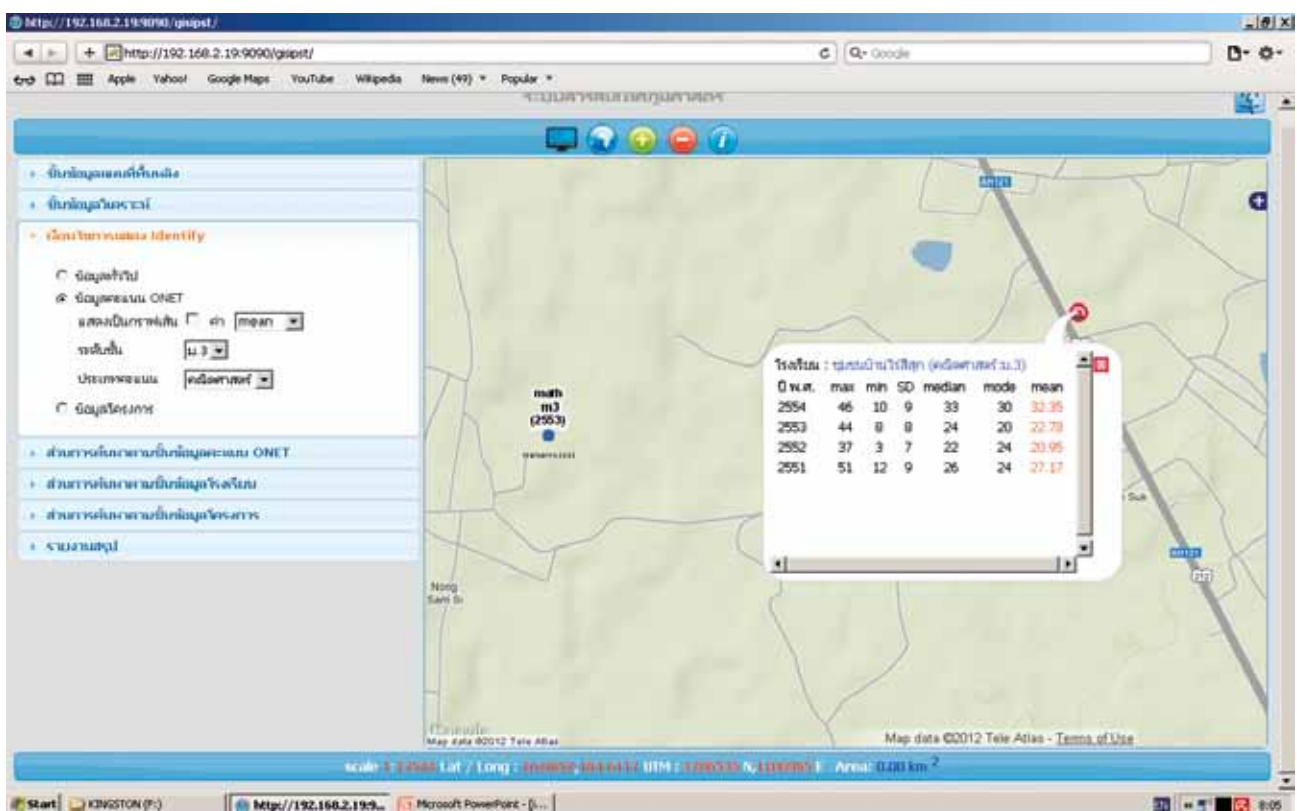


Figure 3: ONET scores of participating schools
Source: Chunithipaisan (2013)

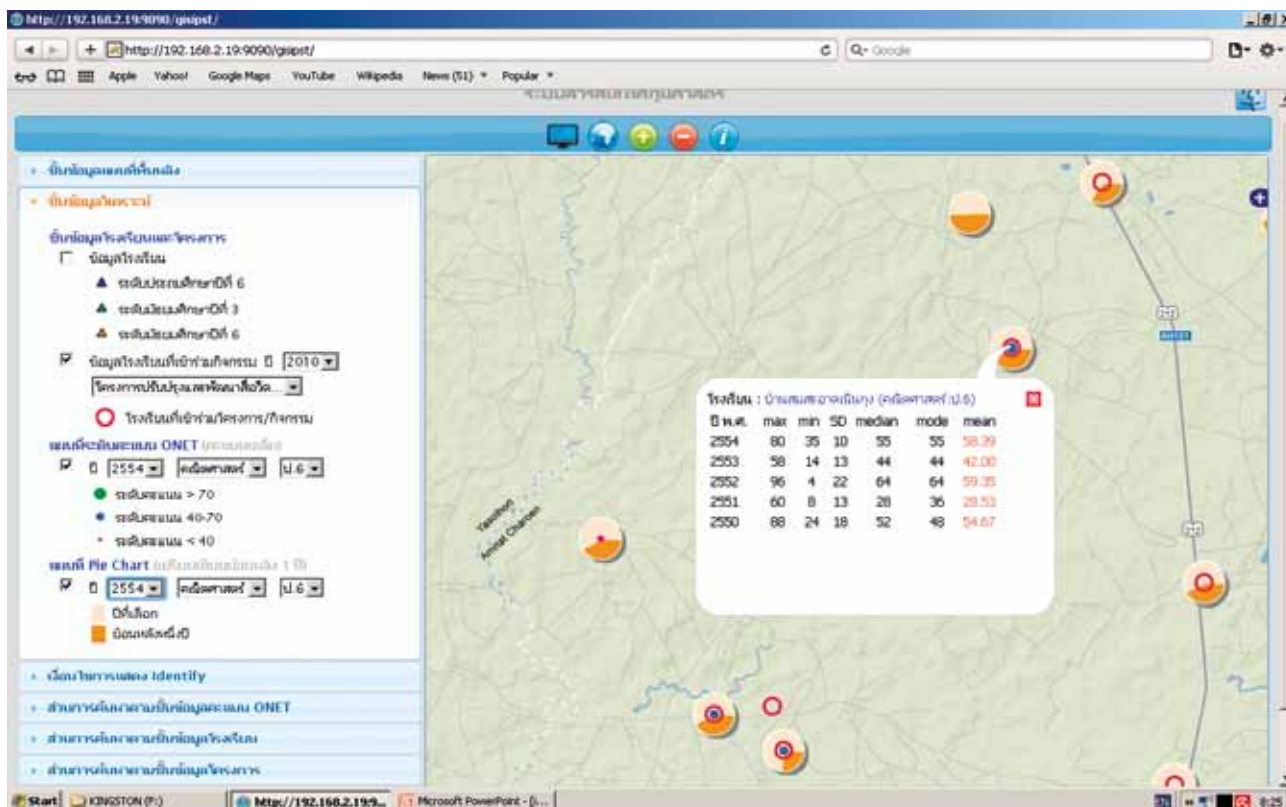


Figure 4: Graphical representation of ONET scores according to subject in each year and a comparison against scores drawn from the previous year
Source: Chunithipaisan (2013)

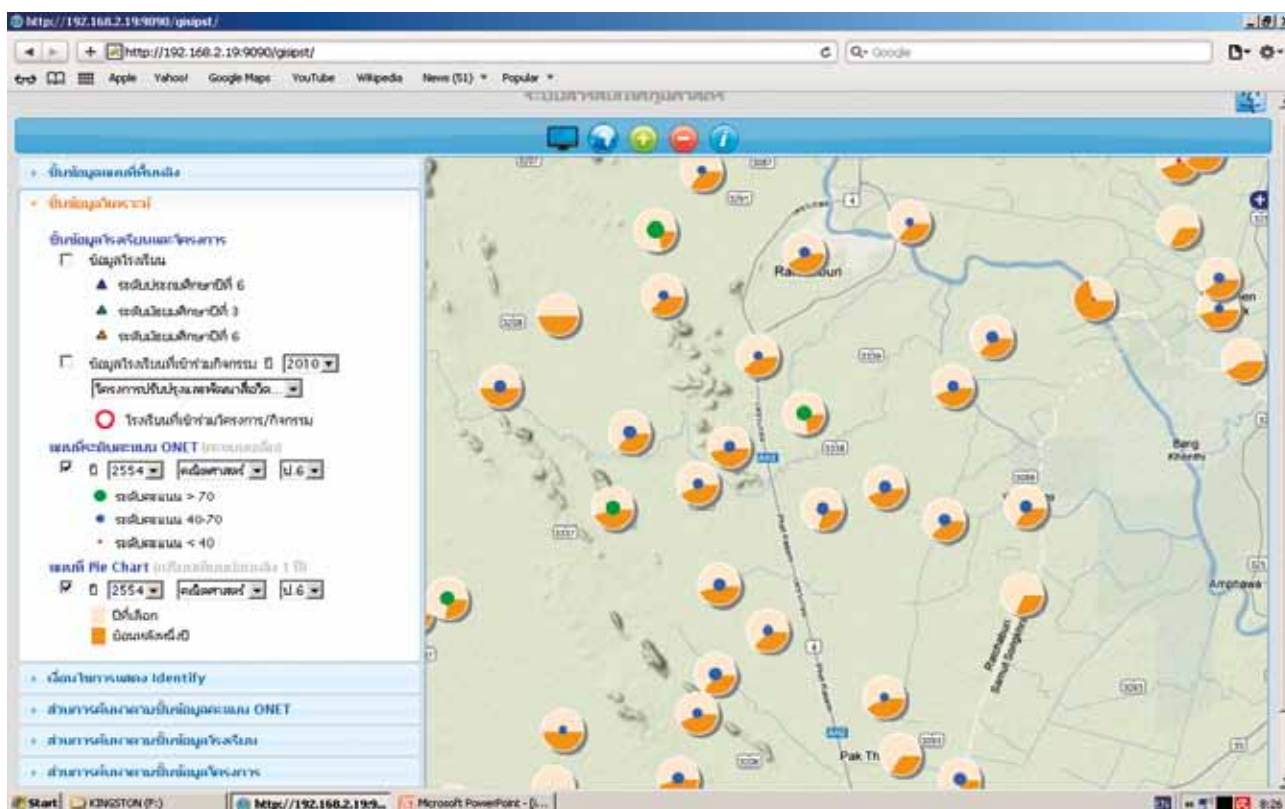


Figure 5: Graphical representation of ONET scores, providing a comparison of scores from the previous year
Source: Chunithipaisan (2013)

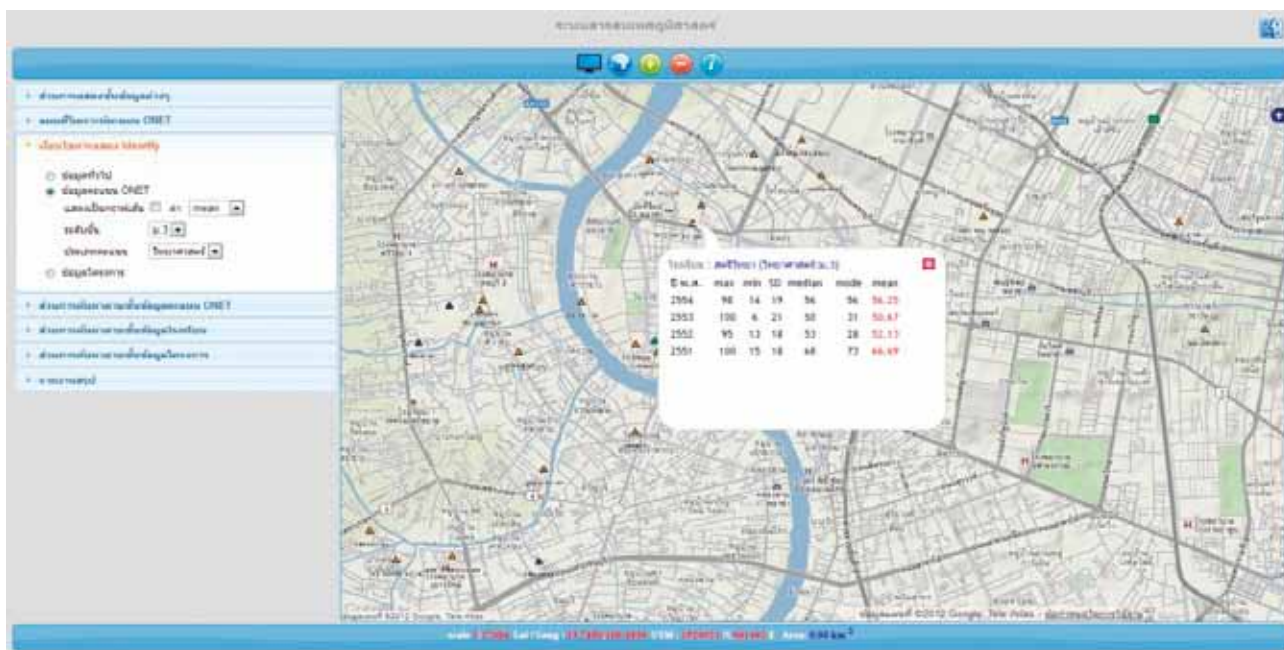


Figure 6: ONET scores for individual schools
Source: Chunithipaisan (2013)



Figure 7: Graphical representation of ONET scores for individual schools
Source: Chunithipaisan (2013)

This area-based information integration helps IPST to analyze the potential of each school more effectively and accurately. It also improves in the process of selecting participating schools and the distribution of projects to improve schools more appropriately.

Examples of the application of GIS in education information management in data search to facilitate effective decision making can be seen in Figures 8-9.

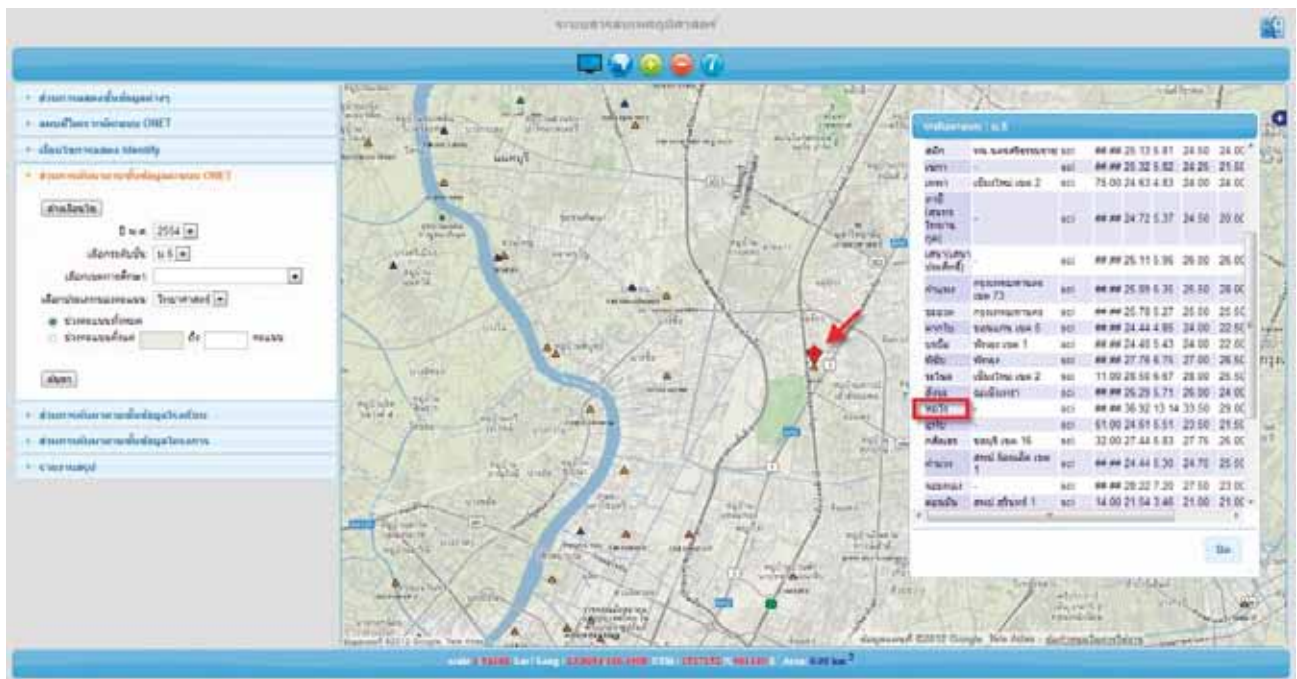


Figure 8: School search tool based on ONET scores
Source: Chunithipaisan (2013)

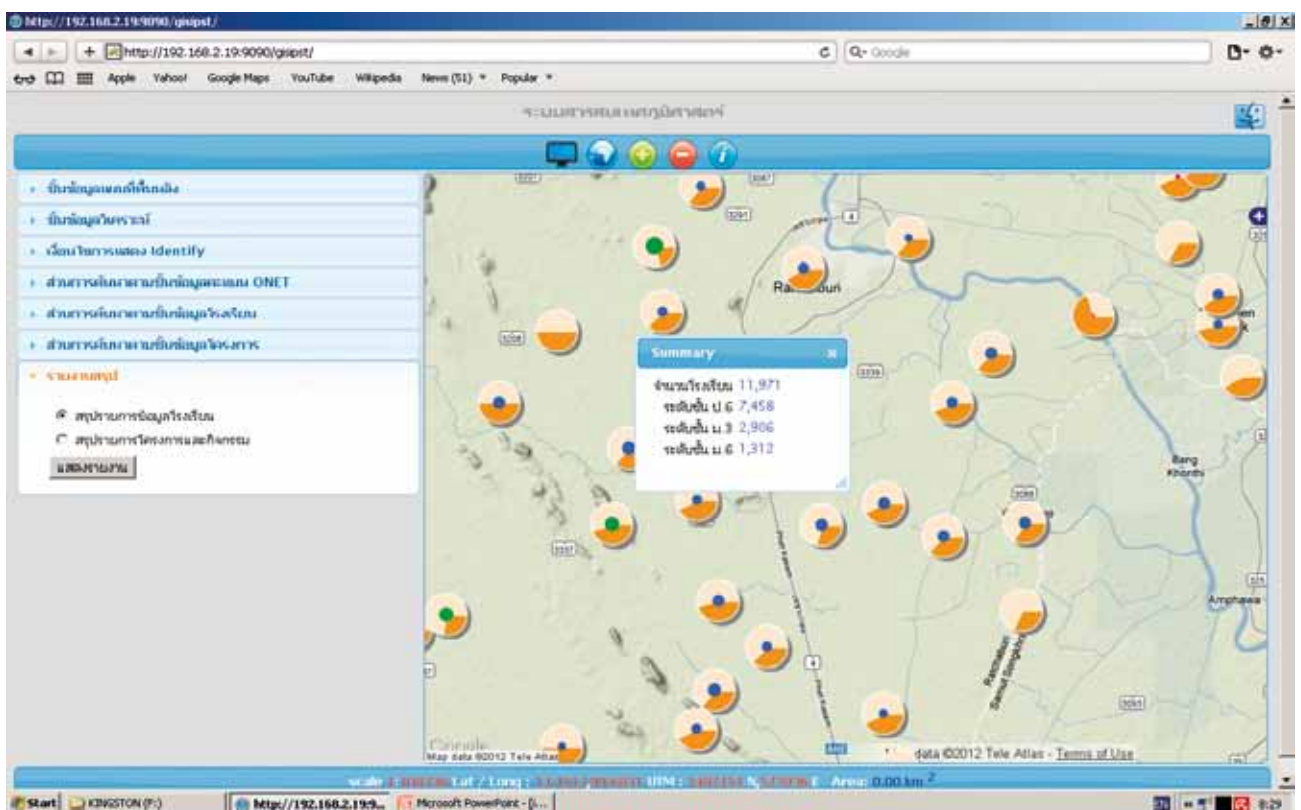
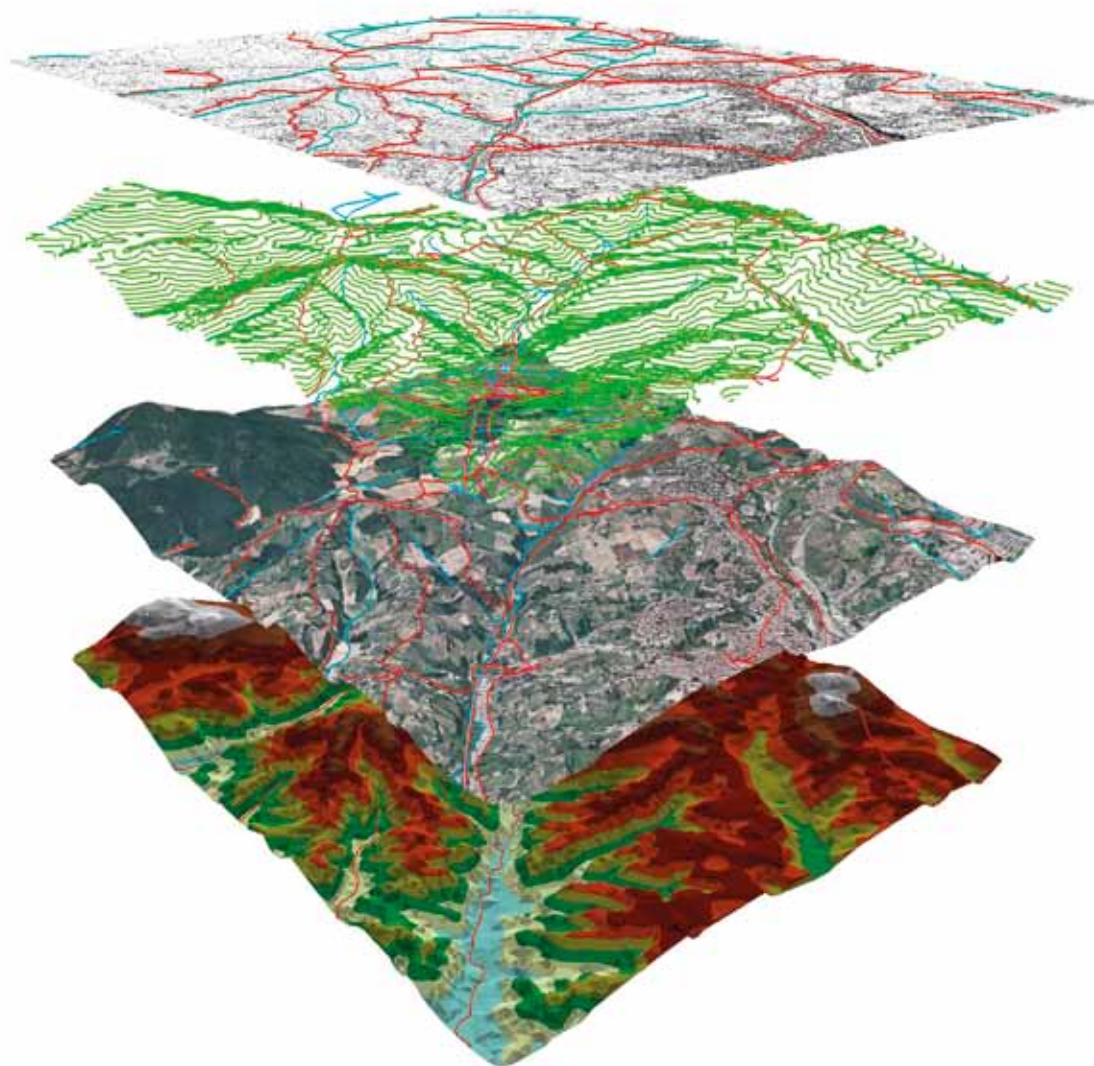


Figure 9: Tool to summarize the number of participating schools
Source: Chunithipaisan (2013)



To fulfil the mission of IPST, the application of GIS in education management helps executives to accurately perceive the overall scope and impact of projects on their target institutions, as well as facilitate project performance evaluation using ONET scores as one of the key performance indicators. Moreover, GIS is a powerful tool which contributes to an effective administration of school development projects, especially in terms of science, mathematics, and technology education management.

Acknowledgement

This article is part of a research project, “*Outsourcing Management Information System (MIS) Design and Development*” funded by The Institute for the Promotion of Teaching Science and Technology (IPST).

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FAQ Retrieval by Distance Measurement in Ontology Graph

Asst. Prof. Sukree Sinthupinyo, Ph.D.

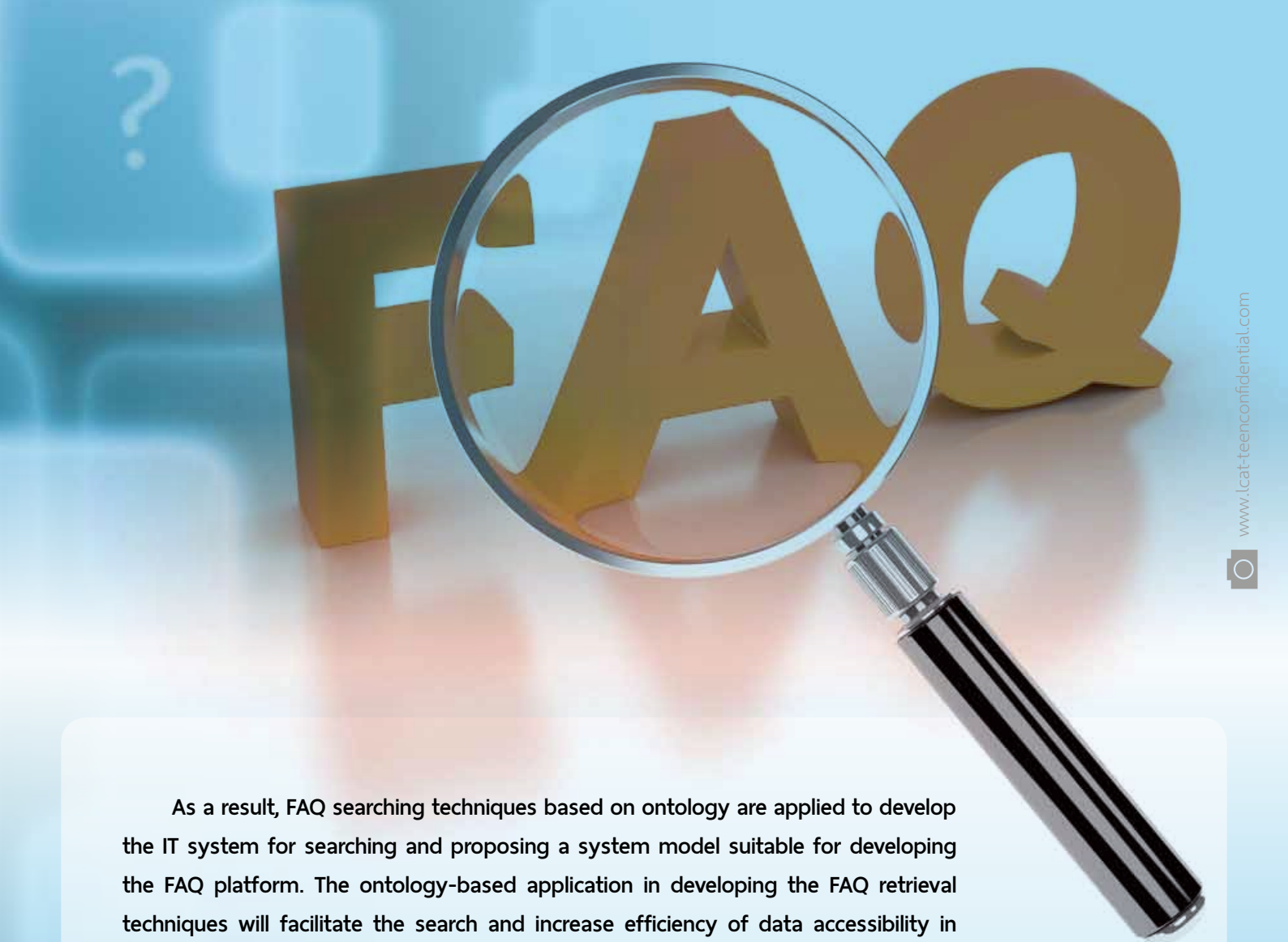
Chanawee Seechanthra

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Introduction

When working on a computer-related task or working with a multitude of rules, the task performer needs to have the status quo knowledge as operation guidelines. However, when a problem occurs, users usually search for answers in a database called frequently asked question (FAQ). However, they will not always find the questions answered there. The reasons for this failure may vary. It could be that the users use keywords that do not match the available answers, or they do not know the exact technical terms that they are looking for. Minor misspellings can also lead to unsuccessful searches.

In addition, in developing the system and preparing the FAQ, the content is usually too technical. When an organization has a lot of product types, it is highly necessary to have the FAQ searching system to assist users in solving basic problems. However, the search keywords are usually non-technical terms, resulting in unsuccessful search attempts. For example, if you search for “blue screen” on the Microsoft website (<https://support.microsoft.com/en-us/search?query=bluescreen>) you will probably see many irrelevant results. There could be various reasons for this. Therefore, the retrieval of data has to be developed for searching with non-technical keywords.



As a result, FAQ searching techniques based on ontology are applied to develop the IT system for searching and proposing a system model suitable for developing the FAQ platform. The ontology-based application in developing the FAQ retrieval techniques will facilitate the search and increase efficiency of data accessibility in the IT system.

Ontology

Ontology represents the body of knowledge using graphs to demonstrate the relation between different things with *nodes* as the keywords. If these nodes are related, there will be *edges*. Relation types may vary. In addition, ontology also presents the body of knowledge of organisms and real object that can define the completeness of semantic models with common traits. The structure of content and body of knowledge through ontology can be successful according to the body of knowledge in a specific domain and it can learn automatically from the related information technology, communication, access, and new body of knowledge.

Therefore, ontology is a powerful tool in creating and maintenance of information technology.

In one sentence, ontology is a specification of a conceptualization. It describes the concepts and relationships between agents. Five of the most common components of an ontology are Classes (C), Relations (R), Functions (F), Axioms (A) and Instances (I). The most common languages used in ontology are OWL and the Jena framework in Java for creating semantic web applications. The body of knowledge in ontology is maintained in 3 types: subject, predicate, and object as shown in ontological graph in Figure 1.

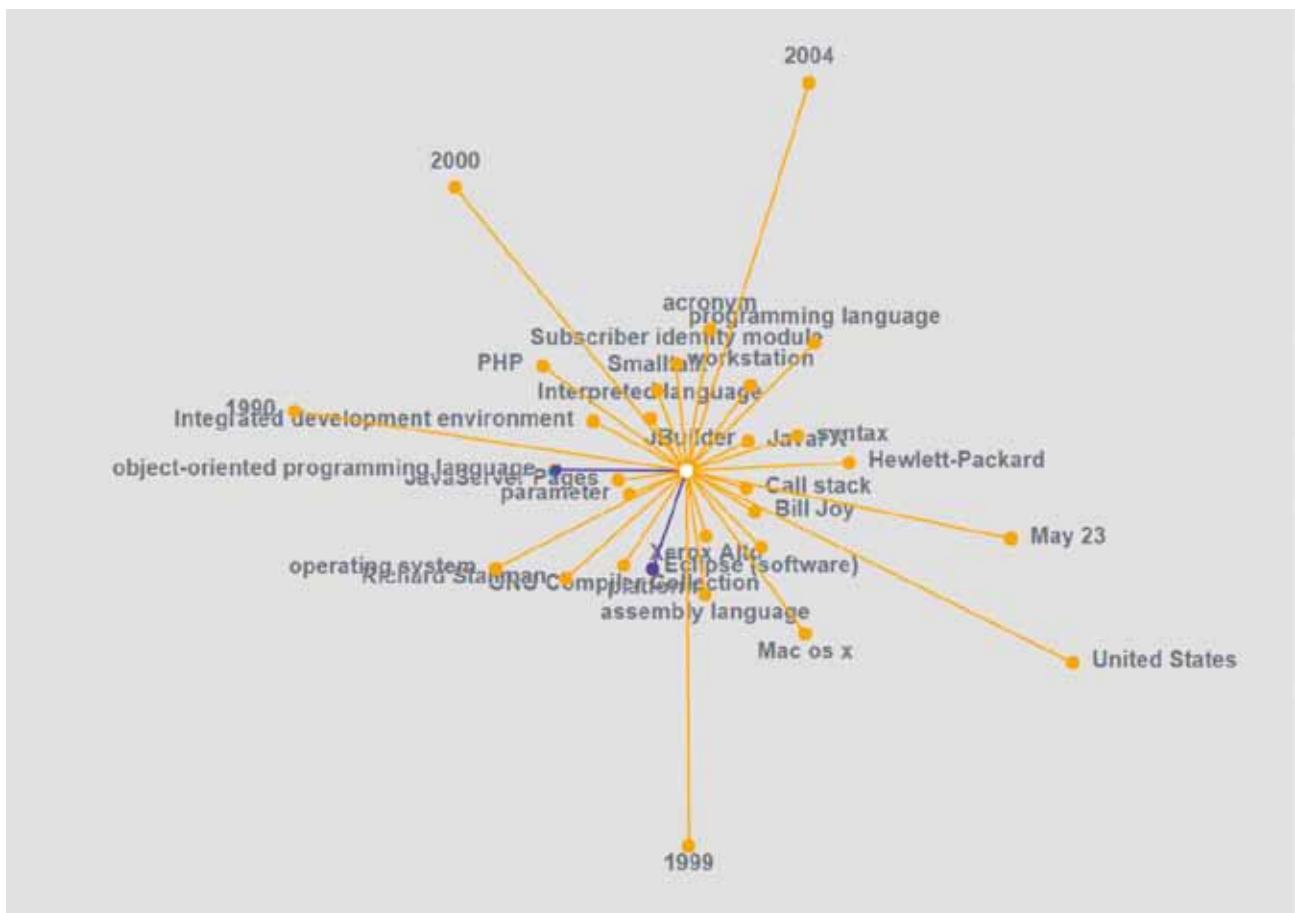


Figure 1: Example of an ontological graph of the query “Java” from www.babelnet.org
Source: BabelNet (n.d.)

Information technology retrieval

In retrieving the data from information technology, users usually start by inputting queries in the system. The system will in turn use the queries to compare against documents, text, or terms in the database. There have been many studies about information technology retrieval, as well as many related theories such as natural language processing, machine learning, mathematical theories, matrix, and matrix processing.

Information technology retrieval is a method used in general measurements. It is also used in this research as explained below.

1. Recall and precision

Recall and precision are general measurements in information technology retrieval. However, both values give different definitions. Recall shows how much the system or method can retrieve the matches desired by the user. On the other hand, precision represents the correctness of the results, determining how much the results satisfy the user’s need. Recall can be calculated using Equation 1 below:

$$Recall = \frac{|Retrieved \cap Related|}{|Related|} \quad (1)$$

Where *Retrieved* refers to the retrieved documents
Related refers to all related documents

Precision represents correctness of the system. It will look for the part of documents that matches the need of the user and all the retrieved documents. The formula for calculating precision can be seen in Equation 2 below:

$$Precision = \frac{|Retrieved \cap Related|}{|Retrieved|} \quad (2)$$

Where *Retrieved* refers to the retrieved documents
Related refers to all related documents

2. R-Precision

R-Precision measures correctness based on the precision of the retrieved documents at the R position. It will only search for the documents that match the search of the user, not the recall. R-Precision can compare correctness by analyzing and sorting out the working process by arranging the processes into an order or algorithm. The reason we need to use this method is that normally we do not know the total number of documents related to the query in the set of document being tested.

Application of Ontology

To apply ontology to study an approach to create the foundation and develop information technology systems in an effective manner, the research team is proposing a technique of using ontology with the following methods:

1. Measuring Distances for Ontology-Based Systems

Nowadays, the measurement and assessment of software is worrisome among developers. Because the constant increase of Web 2.0 and the services that highlight the system using the base from web, ontology is vital for using applications both at present and in the future. It is important to have a matrix of ontology to measure certain aspect of ontology (Mencke, 2008). Therefore, the research

team is proposing a new set of matrix for measurement that has been recommended and widely used. It has also been proved by the research team in developing the information technology system that supports the access to text in the database.

2. Ontology-Based Distance Measure for Text Clustering

The research team suggests establishing a new structure group using the base from the distance on ontology (Jing et al., 2006). Wordnet and learning ontology from the content of data are used to design the model that can measure the Euclidean distance. The result shows that this model can help to group text better.

3. Comparison of Ontology-Based Semantic-Similarity Measures

In order to measure the same ontology (Lee et al., 2008), 3 indicators are used: comments from experts, measurements on ontology, and content data measurements. The results indicate that the content data measurements and using ontology alone generate rather irrelevant results. Using ontology alone gives similar results to using comments from experts. The results from this study reveal that there should be additional studies to verify different methods.

Research methodology

In searching for FAQ, users usually input keywords and the system has to select the question that matches the keywords or is closest to them. The research team is applying the method to calculate the suitable distance to choose the correct question or suitable question so that users get the right answer. The processes can be divided into 3 steps as follows:

1. Analysis of the words in the sentence or search keywords
2. Searching for the FAQ

Table 1: The process of searching the questions close to the keywords

No.	Procedure	Result
1	Collect the original question to compare with keywords	Have 10 original questions
2	Enter each question in the term index table	Content of questions is entered into the term index table
3	Develop the application that draws the data from the term index table	Results are terms that appear in each question
4	Use terms to determine which keywords the user input match which questions by calculating the distance between keywords and terms of each question	Know which keyword fits which questions or are closest to which question

Source: Chanawee Seechanthra (February 2015)

3. Validation and evaluation process

To determine which questions match the query, the original question is defined to compare against the keywords. Ontology-based distance measure is also applied to find what questions are closest to the keywords. There is also an idea of using content filters in searching FAQ (Table 1).

From the trial development of ontology and trial use of the search system, it was found that the system can extend its searching results by retrieving keywords relevant and available in the database. For example, when we searched with the keyword “*nuclear*”, the top 20 relevant results are 1) Cryoseparators 2) Cryoseparators 3) Reduction 4) Reduction 5) Uranium 6) Uranium 7) Reducing 8) Reducing 9) Oxidation 10) Oxidation 11) Titanium

12) Titanium 13) Tails 14) Tails 15) Nichrome 16) Nichrome 17) Monel 18) Monel 19) Tantalum and 20) Tantalum, respectively. It is worth noting that the order of result is still in the process of being researched, which is expected to better prioritize the order of each search.

Since this research is still in the process of verifying the correctness of retrieval, the research team expects that the retrieval results from R-Precision of the proposed method will be better than the comparison method. However, the result of this study can be used to apply with the similar retrieval to FAQ such as conversation log in a specific subject in which user may not use technical queries or keywords.

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Assoc. Prof. Kamales Santivejkul, Ph.D.

IT Strategic Planning and Business Procedure Improvement with Software Packages



Assoc. Prof. Kamales Santivejkul, Ph.D., Director of Computer Center and Lecturer at the Department of Banking and Finance, Faculty of Commerce and Accountancy, Chulalongkorn University, is an IT expert. He is going to share how software packages can be applied to make an IT strategic plan and improve business procedures in organizations or corporations in order to survive amidst the competitiveness in an age of continuous changes.

Definition of a Software package

“...good software package should support a mobile platform and smart phone so that users can work through their mobile phone or mobile devices anywhere and anytime...”

A business software package is an all-in-one system for running a business, starting from purchasing, accounting, production, asset management, and administration. A business software package consists of 4 main elements: hardware, software, peopleware, and network. A corporate could either purchase hardware i.e. server, and software, or rent them. These could be installed inside or outside of the working site. Likewise, peopleware i.e. the system administrator could be someone from within the organization or some outsourced personnel. The key point of a business software package is the network because in the modern world business operations are not conducted only at the headquarters. They can be conducted at other offices or branches of the corporate. The number of offices or branches may vary, depending on the size of the business or organization. People who work for the organization may also have to work offsite throughout the country. They need to use the information technology (IT) to perform their tasks through the shared network. Network today is not just within a building. The system can go anywhere, either in the form of land line, wired or wireless, 3G, 4G, or WiFi. Therefore, a good software package should support a mobile platform and smart phone so that users can work via their mobile phone or other portable devices anytime and anywhere.

An example situation with applications of a software package is when employees at different

branches enter data upon purchasing. It is their routine job. At the end of the day, the sales data of each branch is summarized. This is because the system has been predesigned to collect that data. In other words, when a product is purchased or sold, the system will record it in the accounting system. The accountant only has to verify the data and forward it. If the data entry is incorrect, this software package will be able to trace back to find the person who entered the data incorrectly because the system records every step in the process, or even the delivery of goods in the inventory. Besides, the system can also identify when the product is delivered, in what quantity, and whether the delivery is complete or not. If the product delivery is successful, the system will automatically set the delivering party as the creditor without having to submit the delivery sheet to the accountant. This is because the system has been predesigned to perform the task. In case of requisition of a product, the company could design a requisition form or password to implement it. When someone needs to use the product and enters their password, the stock will be updated accordingly. The system can identify the person who took the product and its quantity. The same also works with delivery. The system can track the current status of the delivery. When the product is delivered successfully to the customer and the delivery is acknowledged by customer's signing, the customer is set automatically as the debtor.

The importance of using a software package for running a business

“...the use of software package in business process allows for a single entry that is effective and avoids double handling...”

The importance of enterprise resource planning (ERP) for business process improvement (BPI) lies upon good management in strategic business planning, consideration of competitive advantage or equivalence, and the ability to apply IT to amplify the enterprise to its full potential.

Before integrating the computer system, computer technicians or system analysts need to perform the system analysis before designing the system. They will then devise the program that suits a certain enterprise in the same manner as a tailor-made suit. Manual operation is replaced by the automatic one. System analysts will first have to go to the site to see how people work and try to design the system to make it automatic and suit the existing procedures. Whether it will be good or bad is not obvious at the beginning. But things become clearer once leading organizations apply software packages like SAP Oracle, which is ERP software. An interesting thing about developing software packages is the framework made up by studying or researching to find out how the application of IT can improve the process efficiency. With a framework, an enterprise that is ready to change the way it runs its business in the standard ERP system can switch to use this system.

However, the standard of ERP systems can be customized to satisfy the specific needs of each enterprise. The software developers need to find out what the procurement and documentation system of the customer's enterprise looks like. If the operation procedure can get along, there is no need to use the old way which wastes so much time. All that needs to be done is modify the system to be able to create the results that can be used in the same way as the existing system. Further modifications are required to allow the ERP software to overview and make use of the entire enterprise's data right

away. That is to say, when someone from a certain department keys data in the system, other departments should be able to use the data correctly and accurately. The entry of data must be done a single time. When data is entered, updated, or changed, all the changes must be complete and consistent across the system. All parties will see the same data which means the database must be the same. The data entry and changes to it must be in real time; when someone enters the data, it can be used immediately by anyone in any department in the enterprise.

A good ERP software application is one with its framework developed based on a best practice model, can link every system together and performs its operations in real-time. If we choose a good software application, the best practice model will cover the complete business structure; procurement, inventory, accounting, finance, asset registration, and preparation are all included in one system. So when a customer places an order, the person in charge can go into the system to see whether the company has the ordered item or not. Following the order confirmation, the order is forwarded to the accountant. If the customer has not paid for the order, the system will set that customer as a debtor so that the accountant does not need to enter the information from the order sheet. These simplified practices are possible because IT knowledge is applied in the business process, making it less complicated and increasing its efficiency.

However, to bring the software package to use in business, it is necessary to plan the operations including strategy, IT, and procedures. At the beginning, it is necessary to analyze the IT system used in the organization, to determine whether it is modern or out of date, how it works, as well as the detailed plan for the next 5 years, what to be done,

and what to be changed. There should be a strategic plan to follow in detail. In addition, a strategic planning is also important for preparing the budget and the working plan of project managers in each section. Therefore, it should be able to identify the objectives and the benefits of each project, as well as the operation and investment budget. If the

project is approved, there will be procurement decisions, the making of the term of reference (TOR), and how to implement the plan successfully. However, the timeframe for designing and applying the software package depends on the type and the size of the enterprise.

Benefits of improving business processes

“...a software package reduces the working time, makes the data clearer, and allows for more efficient performance...”

Since the application of software packages in running a business allows for one time data entry, all the data at any time is consistent all over the network. The system is designed to facilitate work and simplify the complicated tasks, can minimize the errors, deviations, and repetition of data. Since the data is accurate, it can reduce working time and make the working process faster which is good for the entire organization. For example, an organization has 5 departments. Using software package to improve the business process does not mean that each department will work hard at the same level or work in the same manner. Some departments may have

to work harder as they are the upstream to input the data into the system. On the other hand, some department may have less or no work at all. Therefore, the organization can revise, reorganize, or cancel the departments that do the same job. Likewise, the organization may establish new departments. While initially the tasks have to pass through 5 departments, the organization can now reorganize itself to have them pass through only 3 departments. To do that, 3 of the original departments are cancelled, leaving only 2, while 1 new department may be established. Ideally, all departments can be reduced to one in what we call a one-stop service.



Problems and obstacles

“...problems and obstacles are the resistance from people in the organization, the organization not being able to invest, and the management not wanting to invest and improve the organization...”

Most of the problems encountered when introducing the software package to improve business process come from personnel or operators in the organization who do not want to change. In general, Thai people do not like changes. They are also afraid of being devalued from what they have learned in their long working experience. Therefore, human resources problems become the number one issue when changes occur. Without a good plan or effective communication, the changes will certainly affect administration. In some cases, the changes also affect the good governance of the organization because the old way is not automatic in every process; people work periodically. This gives a chance for people in charge of each section to make a decision to act. For example, traditionally there might fee, fine, or alternatively called “facilitation fee”. Without these fees, the operation might be further delayed. So if the system is introduced, these will not happen. It will benefit the enterprise in reducing corruption. However, such changes will be opposed to by stakeholders who do not want to change how they work and to lose their benefits. If not everyone wants to apply the IT to improve operation processes, the organization improvements may be problematic.

In addition, despite an organization’s desire to use new systems, if it cannot afford to invest, the organization will never be able to use systems to improve its performance. On the other hand, if the organization can invest, but the management does not have the policy or desire to invest because they do not want to take action, take responsibility, and take risks, the project to introduce the software

package to improve business processes will never become reality; or it will be very hard to be implemented. Even if it really happens, it is at a very high risk of failure. If the organization’s management has a good vision or the organization has the key performance indicator (KPI) to control the administration, the integration of software packages to improve business processes is more likely.

Therefore, an organization or business needs to have a good consultant who can advise them on the benefits and necessities that the organization needs to use the IT or software package to improve processes. The consultant may provide information about how the new system can help the organization, how much investment is required to introduce the system, as well as buying the software, hardware and implementing and maintaining the system. In addition, the consultant can also inform the organization about new technologies that competitor have already used. The software packages should be obviously worth investing in. The consultant should be able to tell the organization how much they will earn or save by implementing the new system. As a result, when designing or planning the strategy, it is necessary to research the answers to 4 dimensional questions: the desire to use the software packages, the application of the technique, the administration, and the finance management, both in quantitative and qualitative manners. The feasibility study should be conducted in the same way as general business planning, where they have to study the following 4 dimensions: market, production, administration, and finance management.

Popularity and tendency to use in the future

“...today’s software packages are a key and necessary strategic tool.

It is something that every organization needs in planning and driving their business to success...”

In contrast to large enterprises, the application of software packages in improving business processes is not really popular among SMEs. Some public organizations and public enterprises have already started introducing these systems. The interesting thing is that whether you are a business, small or medium enterprises; you can introduce systems to improve your operation. This is possible because the package is available for rent, including its hardware, server, software, applications, and network. As soon as the package is installed, the implementation can commence right away even though it needs to be changed, improved, added, and updated. This support can extend for at least 5 years.

Currently, the government is enhancing small and medium enterprises (SMEs) to introduce the software package to improve their business. It is allocating budget for businesses to rent the package at 50,000 baht per year. This support makes it possible for SMEs to have the system in use like huge organizations without having to invest millions.

In addition, the technology advancement today makes it possible for SMEs to use software package because they do not need to have their own server. They only need an internet connection. The internet allows them to use IT systems to compete with big corporations. This is a different way of investing, one that will allow businesses with a smaller capital, to bring more income in a more efficient way.

Today more private enterprises are introducing the software package to improve their businesses. If public sectors do not adapt themselves, the development of their projects will be delayed. Therefore, the government should emphasize on efficiency and quality by implementing software packages to improve business processes. A software package can increase efficiency, reduce cost and minimize errors in implementing the projects and activities of both state organizations state enterprises. This will enable these agencies to be more competitive in the future.

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Education

- Bachelor of Engineering in Civil Engineering from Prince of Songkla University
- Master of Business Administration from National Institute of Development Administration
- Doctor of Philosophy in Business Administration from Oklahoma State University, USA

Work and Experience

- Director of the Computer Center, Faculty of Commerce and Accountancy (2008-present)
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- Director of Office of Academic Resources, Chulalongkorn University (1995–2003)
- Director of Office of Information Technology, Chulalongkorn University (1997–2000)





How important is Information Technology?

"Around Us"
Assoc. Prof. Thavivongse Sriburi, Ph.D.

blog.hmiaward.com



Globalization is the process of international integration arising from the interchange of world views, economic, environment, and cultural exchange, which quickly reverberate around the world. International communities are increasingly inter-connected, and can be very rapidly impacted by remote events. The orchestration of such events- whether as acts of global citizenship or terrorism- has been made possible by the application of information technology to bring a new and deeper reality to the traditional economic concept of globalization.

In Thai, the term for globalization was coined from two words loaned from Pali *"loka"* and *"vata"*. The Royal Institute Dictionary¹ defines globalization as *"international global communities that are aware of, globally connected and can be affected by incidents that occur instantly and widely due to the development of information systems"*.

Thus, globalization today refers not only to the elimination of barriers to international trade, but also to revolutions in communication, in transportation and in cultural exchange. Opportunities, challenges and threats abound along this fast-moving trajectory for companies, civic groups, governments and individuals. And we don't have a map.

In the past, despite the diversity of traditional models of organizational management, small or large enterprises at both national and international levels tended to follow one common framework. This framework is a fundamental element in these models and can be identified- recognitions of factors that lead to the desired enterprise goal- in layman's terms,

"Man, Money, Material and Management", better known as the 4M's.

Globalization has drawn countries into a competition for these resources to drive economic and social development. With the gradual dismantling of market protectionism, the need to enhance national competitiveness has become vital, and technology has of course been integral both as a tool as well as a product category of its own. IT devices such as computers and mobile phones have been widely used. These technological devices enhance competitiveness by providing convenient communication channels and fast connections for management. Corporations today need to be extraordinarily well-informed, to able to race very fast, make fewer errors and make sense of trends in vast amounts of data.

Key factors that contribute to effectiveness and efficiency in working nowadays are the emergence of devices and tools from the combination of *"information"* and *"technology"*. These devices were

¹ Royal Institute of Thailand, *The Royal Institute Dictionary B.E. 2542 (1999)* (Bangkok: Nanmeebooks Publications, 2003), 1044.

invented and brought to us via scientific development. The practicality and invention of these two terms gave birth to a widely used acronym IT (information technology).

According to the Royal Institute Dictionary, the term “*information*” was defined as “*content acquired from thinking, analyzing, calculating, computing, arranging, sequencing, or categorizing data which leads to meaningful content that benefit users*”².

An “*Information system*” was defined as a system that includes computers, both software and hardware, database, networking systems, developers and users. The system allows developers and users to import a large amount of data into its internal memory and be able to manipulate the data in many ways in order to create useful information for specific purposes such as policy planning, monitoring and various aspects of management both for public and private sectors or even in education.

Technology includes the use of tools, knowledge, ideas, theories, techniques, methodologies, processes and scientific achievements in organizations to make a change in the process as well as increase efficiency and productivity.

Information technology can help organizations of any scale or type to achieve the following goals:

1. Efficiency: IT can help organizations reach their targets and goals faster and more accurately.
2. Productivity: by automating repetitive or time-consuming tasks, IT can greatly enhance labour productivity and increase efficiency.
3. Economy: Investing in IT can save both time and labour, reducing operational costs as well as risk.

Combining the six factors of effective administration: manpower, budget, materials and tools, management, information and equipment together with the use of IT can benefit strategic and technological planning to overcome three major challenges in:

1. Increasing productivity without increasing manpower

2. Decreasing manpower and maintaining productivity

3. Maintaining or increasing production quality

In Thailand, for the initial stages of IT development mainframe computers and computer centers were built to develop an organization’s hardware. Thus, the maintenance budget was high and it required a lot of staff. These technologies were used by the National Statistics Office to process and calculate big data such as demographic statistics. The banking industry is an example of a private sector that has been using these technologies. For example, the banking sector has developed interactive computer programs that can respond to the customers’ requests. These technologies are being developed due to an increasing number of transactions.

The development of networked computers was even more radical as an innovation than the stand-alone PCs that they linked together. It enabled free or low-cost collaboration across geographic and time barriers, and evolved into today’s ubiquitous Internet. Individuals around the world routinely work together, connect with other like-minded individuals,



² Royal Institute of Thailand, **The Royal Institute Dictionary of Educational Terms (A-L)** (Bangkok: Nanmeebooks Publications, 2008), 222.

form groups and share information. It is an unbounded social revolution, affecting so many aspects of the way we live: how we trade, invest, buy our groceries, travel, gather news, educate ourselves and use our leisure time through social media.

The explosion of new ways to use the Internet and their rapid obsolescence and replacement by the next technology wave carries major implications for business. To survive and retain their relevance, let alone thrive, companies must learn to constantly monitor and evolve to keep pace³. Organizations have to improve their strategic management in the following areas:

Education: educational institutions are increasingly making use of computers, the internet and distance learning to broaden access to education. Computer laboratories offer students specialized opportunities to study and practice. At the same time, agencies responsible for education have tried to bring modern technology to support teaching and learning systems for all ages, from kindergarten to tertiary level. The introduction of Tele-education in Thailand has helped reduce inequality of access to education for rural students. At tertiary level,

universities use modern technology in teaching to equip their graduates with the required competencies and skills to meet market needs.

Meanwhile, the Ministry of Education allocates budgets for the national education development plan to upgrade computer hardware and software and link provincial information centres together and with headquarters in Bangkok.

Of course, many new challenges arise from the new-found ability of students to search and obtain information directly from the Internet, including the unknown provenance of information found on the internet, and the ease with which text can be copied and represented as the student's own work.

Medical: information systems are vital tools for medicine, not only in terms of new diagnostic and patient management tools, but also in terms of the potential of tele-medicine. Expert systems can not only store vital patient records, appointment dates, and prescriptions, but also can be linked to satellite systems via high speed internet links for remote diagnosis of patients in rural areas who cannot travel long distances to hospitals. Another example is doctors using online systems to order prescriptions to avoid misreading information due to handwriting difficulties.

Banking: technology has revolutionized the global banking system by providing banking services via the internet, by computer or mobile phone (E-banking) and also revolutionized stock market transactions via electronic trading.

Business: competition has never been more fierce. Improvements in management efficiency and cost-saving strategies are vital to enable companies to compete with agile rivals and survive in today's fast-changing and volatile markets. Computer literacy is therefore integral to performance at every level, and at strategic level, a well-designed corporate management information system architecture and help executives make vital decisions faster, more



³ Even highly innovation world-class companies such as Nokia are now paying the price of their failure to re-innovate.



efficiently and more accurately. Nowadays, leading organizations seek employees who are computer literate users and are able to use word processors, spreadsheets, presentations and other supporting tools. There are also organizations that require people with more advanced skills such as programmers, system analysts, system administrators or CG designers.

Science and technology: the explosion in low-cost computing power and advances in networking have allowed major progress in forecasting systems- for weather, climate and disaster risk such as tsunami, earthquake, storms and climate change. Such systems can help authorities cooperate in preventing and mitigating damage to life and property, and also in developing predictive models that can support regional, urban and agricultural planning and in developing risk mitigation strategies.

The above examples help to highlight the vital role of Information technology in today's world, as the key to competitiveness in a globalized market as well as in all other areas of human endeavour. Nowadays, the success of an organization depends on the employee's use of technology to access and

utilize data. As a result, successful organizations normally possess a strong company culture based on knowledge sharing between their employees.

Therefore, personal development plays crucial role in all organization. Employees should be trained to be aware of the rapid technological developments that could affect their organization. Personal development in today's world should focus on these changes and help employees to adapt and adjust themselves to the changes more easily.

Nevertheless, today's obsession with social media carries risks in terms of personal isolation and reduced real-world interaction, especially among the young. Our society has become a '*phubbing society*'. Internet and gaming addiction introduce other social problems that can lead, in extreme to obsessive introverted behaviour and total exclusion of family and friends. Some employees use social media applications for personal purposes during working hours which leads to poor efficiency. This lack of responsibility may hinder the competitiveness of the organization itself. Appropriate IT policies within the organization should aim to maximize productivity, whilst recognizing and protecting staff from risks.



Guidelines for the preparation of database and status indicators of Thailand's R&D.

Research and Development (R&D) are crucial drivers of national development. A study was conducted to develop indicators of the country's R&D status- overall, as well as at academic and industry levels. A national R&D database has been developed, including reporting status, data collection and indexing on R&D at all levels appropriate to the country. Study results can be used to inform decision-making as well as to support policy formulation by relevant agencies, and to shape the future direction of R&D in Thailand.

The study team defined a comprehensive R&D concept for both scientific and social sciences, focusing on the needs of developing countries. The study is summarized below.

Step 1: Study and development of key R&D indicators

Secondary data were collected from a range of sources at national and local levels, including the

following: national economic and social development reports, national policy and strategic research, concept of system reform research, and Thailand's educational Master Plan. Global advances in development of R&D indicators were also reviewed, principally relying on data from organizations including the Organization for Economic Co-operation and Development (OECD), the International Institute of Management, World Economic Forum and the



Global Innovation Index, all of which contribute to the Transcription Index of international organizations research. The study protocol specified that each of the international organizations including the World Bank, used data index research and development of the selected countries for comparison from agencies index weights are calculated using statistical methods.

The researchers collected primary data from in-depth interviews with experts on R&D, and used the findings to develop indicators to assess the status of R&D, categorized by organizational type, including government, state enterprises, tertiary education institutions (public and private sector), and the private sector.

Step 2: Development of R&D indicators, including guidelines for establishing a national R&D database.

- Define and create a framework of R&D indicators at 3 levels: overall, academia and industry.
- Conduct focus group discussion with representatives from government agencies, the private sector and academic institutions to review national R&D indicators. This resulted in a set of revised definitions and indicators for each category.

- Obtain in-depth information directly from government agencies, academic institutions and the private sector to establish the status of R&D in each organizational sector.
- Comparison of data collection and indexing methods of global benchmarks, with Thailand's R&D indicators status indicators, including gap analysis.
- Arrange groups to brainstorm the results of the study and prepare recommendations for further improvement and next steps.

Step 3: Finalize R&D indicators appropriate to Thailand at overall, academic and industrial levels,

using data from Steps 1 and 2 to prepare a draft report and information base, as well as organize seminars to broaden awareness and elicit further recommendations in drafting the Final Report. The report will contain the study's recommendations for developing R&D indicators for Thailand at overall, academic and industry levels, for use as a policy blueprint for research and education, and in ongoing monitoring of the country's progress.

The National Research Council of Thailand (NRCT) will lead this study to be used as guidelines for the preparation of databases and status indicators of Thailand's R&D.

Seminar on “Quality Standards for Property Business Management in AEC”



On Monday 25 May 2015, **Chula Unisearch** together with the Department of Business Development (DBD), Ministry of Commerce held a seminar on the topic of “**Quality Standards for the Property Management Business in AEC**” at Chulalongkorn University. It was a great honor to have Asst. Prof. Prasert Akkharaprathomphong, Advisor to the President of Chulalongkorn University in Quality Management and Ms. Maliwan Dejaritt, special instructor at the School of Business Administration, Bangkok University, as lecturers. The seminar was

attended by a total of 80 participants, including delegates from DBD as well as enterprises and administrators in the property management, housing development and office buildings businesses. The seminar aimed to raise awareness among participants of the overall status and prospects for Asia’s property management business, concepts and standards in quality management as well as tools for measuring quality to enhance property business management standards for commercial properties.

Opening ceremony of seminar “The Prospect #6”



On Tuesday 23 June, 2015, Prof. Pirom Kamolratanakul, M.D., President of Chulalongkorn University, presided over the opening ceremony of Chulalongkorn University’s 6th Academic Directors Seminar “**The Prospect**” and was also a special lecturer on the subject of “**Chulalongkorn University’s Strategies**”. The seminar was held in Meeting Room 201, 2nd Floor of Chulalongkorn University Research Building. The 40 participants were briefed to support the University and align the strategies of their organizational units to meet the University’s goals and missions.

Chula Unisearch was assigned by the Office of Human Resources Management, Chulalongkorn

University to organize “**The Prospect**” from generation 1 to the latest 6th generation.

The objective is to develop a vision and paradigm of higher education on research and development and quality of higher education at national and international levels, to manage and create networking skills to equip staff for possible future roles as executives to enhance the performance and readiness of academic directors to support the university’s goals. “**The Prospect**” program was held each Tuesday and Thursday from 23 June 2015 to 17 September 2015 from 09.00 - 16.00 hours, a total study time of 129 hours.

Opening Ceremony: the 4th “Bhumipalung Phandin” for Chief Executives



Prof. Pirom Kamolratanakul, M.D., President of Chulalongkorn University, presided over the opening ceremony of the 4th “*Bhumipalung Phandin*” (BPP) for Chief Executives on Tuesday 2 June, 2015, at Chulalongkorn University. Prof. Pirom was also a special lecturer on the subject of “*Chulalongkorn University and Bhumipalung Phandin*” at this event. We were honoured on this occasion by the presence of Mr. Chuan Leekpai, Former Prime Minister of Thailand, and former participant of BPP from its 1st generation. Mr. Chuan delivered a special lecture on the subject of “*Bhumipalung Phandin and the country’s development*”.

Chulalongkorn University assigned **Chula Unisearch** to organize the BPP program since its inception in 2012. With the focus aimed at raising awareness among chief executives from both public and private sectors to support and promote the

major institutions of the Kingdom, including nation, religion and the King, which have maintained peace and stability in the country until today. In particular, the King’s royal duties should be set as a best practice and an example for those who are able to effect change and drive collaboration for the advancement of the country to thrive sustainably in the 21st century. Since 2012 **Chula Unisearch** has organized three “*Bhumipalung Phandin*” programs and trained a total of 314 chief executives.

The 4th BPP for chief executives required a total 100 hours of study time, with sessions held each Tuesday from 2 June 2015 to 24 November 2015 from 13.30 – 18.00 hours at Maha Chulalongkorn Building, Chulalongkorn University. The program includes lectures, discussions, seminars, debates, brainstorming group practices, study trips and group writing an independent study (IS).

Press conference: “Biomaterial Medical Product Development”



On Tuesday 7 July, 2015, Prof. Pirom Kamolratanakul, M.D., President of Chulalongkorn University, Assoc. Prof. Sophon Napathorn, M.D., Dean of the Faculty of Medicine and Prof. Bundhit Eua-arporn, Ph.D., Dean of the Faculty of Engineering, held a joint press conference on “**Biomaterial Medical Product Development**” - a collaborative research to benefit the academic and medical engineering fields. The press briefing was held in Seminar room 202, on the 2nd floor of Chamchuri Building 4.

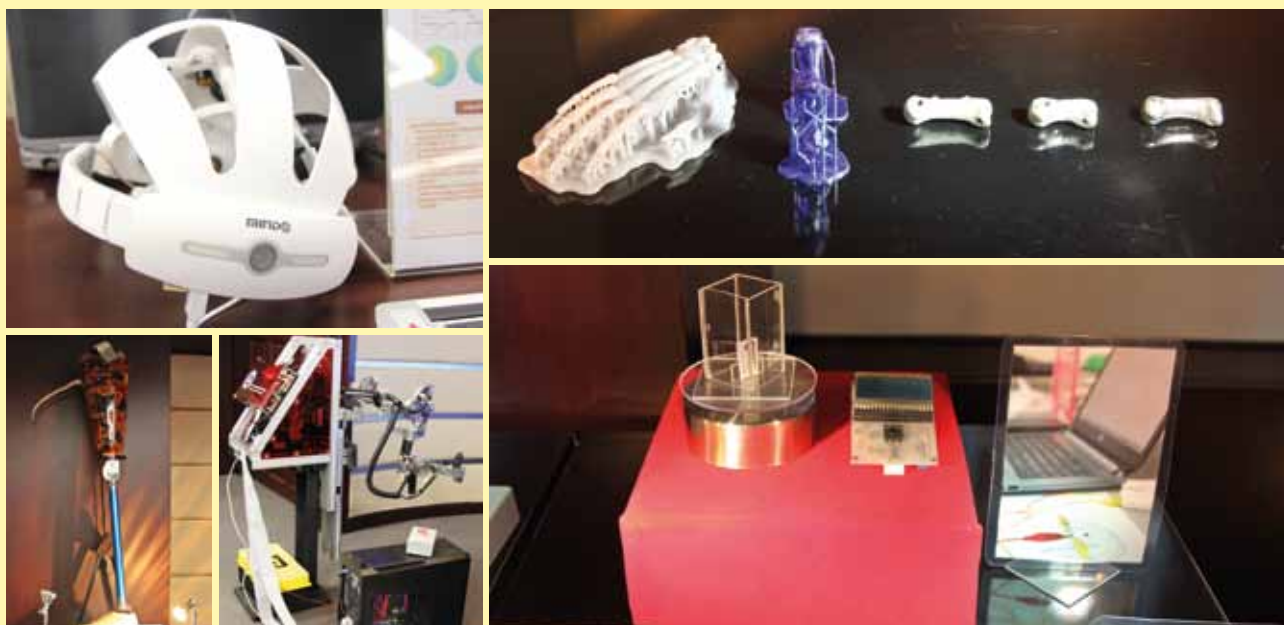
The seminar was also attended by Assoc. Prof. Thavivongse Sriburi, Ph.D., Managing Director of Chula Unisearch, Saowanee Wijitkosum, Ph.D., Deputy Managing Director, Chula Unisearch and Prof. Anan Srikiatkachorn, M.D., Associate Dean for Research Affairs, as well as the Presidents of each of the university’s 9 Research Clusters.

The “**Biomaterial Medical Product Development**” began from collaboration in research and development (R&D) between the University’s Faculty of Medicine and the Faculty of Engineering,

focusing on bringing medical technologies to be responsive and beneficial to society. Examples of the successes of this collaboration include the following projects:

- “Development of exoskeleton robot controlled by the brain wave signal and the control system of virtual reality gaming for rehabilitation of stroke patients”
- “Assays chip electrochemical Immuno-Sensor for Acute Kidney Injury”
- “Orthopaedic Implant for the disabled” including dynamic foot prostheses, polycentric knee joints, modular cemented hip and unipolar heads.
- “Disc prosthetic, ready within one day”

This program forms part of the research under the inter-cluster research budget of the Health Cluster, which received funding from Chulalongkorn University and the Office of the Higher Education Commission. **Chula Unisearch** is the central unit to coordinate projects according to plan and set goals.



A Regional Trade Policy Course for Asia & Pacific Countries: Cooperation among WTO, ITD and Chulalongkorn University



On Tuesday 29 September, 2015, the Administrative Board of Chula Unisearch, including Assoc. Prof. Thavivongse Sriburi, Ph.D. (Managing Director), Assoc. Prof. Voranop Viyakarn, Ph.D., and Saowanee Wijitkosum, Ph.D., (Deputy Managing Director), welcomed Asst. Prof. Kamalinne Pinitpuvadol, Ph.D., Director of the International Institute for Trade and Development (ITD) to discuss implementation of a WTO Regional Trade Policy Course for regional government officials of Asia-Pacific countries. Under an agreement between WTO (World Trade Organization), ITD and Chulalongkorn University, **Chula Unisearch** is responsible for organizing and managing the 8-week training course between

October 12 and December 4, 2015.

The opening ceremony of the training course was held at Chulalongkorn University on Monday 12 October, 2015, and was presided by Prof. Mongkol Techakumphu, DVM, (Vice President of Chulalongkorn University) and Mr. Faustin Luanga (Asia-Pacific Desk Chief of WTO).

The course aims to share knowledge and provide capacity building support to stimulate development by eliminating trade barriers and reducing agricultural subsidies, in line with the global trade liberalization agenda arising from the Doha Round negotiations. 29 officials from 16 countries throughout Asia and the Pacific participated in the course.

Chula Unisearch Staff Join Together to Salute Her Majesty Queen Sirikit

Executives and staff of **Chula Unisearch** expressed their love and loyalty by wearing blue shirts and blouses throughout August, 2015 on the auspicious occasion of Her Majesty Queen Sirikit's 83rd birthday on Wednesday



12 August, 2015. The wearing of blue shirts and blouses symbolizes our realization of the benevolence and dedication of Her Majesty Queen Sirikit in discharging her Royal duties, relieving the suffering of Thailand's people and helping her people live happily.

Training on "Business Process Management and Improvement"

On Friday 17 July, 2015, **Chula Unisearch** conducted a training course on the topic: "**Business Process Management and Improvement**" to a total of 50 staff and project officers from **Chula Unisearch**. The training was conducted in Meeting Room 201, Chulalongkorn University Research Building. Mr. Chamluck Khunpolkaew served as the main speaker to share his extensive knowledge and experience of organizational change including enterprise management systems, evaluating performance, business process management and improvement. The training offered staff an opportunity to enhance their knowledge, experience and develop skills related to their duties and responsibilities to achieve greater efficiency and effectiveness in managing **Chula Unisearch** to maximize its effectiveness and value.





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