



**Case Study: Institution-Based Information Systems
Thai AGRIS Centre**

EXECUTIVE SUMMARY

Although the Thai AGRIS Centre (TAC) was formally established in 1980, it was conceived as early as 1969 when the Food and Agriculture Organization of the United Nations, the Commonwealth Agriculture Bureau and the National Agricultural Library conducted a study on establishing an agricultural information system. During its first phase (1975-1980), it operated under the Thai National Documentation Center of the Science and Technology Research Institute. The TAC then became part of the Kasetsart University Central Library in 1980. The director of the Kasetsart University Central Library also acts as the director of the TAC.

The vision of the TAC is to become a "smart" agricultural information service provider guided by international standards. The Thai government, through the Kasetsart University Central Library, provides funding support to the TAC. Other sources of funds come from the profits of the Central Library. The University also provides subsidies in kind such as office space, personnel and infrastructure. Additional funding is generated through research collaboration.

The main stakeholders of the TAC can be classified as: internal faculties and departments under Kasetsart University; state-owned and private universities; departments under the Ministry of Agriculture and Cooperatives; and government research agencies. Aside from these, other stakeholders include: the Technical Information Access Center (TIAC), the National Science and Technology Development Agency; and the Information Center for Chemical Safety, Chulalongkorn University. These stakeholders provided assistance in the development of a multi-database search engine while the Department of Computer Engineering, Kasetsart University assisted in the development of eContent, document image-clearing tools, and a Web search engine.

The TAC has an open and flexible policy. All the materials in the system are available for all the organizations within and outside the country. For all information collected, the Centre recognizes the importance of intellectual property rights. The approval of the source is always sought first. However, content inputs from any organization to the TAC are likewise guided by the organization's internal policy.

The TAC case highlights the following lessons: adapting content to the local context; addressing diversity; capacity building as service provision; access and empowerment; strengthening participation; realistic approach to technologies; adopting a new ICT Culture; financial sustainability; and mutually beneficial partnerships. Conversely, it underscores the following issues: language barriers; technical barriers; incompatibility between local information and vocabularies; and limited staff.

1. BACKGROUND

Thailand's agricultural sector needs to adopt modern technologies, without neglecting valuable local knowledge, while taking into account national food requirements and

environmental degradation. Nowadays, consumer economies demand higher quality, adopt global standards, and underscore food security. These are the challenges faced in modernizing the Thai agricultural sector. To address these challenges, the sector requires timely, relevant and vital agricultural information.

Thai agricultural information can be obtained from a variety of sources: academic institutions, government agencies, the private sector, and local communities. However, these sources do not share a common platform. There is a need for a centralized database at the national level to support the agricultural information needs of the country as a whole. The establishment of the Thai National AGRIS Centre or, simply, TAC, on 16 March 1980 was the first attempt to gather agricultural information at the national level. At the same time, specific information can be shared across the international AGRIS network. Since then, the existence of the TAC has become a milestone in the new era of modern agricultural development in the country which aims to be environment friendly while achieving food balance.

Although the TAC was formally established in 1980, it was conceived as early as 1969 when the Food and Agriculture Organization of the United Nations, the Commonwealth Agriculture Bureau and the National Agricultural Library conducted a study on establishing an agricultural information system which eventually resulted in the creation of the International Information System for Agricultural Sciences and Technology (AGRIS). During its first phase (1975-1980), the TAC operated under the Thai National Documentation Center of the Science and Technology Research Institute. The TAC then became part of the Kasetsart University Central Library in 1980. The director of the Kasetsart University Central Library also acts as the director of the TAC.

Annex 1 provides a detailed account of the development of the TAC from 1980 to 2005, while Figure one gives the organizational structure.

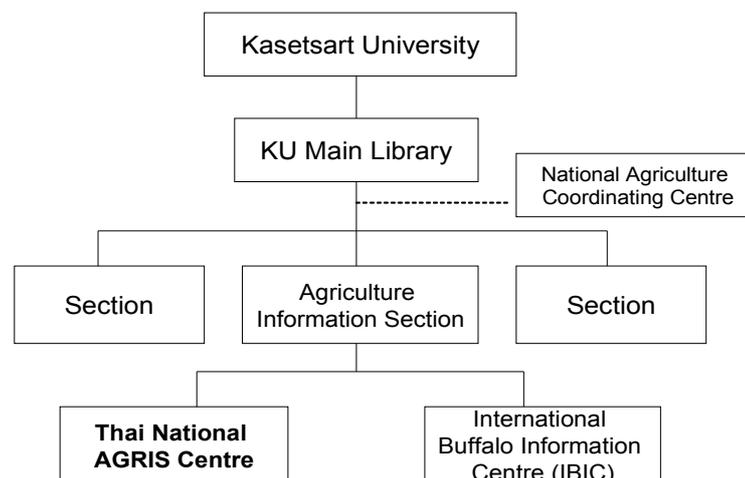


Figure 1. ORGANIZATIONAL STRUCTURE

The vision of the TAC is to become a “smart” agricultural information service provider guided by international standards. The Thai government, through the Kasetsart University Central Library, provides funding support to the TAC. Other sources of funds come from the profits of the Central Library. The University also provides

subsidies in kind such as office space, personnel and infrastructure. Additional funding is also generated through research collaboration.

2. STAKEHOLDERS

Agricultural information is essential to the development of agricultural production capacities and livelihoods of farmers. The Royal Thai Government has completely supported the development of centralized agricultural information databases in support of a variety of users encompassing farmers, producers, consumers, exporters and academics. Given this support, FAO and the Central Library of Kasetsart University agreed to establish a national agriculture information center that would collaborate with 197 other AGRIS centers.

The main stakeholders of the TAC can be classified as: internal faculties and departments under Kasetsart University; state-owned and private universities, departments under the Ministry of Agriculture and Cooperatives; and government research agencies.

Aside from these, other stakeholders include: the Technical Information Access Center (TIAC), the National Science and Technology Development Agency; and the Information Center for Chemical Safety, Chulalongkorn University. These stakeholders provided assistance in the development of a multi-database search engine while the Department of Computer Engineering, Kasetsart University assisted in the development of e-content, document image-clearing tools, and a Web search engine.

For the development of Web databases, Thai AGRIS collaborates with the following institutions: Agricultural and Agro-industrial Product Improvement Institute, National Corn and Sorghum Research Center, Agriculture and Life Science Research Committee (National Research Council of Thailand), Kasetsart University, and the National Agriculture and Forestry Research Institute (Lao PDR).

Furthermore, the TAC provides services to the following groups of end-users: policy-makers and their advisors; rural service providers; and rural communities and households. The establishment of the TAC as an agricultural information exchange trumpets a new era for agriculture industry in the country.

3. THE PROCESS

The TAC has an open and flexible policy. All the materials in the system are available for all the organizations within and outside the country. For all information collected, the Centre recognizes the importance of intellectual property rights. The approval of the source is always sought first. However, content inputs from any organization to the TAC are likewise guided by the organization's internal policy.

The TAC subscribes to the National Information Act, which recognizes the right of every citizen to access information freely and effectively. Conversely, Thai AGRIS recognizes the rights of its members over data or information contributed. This reciprocity is essential in data sharing.

The TAC and the Central Library, Kasetsart University work together to provide a variety of information services to support end-user's requirements. Some of these services were obtained through the AGRIS cooperating network system. These include bibliographic databases, experts databases, reprographic services, consulting services and training.

At present, TAC staff number 12. Most of them are female information officers. There is one information technologist. Because of the limited number of staff members, the Centre encounters difficulties in developing ICT system, improving services, maintaining and updating service materials. Collaborative projects with partner agencies have become an alternative solution to address these concerns.

Feedback from users has made the staff fully aware of the real value of their work. The appreciation received from services rendered has given the TAC a clear incentive to further improve its performance. This sentiment has been a perennial driving force in maintaining the Centre's morale even during trying periods.

4. FINANCIAL ASPECTS OF PROCESS

The budget of the TAC primarily comes from the annual revenue of the Kasetsart University Central Library. Some income is raised from services. Furthermore, a number of agencies provide support to the Centre through research collaboration. An example is the development of Thai agriculture thesaurus and other knowledge-based projects supported by the Kasetsart University Institute of Research and Development.

Table 1. Source of Budget of the TAC (1995-2007)

Years	Internal budgets (Baht)	Research funds (Baht)
1995	50,000	-
1996	60,000	-
1997	70,000	-
1998	70,000	-
1999	76,500	-
2000	100,000	1,000,000
2001	196,000	650,000
2002	220,000	774,000
2003	248,015	1,800,000
2004	330,000	1,945,000
2005	330,000	1,015,000
2006	250,000	6,155,000
2007	280,000	862,000

Note: The budget above does not cover salary of staff

Costs for running the Centre include salary, operating expenses and ICT investment expenses. The university through the Central Library is funding these expenses. The additional revenue that comes from research funds helps improve infrastructure and services of the Centre. FAO provides external support such as training and technical assistance.

5. CONTENT OF STRATEGY

Strategic and Operational Levels. The TAC functions at three levels: international, regional and national.

At the international level, the TAC is a member of the coordinating network of Information Systems for Agricultural Science and Technology. The Centre acts as the AGRIS liaison office and input center responsible for providing inputs and conducting technical exchanges with the system. Its main role includes collecting, cataloging, classifying and submitting agricultural literature produced in Thailand for inclusion in the AGRIS database with 201 other participating centers from all over the world. It

also plays an important role as agricultural referencing center, assisting the user in accessing information in the database. Additionally, it promotes research findings generated in Thailand to the global agricultural research community.

At the regional level, the TAC promotes agricultural development in Asia by participating in agricultural information exchange among country hubs and regional centers in the Region. Additionally, it provides technical assistance on management procedures to improve agricultural information systems such as organizing training courses for information specialists coming from other Asian countries. This enables the establishment of new specialized information centers. Supporting the creation of Lao AGRIS and Lao AGROVOC under the National Agriculture and Forestry Research Institute (NAFRI) is another way of regional collaboration. The co-development of local content for AGRIS and AGROVOC between Thai AGRIS and NAFRI is ongoing.

At the national level, the TAC is the national organization responsible for agriculture information development. Its role at the national level encompasses:

- Collection and production of agricultural information, such as the Thai Agricultural Bibliography (1980-1991) which is a major output publication distributed nationwide.
- Building the Thai Agricultural Database (1990-present).
- Providing agricultural information from abroad wherein the center allows Thai users' to access to international agricultural information in the central AGRIS database.
- Expansion of the agricultural information network within the country where network discussion forum and policies enable sharing of resources.
- Supporting other agricultural information systems in Thailand such as providing technical assistance.
- Conducting training workshops for librarians and information scientists from various institutions in Thailand.

There are at least 942 organizations in Thailand that generate agricultural information. This situation necessitates agreements in policy, procedures, and standards of information, to enable these organizations to appreciate and participate in Thai AGRIS. The TAC enters into bilateral agreements with each organization involved.

A Strategy of Flexibility and Adaptability. The TAC continually learns and develops strategies and policies that promote the management of information. The improvement of value-added services is ongoing. Shifts in ICT technology and information needs require flexibility and willingness to change. Being a service provider for the past 25 years, the TAC learned from its experiences and has successfully adapted to the changing times. The Centre's mindset is now geared towards a more strategic approach to make use of limited resources more efficiently.

As the TAC is categorized as a part of the Kasetsart University Central Library, its initial role was that of a disseminator for the Main Library. This was partly due to the Centre's limited resources. Although it was not practical for the Centre to bring information products to end-users, cutting-off communication between the Centre's staff and users meant losing feedback opportunities and, in effect, psychic rewards. The staff will not be aware of how valuable their information product meant to the user. On the other hand, close contact with their users enabled immediate reliable feedback bringing psychic rewards that inspire the staff to improve their performance. This strategy of dependence on psychic rewards changed in 2005, after 25 years of operations, when the Centre got more support in terms of staff and resources.

The sustainable development of the TAC should contribute to the vision and mission of the director of the Kasetsart University Central Library who concurrently serves as the director of TAC for the past 20 years. She is also one of the four librarians who maintained the Centre since the initial phase.

Demand-side information management. In terms of resource allocation, information management often receives low priority. ICT entails long-term investment and the results are not immediate and are subjective in nature. The TAC's strategy is to make information more valuable for users by making it more interesting among high-ranking managers. The packaging of information for specific users is therefore critical. The Centre increases customer demand with more value-added products. Partnerships in the network are required to solve this obstacle.

Setting-up the TAC inside Kasetsart University Campus was the appropriate strategy. The Centre is able to receive support in terms of provision of documents, bibliography and other agriculture related materials from the Library and other faculties specially Faculty of Agriculture.

Multilevel Promotional Strategy. The TAC likewise adopts a three-tiered promotion strategy: 1) National Level; 2) Regional Level; and 3) International Level.

National Level. The TAC situated in the Central Library, Kasetsart University gets precedence when it comes to services to students, faculty, and researchers, be it on the campus or outside the campus. At the same time, it reaches out to the public, particularly farmers by promoting its services through brochures, documentation, public media, on-site demonstration and advertisements in the Internet.

Regional Level. The TAC exchanges and promotes agricultural information among its member network in the region. The sharing of experiences in agriculture science is evident in the national food security status of each member country.

International level. Since information from the TAC is on the central AGRIS database, international users can access agriculture research information from the members of the Thai AGRIS network through WebAGRIS. Activities related to TAC are also published on the Centre Website.

Using Technology and Systems. The Thai AGRIS center strategy on technology and systems is reflected in its hardware, connectivity, applications and capacity building choices.

Hardware. The system hardware includes a central server, which is running on an open source Linux platform. The Ethernet is housed in the Centre and enables the staff and end-users to access information from every point of service inside the main library. Because the TAC works on web-based technology, it is easy for end-users to access the global Internet system. The TAC intends to upgrade server capacity to cope with the increasing volume of data. A terabyte server is being considered for the future. The Central Library supports most of the ICT hardware

Connectivity. The TAC is hooked-up with the KU-Net inside the Kasetsart University campus. The University Network (UniNet) provides connectivity among other national universities in Thailand. Links with the other government agencies use the existing fiber optic infrastructure connecting governmental bodies called the GNet.

Applications. The development of the TAC was based on the FAO AGRIS standard. A *ready-to-exchange* format is applied. The development of open source software for agricultural information database is ongoing. The system will adopt the AGRIS standard but will be more flexible for local use. The need to develop the local context in collaboration with NAFRI is underway to improve the Thai-Lao AGROVOC system.

Capacity Building. The TAC has provided 3 types of training as part of its information services strategy: 1) in-service training of member organization; 2) on-site training organized at the information provider's workplace per special agreement; and 3) system demonstration at academic conference sites.

Stakeholders' Participation. The motivation of stakeholders to participate in the TAC depends significantly on the benefits that these organizations can acquire. Encouraging the use of information is the priority of the Centre. The TAC participates in national seminars and conferences through exhibitions and presentations on the Thai AGRIS and the agriculture information network at the national, regional and international levels.

Information is worthless if not used. But the same information becomes valuable when needed. Most of the time, the user does not appreciate how much resources and effort are invested on a piece of information. Preparing ready-to-use information for expected users is therefore vital. The TAC forecasts and at times determines customer demand. Reprocessing and synthesizing existing information is another strategy of adding value and creating a new product for the user.

6. LESSONS LEARNED

Adapting content to the local context. The TAC developed the Thai agricultural bibliographic database in both the Thai and English languages. A nationwide agricultural bibliography and other related international databases can be searched through Thai WebAGRIS and Thai AGROVOC. Thai AGROVOC, in particular, expands the knowledge boundaries from the local context to global knowledge. The system helps local researchers and communities in the country to have access to agriculture information more easily. Thus, the TAC plays a significant role in the information infrastructure for agriculture development and community learning.

Future activities of the TAC will involve local knowledge in agriculture emanating from communities. This will elevate local knowledge to global knowledge. In this way, the Centre will become more useful for users in rural and remote areas.

Addressing diversity. The TAC provides information services for everybody, regardless of gender and nationality. As the services are Web-based, it benefits all users who access the site. The TAC plans to determine the profile of its users, i.e., their gender, education, occupation and age. Knowing its users will enable the Centre to serve them more efficiently.

Capacity building. The TAC provides training in information management to the staff of Kasetsart University and other agencies upon request. The main purpose of the Centre is to build up capacities of researchers to tap appropriate sources of information. It also attempts to convince extension authorities to use the system as their source of for information.

Access and empowerment. The power of information depends on how the people use them. Even though the TAC does not target poor farmers specifically, the Centre plans to collaborate with other agencies to help farming communities learn. Under such a project, communities will be empowered to utilize information to solve their problems.

Strengthening partnerships and participation. The TAC's partnership with agricultural communities in the country is still in its planning stage. On the other hand, the awareness of Thai AGRIS and Thai AGROVOC system has greatly

increased. The possibility of bridging the digital divide relies on the relationships among and the benefits derived by the stakeholders.

Realistic approach to technologies. The Centre gets support such as ICT equipment from the Kasetsart University Central Library. Due to the expansion of services and new collaborative arrangements, procurement of new equipment is vital. Agricultural Services Centers established in every district can serve as channels of Thai AGRIS and Thai AGROVOC in the future.

New ICT Culture. The AGRIS Centre considers that the utilization of more information in support of policy might eventually impact on Thai national agriculture strategy. In fact, the success and failure of existing information networks depend on the policy-maker. In this sense, a closer relationship with policy makers is critical to make them understand the importance and power of information. The establishment of a new ICT culture within organizations should be considered a priority.

Financial sustainability. Financial sustainability is considered as the Centre's key to success. As the volume of data increases and services are being expanded, more support in terms of resources is required.

Benefits. Collaboration between the TAC and AGRIS/FAO has been mutually beneficial. The Centre receives technical assistance and training support from AGRIS/FAO. This collaboration has resulted in the availability of the Thai WebAGRIS and Thai Agriculture Thesaurus, both of which have been developed and servicing the public since 2003.

7. ISSUES AND CHALLENGES

Language barrier. Most of the agricultural information available is research or academe-based and are used by highly educated people well versed in English. Difficulties with the users in rural and remote areas of Thailand still exist. The TAC solution for this is developing dual language databases and including articles of interest to general users in the same database. The Centre copies information that is in compliance with the AGRIS system to FAO and keeps local information in Thai for domestic users. This issue of local language is something that FAO AGRIS should look into because this is a primary cause for low utilization rates.

Technical barriers. The ability to solve ICT problems differs from Center to Center. Centers with ICT specialists are able to solve their problems by themselves. For the staff of the TAC, the interface of AGRIS indexing and databasing is still complicated. Since there are so many sources of information competing for users, only the "friendlier" systems will survive. The need to improve standards and the AGRIS' structure towards an appropriate information management system should be considered a priority.

Thai AGROVOC. The main obstacle in the Thai AGROVOC is incompatibility between local information and vocabulary. Many terms in the AGROVOC are not available in the local scope of knowledge or cannot be easily understood by local people. Thus, FAO needs to update AGROVOC by restructuring and editing the vocabulary. This would result in a clearer procedure to identify data structure.

Limited Staff. Having only one IT person at present makes it hard to achieve the vision of using open source applications in the long run. The annual budget is quite small as compared to the responsibility of the Centre, while the funding from research collaboration is substantially high. These facts should bring more support from the government and others donors to keep the Centre sustainable.

The maintenance of the TAC requires a multidisciplinary staff, preferably with backgrounds in both agricultural science and information management. Human resources are most difficult to manage in the TAC since reward for good performance cannot be guaranteed. Thus, staff turnover is expectedly high.

The TAC is looking towards new technology and knowledge in information management to improve performance and services. The development of the Thai AGROVOC is testimony to its willingness to enhance capacities in agriculture information management. To achieve this objective, however, the Centre needs to closely collaborate with the other institutions in the field of artificial intelligence, natural language, computer engineering and computer science. The TAC is planning to develop tools such as:

- A scanner noise-clearing system, knowledge extraction and generalization for the knowledge acquisition phase.
- A Thai language processing system that will enhance the performance of automatic document annotation, document indexing and subject categorization for the formalization phase.
- A machine translator for accessing Web-based English information for the knowledge sharing and accessing phase.
- A multi-viewpoint knowledge tracking system based on information extraction and ontology for the knowledge tracking phase. These achievements should benefit all AGRIS Centres in the near future.

Knowledge management is another challenge for the TAC. The plan is to assemble available Thai agriculture information into a comprehensive knowledge base and to transform tacit knowledge into explicit knowledge.

The TAC pays attention to the significance of local information in agriculture. Agricultural information does not only include research results but also gray literature and unrecorded local knowledge. These constitute intellectual capital that has been neglected for so long but are invaluable not only for productivity purposes but also in the historical and cultural sense.

TAC intends to document these material and local knowledge and include them in its knowledge system. The Centre is looking forward to collaborative arrangements with its partners and farmers' communities as well. Such should result to a better information management for farmers and the entire agricultural sector.

URL of the Thai AGRIS service: <http://thaiagris.lib.ku.ac.th>

URL of the Thai AGROVOC Thesaurus: <http://pikul.lib.ku.ac.th>

ANNEX 1: TAC development timeline

Development of AGRIS information system and the Thai AGRIS Centre

Year	Development
1969	FAO, Commonwealth Agricultural Bureau and the National Agricultural Library conduct a study to establish AGRIS system.
1974	The international information system for the agricultural sciences and technology (AGRIS) is established and provides training to member countries.
1975	The Kasetsart University library is selected to host the national AGRIS Centre. Because of insufficient personnel, the initial responsibilities are given temporarily in January to the Thai National Documentation Centre of the Science and Technology Research Institute, although retaining close cooperation with the Kasetsart library. The First Thai AGRIS input on paper form is submitted through the Agricultural Information Bank for Asia.

Year	Cooperation	Information Technology Development	Information Service
1980	The Kasetsart University library becomes the Thai AGRIS Centre and initiates Thai agricultural information development at Kasetsart University (3/1980).		<ul style="list-style-type: none"> Provides agricultural information service through the bibliography-AGRINDEX (1975-1994), AGRIASIA (1977-1996). Initiates document delivery service through AGLINET.
1982		<ul style="list-style-type: none"> Created the Thai Agricultural Database. Published the first volume of Thai Agricultural Bibliography 	
1983	Organizes the first workshop to create cooperation network amongst agricultural institutes, agricultural libraries and the concerned agencies.		Have the first demonstrating on agricultural information retrieval: On-line service to AGRIS Processing Unit, Austria by connecting to International Database Access and Remote Computing Service. (28/10/1983).
1985		The Kasetsart library obtains its first computer with the support of IDRC. Inputting using Dbase III Plus.	Provides AGRIS SDI services.
1986		Submits first AGRIS input in electronic form, sending diskette via mail.	Starts the AGRIS online data retrieval service (AGRIS/STAIRS) by connecting to AGRIS processing unit in Vienna. The service was done through international communication service, Communication Authority of Thailand (9/12/1986).

Year	Cooperation	Information Technology Development	Information Service
1987		<ul style="list-style-type: none"> Changes database application to Micro CDS/ISIS version 1.0. Micro CDS/ISIS version 2.3, in December 1989. AGRIS on CDS/ISIS version 2.0 and AGCHKE base on Micro CDS/ISIS version 2.3 in January 1991. (Technical note 26, 27). 	
Year	Cooperation	Information Technology Development	Information Service
1997	Promotes cooperation between countries in the region by carrying out the agricultural information development project for the forestry department library in Lao PDR.	Implements KU CD-NET system for AGRIS and FHN CD-ROM information retrieval on Kasetsart University campus network (1/1997).	Tests KU CD-NET system, evaluating AGRIS CD-ROM information retrieval service and survey for user requirement.
1998	<i>Fourth technical consultation of AGRIS and CARIS participating centres: Strengthening AGRIS network's role as a provider of information and knowledge in sustainable agricultural development, 8-11 June 1998.</i>		
		Submits AGRIS data input via Internet using email and FTP (9/1998).	<ul style="list-style-type: none"> Provides AGRIS CD-ROM retrieval system on campus network: KU CD-NET (5/1998). Assistance to the library in the forestry department of Lao PDR under the support of FAO/FORSPA to develop a Lao forestry database.
1999	<ul style="list-style-type: none"> AGRIS processing unit in Vienna is terminated. AGRIS process transfers to Rome. AGRIS database is available on the Internet. 		
			Promotes access to AGRIS Database via Internet.
2000	<ul style="list-style-type: none"> FAO provides an opportunity for participants of AGRIS input centres in the Asia-Pacific region to attend a WAICENT workshop in Japan. Dr. Stephen Rudgard is the keynote speaker for the 20th anniversary of Thai AGRIS Centre conference, 6-7 July 2000. The first consultation on agricultural information management (cir 2/2000) takes place 5-7 June 2000. 		
	<ul style="list-style-type: none"> Representative from Thai AGRIS Centre attends WAICENT workshop in IWS2000, Tsukuba, Japan. Organizes 1st conference on Information Technology for Agriculture, 6-7 July 2000. 	<ul style="list-style-type: none"> Creates Thai National AGRIS Centre Homepage. Provides Thai AGRIS Database Information retrieval service on web. Set up Linux and WebSIS server. 	Establishes the agricultural Web portal with both local and international information.
2001	<ul style="list-style-type: none"> Thai AGRIS Centre is nominated as a centre of excellence AGRIS network. Thai AGROVOC and Thai Agricultural Knowledge-Based Development Project was approved. Collaborates with FAO on the Thai AGROVOC development. Meets with Thai AGRIS network agencies on Development of Agricultural Information System for Knowledge Acquisition and Dissemination (8/2001). 	<ul style="list-style-type: none"> Kasetsart University provides two servers and a scanner for the centre's document digitalization project. Starts digitalizing documents. Replaces the archive collection in microform with digital scanning. Starts developing Thai AGROVOC. Creates Thai WebAGRIS for data entry in both Thai and English languages. 	

Year	Cooperation	Information Technology Development	Information Service
	<ul style="list-style-type: none"> Trains staff on development of the Thai AGROVOC and Thai WebAGRIS at FAO Rome, Italy (11/2001). 		
2002	Attends WebAGRIS workshop at the Institute for Computer and Information Engineering in Brussels, Belgium.	Thai AGRIS centre installs a system for providing agricultural e-document services (10/2002).	
2003	<p>Studies and develops agricultural knowledge management system and multilingual ontology.</p> <p>With the collaboration of the specialty research unit of Natural Language Processing and Intelligent Information System Technology, Department of Computer Engineering, Kasetsart University,</p> <ul style="list-style-type: none"> In collaboration with FAO, organizes the first <i>Workshop on agricultural information management: WebAGRIS system and Thai agricultural information networking</i>. 	<ul style="list-style-type: none"> Tests Thai WebAGRIS system for Thai information retrieval and data entry through Internet. Tests Thai AGROVOC service via Internet for public feedback and improve for the beta version. Testing Thai AGROVOC for Thai WebAGRIS data entry and indexing. 	Provides database management application, Thai WebAGRIS and also the utilization of Thai AGROVOC.
2004	<ul style="list-style-type: none"> Strengthen collaboration with other partner in AOS workshop, Beijing (4/2004). 	<ul style="list-style-type: none"> Finished first edition of Thai AGROVOC. Develop Thai agricultural thesaurus and Thai agricultural ontology. Finished developing and testing Thai WebAGRIS. Officially use WebAGRIS system for Thai AGRIS Centre data entry (1/12/2004). Transfer all Thai AGRIS database in AGRIN 3.0 format to Thai WebAGRIS system. 	<ul style="list-style-type: none"> Announce first edition of Thai AGRIVOC for indexing and query expansion. Provide Thai AGRIS database on Thai WebAGRIS system via Internet. Assistance to NAFRI, Lao PDR, under the support of SIDA and in collaboration with FAO to develop a Lao AGROVOC and Lao agricultural database.
2005	<ul style="list-style-type: none"> Organized second conference on information technology for agriculture, 9-10 March 2005, in occasion of 25th anniversary Thai AGRIS Centre, in collaboration with FAO. 	<ul style="list-style-type: none"> Finished first phase of document digitization. 	<ul style="list-style-type: none"> Announced agriculture e-document service. Provided Thai agricultural knowledge-based service.

Annex 2: Summary of the TAC staff

Year	Number of staff								
	Information officers				Input staff	Technicians			Total
	Staffs	Temporary staff	Project staff	Total		Staffs	Temporary staff	Total	
1980	0	0	0	0	1	0	0	0	1
1981	0	0	1	1	1	0	0	0	2
1982	0	0	1	1	1	0	0	0	2
1983	0	0	2	2	1	0	0	0	3
1984	0	0	2	2	1	0	0	0	3
1985	1	0	1	2	1	0	0	0	3
1986	2	2	0	4	1	0	0	0	5
1987	2	2	0	4	1	0	0	0	5
1988	1	2	0	3	1	0	0	0	4
1989	1	2	0	3	1	0	0	0	4
1990	1	2	0	3	2	0	0	0	5
1991	1	2	0	3	2	0	0	0	5
1993	1	3	0	4	2	0	0	0	6
1994	2	3	0	5	2	0	0	0	7
1995	3	3	0	6	3	0	0	0	9
1996	3	3	0	6	3	0	0	0	9
1997	3	3	0	6	3	0	0	0	9
1998	3	3	0	6	3	0	0	0	9
1999	3	3	0	6	3	0	0	0	9
2000	3	3	0	6	3	0	0	0	9
2001	3	3	0	6	6	0	1	1	13
2002	3	3	2	8	6	0	1	1	15
2003	3	3	2	8	6	0	1	1	15
2004	3	3	2	8	5	0	1	1	14
2005	3	3	2	8	5	0	1	1	14
2006	5	3	0	8	5	1	0	1	14
2007	4	3	0	7	5	1	0	1	13