

Project Proposal
**“Case study of the real-time monitoring system of
Thai Traditional and Alternative Medical (TTM)
Services in Thailand”**

20 September 2022

Department of Thai Traditional and Alternative Medicine (DTAM) and
Health Intervention and Technology Assessment Program (HITAP)

Table of Contents

1. Research Title	5
2. Project Leaders	5
3. Details of the Project	5
3.1 Background and rationale.....	5
3.2 Objectives.....	6
3.3 Literature Review	6
3.4 Frameworks for evaluating health information systems.....	10
3.5 Conceptual framework for this research project.....	14
3.6 Research Methodology	15
3.7 Action plan	22
3.8 Expected Benefits	23
3.9 Benefit for the funding organisation	23
3.10 Output.....	24
3.11 Outcome	24
3.12 Funders	25
3.13 Research Organisations.....	25
3.14 Percent contribution of researchers.....	25
3.15 Research dissemination plan	25
3.16 Conflict of interest	25
3.17 Acknowledgement	25
3.18 References	26
3.19 Appendix	28

List of Tables

Table 1 Comparison between HOT-fit and DIPSA frameworks..... 13

Table 2 Details for key informant interview 17

Table 3 Details for the focus group discussion 18

Table 4 Detail for stakeholder consultation meetings..... 18

List of Figures

Figure 1. Nuad Thai inscription at Wat Pho	7
Figure 2. The categories of 5 reports in HDC TTM Service.	8
Figure 3. The dashboard report in HDC TTM Service.....	9
Figure 4. Flowchart of data transmission in HDC TTM Service system.....	10
Figure 5. HOT-Fit Evaluation Framework.....	12
Figure 6. Outline of key components and framework of the research project	14
Figure 7. Flowchart of the study activities.....	16

Case study of the real-time monitoring system of Thai Traditional and Alternative Medical (TTM) Services in Thailand

1. Research Title

English: Case study of the real-time monitoring system of Thai Traditional and Alternative Medical (TTM) Services in Thailand

Thai: กรณีศึกษาระบบกำกับติดตามแบบเรียลไทม์ของบริการการแพทย์แผนไทยและการแพทย์ทางเลือกในประเทศไทย

Keyword: Real-time monitoring system, Health Information System, Thai Traditional and Alternative Medicine

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3. Details of the Project

3.1 Background and rationale

Traditional and complementary (T&CM) medicines have increased in uptake and economic importance globally. T&CM involves the examination, diagnosis, therapy, treatment, disease prevention, and rehabilitation. The World Health Organization's (WHO) Traditional Medicine Strategy 2014-2023 outlines a framework for action through regulation, research and integration of T&CM products, practices, and practitioners into the health system¹.

T&CM has a long history of use in South-East Asia and in Thailand, the Ministry of Public Health (MoPH) has promoted the use of Thai Traditional and Alternative Medicines (TT&AM), integrating services as a part of the national health system. The Department of Thai Traditional and Alternative Medicine (DTAM) is the principal national authority body that manages and monitors the quality standards of TT&AM services in Thailand, which are available across the 77 provinces in Thailand at various levels of care². In 2013, DTAM, in collaboration with the Provincial Health Office (PHO) of Sakaeo province, National Health Security Office (NHSO) and the Information and Communication Technologies (ICT) Center, MoPH, introduced a service reporting application with the idea of 'Everywhere and Everytime' data. This service, called 'Health Data Center (HDC)', integrates the provincial level data using the existing data system for monitoring and evaluation (M&E) for modern medicine and TTM services. For TTM, this application is called 'HDC TT&AM

Service' and since it was first established, a Real-Time Monitoring System (RTMS) has been developed to report and manage the information system of TT&AM services in all healthcare facilities across the country in real time³. RTMS is being used to track service use of TT&AM across health regions, budget allocation and planning by the Thai MoPH, in conjunction with the public health insurance schemes and there is potential for using it more strategically in the coming years³.

Up-to-date information on TT&AM services in the health care system is pivotal for its management and administration. The implementation of RTMS over the past years offers a useful case study for other countries in the region to develop a TT&AM information system and utilise it to promote access and support Universal Health Coverage (UHC) objectives. In this regard, the WHO South-East Asia Regional Office (WHO SEARO), in collaboration with DTAM and the Health Intervention and Technology Assessment Program (HITAP), Ministry of Public Health, Thailand, seek to review the implementation of RTMS of TT&AM in Thailand and offer lessons for other countries in the Southeast Asian region.

3.2 Objectives

This study aims to understand the performance of the real-time monitoring system (RTMS) of Thai Traditional and Alternative Medical (TT&AM) services in Thailand, by:

- Reviewing the implementation of RTMS for TT&AM and identifying the key features of the RTMS system;
- Assessing the facilitators and challenges of developing and implementing the RTMS system;
- Identifying lessons learned and formulating recommendations for the way forward in Thailand and for other countries.

3.3 Literature Review

Importance of health information systems and traditional medicines

Health information systems (HIS) deliver essential information to improve the quality of healthcare services and reflect the interaction between people, process, and technology to support operations and management. HIS are a powerful means of managing and strategically using data to inform policy and enhance service provision for health systems⁴. There are, however, barriers to their effective use. In the case of T&CM, one of the main challenges in harnessing the potential of HIS is the lack of standardisation of T&CM in terms of safety, procedures and treatment, unlike modern medicine, which impacts the design and structure of the information system; additionally, treatment with T&CM is not easily quantifiable and data quality, when available, may be heterogenous^{5,6}.

Given the advances in technology and systems, it is now possible to transmit and use data in real-time. Having a real-time HIS is commonly assumed to mean "fast", in the sense that a system is considered real-time if it processes data quickly^{7,8}. This translates into reducing the delay between an instruction to transfer information and the information actually being transferred.

Real-time monitoring provides a continuous stream of relevant and current data from which administrators can immediately identify serious problems. Alerts can be more quickly routed to appropriate staff or even to automated systems for mitigation. By tracking real-time data over time, organisations can monitor and predict trends and performance⁸. These capabilities can be used to inform short and long-term decisions for policies on TT&AM including tracking service provision and resource allocation.

History of Thai Traditional Medicine in Thailand

Thai traditional medicine knowledge is considered as a national cultural heritage and traditional wisdom that has been part of the Thai society for several centuries and these practices has been developed and passed on from generation to generation. Many practices have been used for providing health care for Thai people. According to the document, the knowledge of traditional medicine has been practiced in Thai culture since the Sukhothai period (B.E. 1238-137(7). Historical sites have displays of TT&AM knowledge, medicine formulas, diagrams of Nuad Thai (Thai massage) and hot herbal compress and these are inscribed on the marble tablets placed on the walls of temples such as Wat Pho where people can visit and learn the practice. Historically, the practice of TT&AM can be divided into four main areas, i.e., (1) Thai traditional medicine involving diagnosis and treatment of diseases or symptoms based on the TT&AM theories; (2) Thai pharmacy involving the knowledge of herbal materials and its therapeutic properties and preparations; (3) Traditional Thai massage (Nuad Thai) involving the therapy and treatment with therapeutic massage; and (4) Traditional midwifery involving prenatal care, assisting childbirth, postnatal care and new-born care⁹. The scope of TT&AM services has expanded to include the treatment and diagnosis as well as the rehabilitation and health promotion. This involves the Nuad Thai, hot herbal compression, herbal steam bath, herbal and traditional medicines, postpartum care and more. In addition to TT&AM services, alternative medicine service available in the health service system are, e.g., acupuncture, Somporn Kantharadussadee Triumchairi (SKT) meditation therapy¹⁰, Maneevej body balance exercise therapy¹¹.

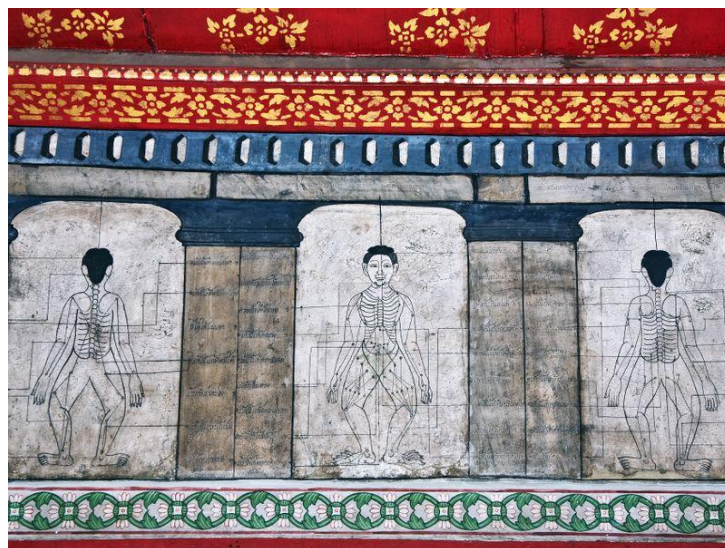


Figure 1. Nuad Thai inscription at Wat Pho (source: Wat Pho | TakeMeTour)

Information system of Thai traditional and alternative medicine (TT&AM) services in Thailand

With an aim to restore and maintain the Thai traditional medicine practice, the Thai government has highlighted the importance of Thai traditional medicine and encouraged its use in current practice. In response, MoPH has promoted the use of herbal medicines¹² and developed the information system to collect the use of TT&AM, and its practices. Information system of TT&AM services in Thailand is a Management Information System (MIS) in the form of a Web Application called 'HDC TTM Service'. Originally, this application obtained information through the e-claims system from NHSO and utilised its information for M&E of the use of TT&AM in Thailand. Now, data are now obtained from the provincial level using the existing 43-standard folder system of the MoPH ensuring the real-time update of the information. This easy access, user friendly, and multi-purpose health information system has been set up to meet the demand for M&E information of TT&AM services^{2,3}.

The HDC TTM Service is a real-time monitoring system that compiles and presents data on TT&CM services by using the summarised data set from the HDC Service operated by the MoPH. Datasets are based on provincial report data and summarised as a 'Summary table' or 'S_table' at the virtual server (Virtual Machine: VM) of DTAM automatically every day. This makes them aware of the current situation of TT&AM services in health regions. The HDC TTM Service categorises the summarised data into five categories of reports on TT&AM services, OPD and IPD as follows: (1) Diagnosis & Treatments; (2) Medicines prescribed; (3) Manual therapies; (4) Health promotion; and (5) Proportion of TT&AM services in health service system. Details as shown in Figure 2.

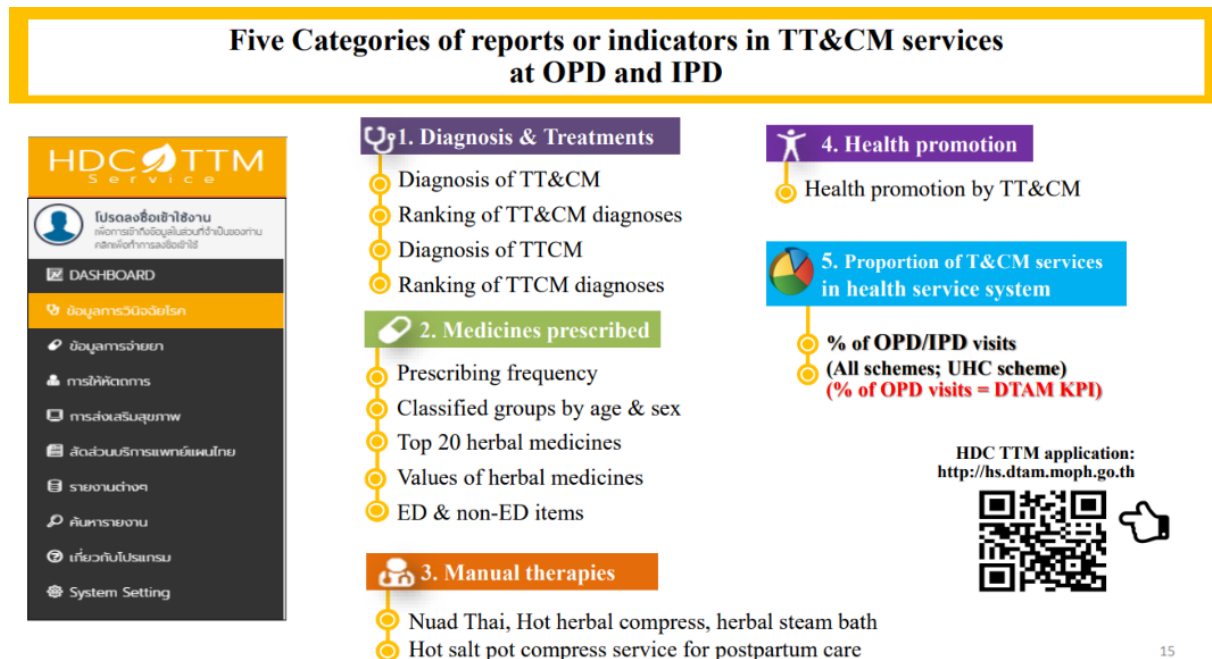


Figure 2. The categories of 5 reports in HDC TTM Service.

The reports can be displayed in the form of a dashboard such as graphs and numerical data (See Figure 3). The service reports are available on web browser via computer and smartphone which is beneficial for executive, inspector, supervisor, TT&AM practitioner, and also provincial service unit to monitor and evaluate the performance of TT&AM services in that area and compare it with other health regions. Therefore, it contributes to the management of TT&AM service at the local, provincial, and regional levels.

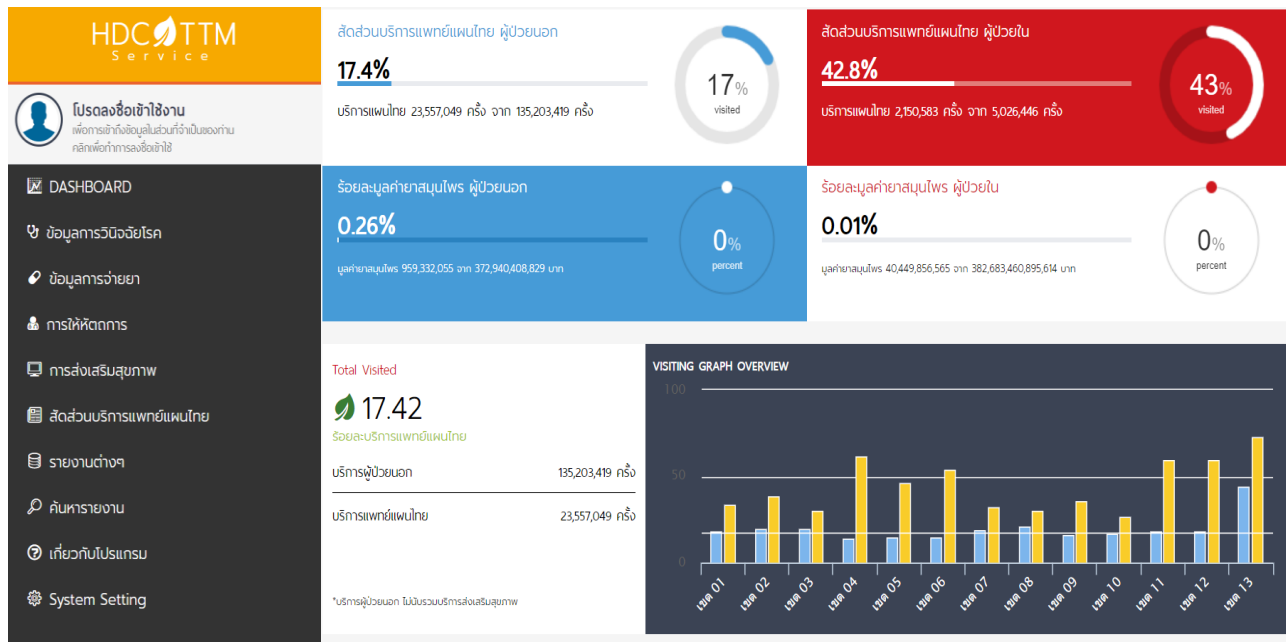


Figure 3. The dashboard report in HDC TTM Service.

According to the HDC TTM system, IT staff from the ICT division in the MoPH maintain the virtual server. In addition, IT staff from the Provincial Health Office (PHO) of Sakaeo Province, Khao-Su-Kim hospital and DTAM add TT&AM information at the back-end of HDC Service^{2,3}.

Access to the system is limited and users, who are usually provincial officer and IT staff, must know the host number/Port number of the server and username and password. Therefore, in general, the guest cannot log in to the back-office system of HDC TTM service. This process ensures a safe and secure server of the HDC TTM service system.

The flowchart of the data transmission of TT&AM service from the health regions to HDC TTM Service reporting system is shown in Figure 4. The process of data transmission is as the following:

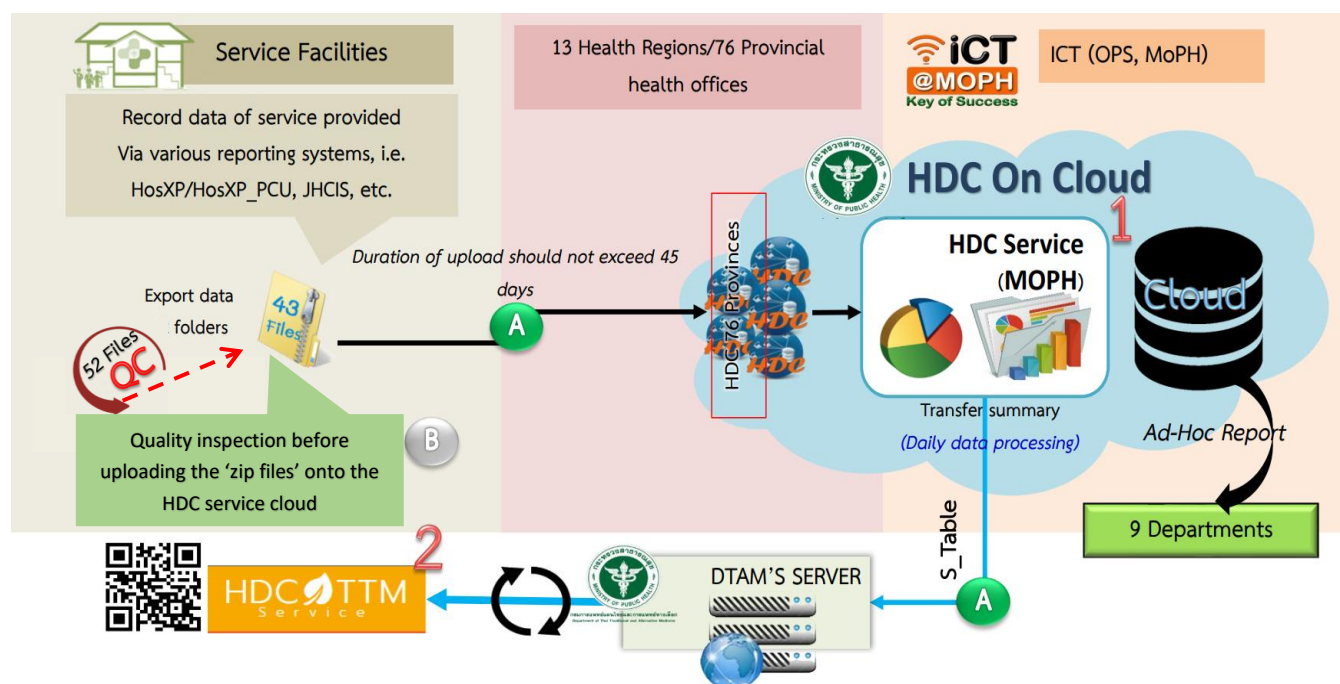


Figure 4. Flowchart of data transmission in HDC TTM Service system.

Step-by-step flow of data transmission for the HDC TTM service

1. Service units generate the data in the form of a zip file via HDC's upload channel. The timeline for submitting the data is as follows:
 - In district hospitals, information should be inputted within 30 days of the following month, and
 - In subdistrict health promotion hospitals, information should be delivered within 15 days of the following month.
2. HDC Service team at ICT centre, MoPH, then transmits the TT&AM dataset in the format of 'S_Table' to DTAM's virtual server on a normal day basis, the operating time is accounted for approximately 1 day.
3. HDC Service team processes the data of TT&AM services, as per the requirements of each report at the server of the DTAM and displays the data in a form of graph and numeric data in the Web Application called 'HDC TTM Service'.

The above process shows how the HDC TTM Service processes data that can be used to monitor and evaluate the TT&AM service data rapidly and conveniently.

3.4 Frameworks for evaluating health information systems

Based on the review, there are a range of frameworks for health information systems¹³⁻¹⁴. However, there are two frameworks which are suitable to assess the implementation of RTMS in HDC TTM service as below:

1) Human, Organisation, and Technology-Fit (HOT-fit) Framework

The HOT-fit framework¹⁵ is a framework that Yusof and team¹⁴ developed from the combination of the concept of the DeLone and McLean IS Success Model (ISSM) and the IT-Organisational Fit Model. According to ISSM, there are six dimensions that determine the quality of an information system: (1) system quality; (2) information quality; (3) use; (4) user satisfaction; (5) individual impact; and (6) organisational impact. Meanwhile the IT-organisational fit model describes success in managing the deployment of information technology in the organisation in terms of the balance in the following six factors: (1) external environment; (2) organisation strategy; (3) individuals and roles; (4) organisation structure; (5) technology and (6) management processes.

HOT-fit framework can be used to evaluate health information systems and incorporates the above dimensions. HOT-fit framework can be used to evaluate health information systems. This model places importance on namely Human, Organisation and Technology and the suitability of the relationship between them (Net Benefit)¹⁵⁻¹⁶.

The HOT-Fit has three aspects, namely technology, human and organisation and each has different dimensions. Under technology, there are three dimensions: (1) system quality; (2) information quality; (3) service quality. System quality measures the processing of the system itself and refers to: a) ease of use and ease of learning; b) efficiency, seen from the length of response and loading process; c) system reliability, indicated by the existence of system technical assistance, an error warning, the ability to integrate with other systems (availability), tested free from errors (reliability), and system security; d) completeness, including complete features and complete database contents. Information quality is measuring the information generated by the application (output) in terms of: a) content, including format according to needs, form and relevance of the information generated, and completeness; b) usefulness, including easy to read, concise and informative; c) data reliability, including data accuracy, timeliness, can be compared and can be verified. The quality-of-service dimension, that is overall support from service providers, which can be accessed from the speed of response, guarantees, empathy, technical support, and follow-up service to system users.¹⁷

In the human aspect, there are two dimensions: (1) system use; and (2) user satisfaction. The system use dimension refers to the person who uses it, their levels of use, training and user knowledge, user expectation, and the attitude of acceptance or resistance to the system. In the organisational aspect, there are two dimensions: (1) structure; and (2) environment. The nature of a healthcare institution can be examined from its structure and environment. Organisation structure consists of nature including type and size (number of beds), culture, politic, the structure of the person responsible for the information system (management), planning and control system and the communication made by superiors to their employees relating to the information system. Leadership, top management, and medical staff sponsorship are also important measure of HIS success. The environment of healthcare organisation can be analysed through its financing source, government, politics, localisation, competition, inter-organisational relationship, population served, and communication. Those dimensions are used to measure the net benefits (see Figure 5).

Overall, the net benefits capture the balance of positive and negative impacts on user, which includes clinicians, manager and IT, staff, system developers, hospitals, or entire healthcare sector.^{14-15,18}

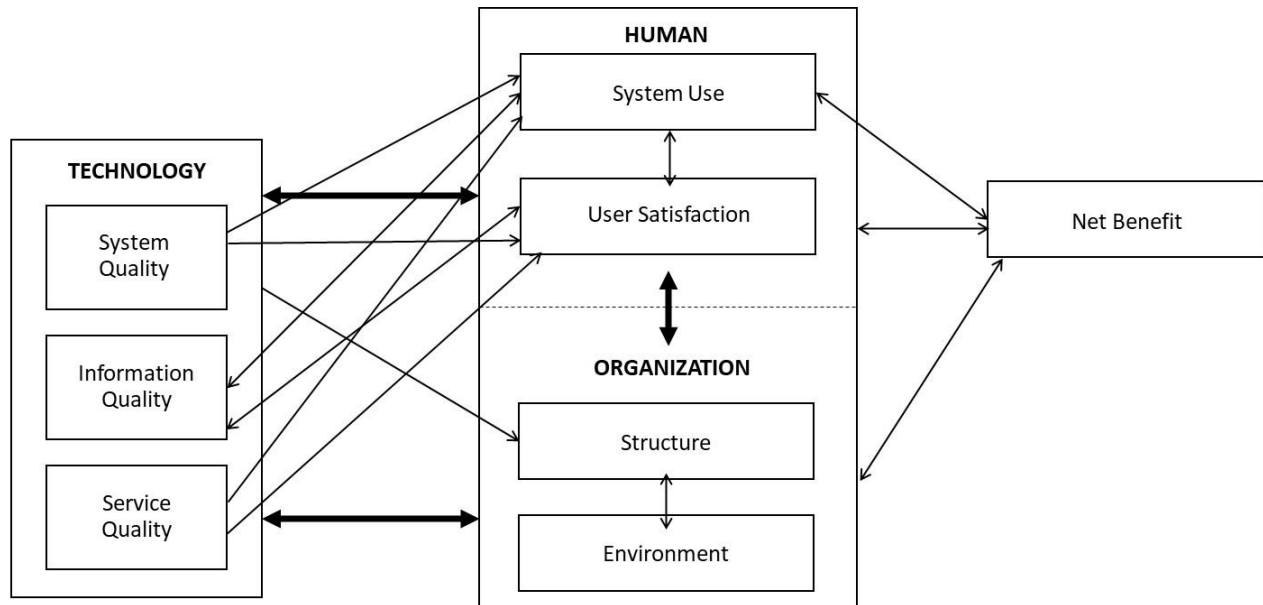


Figure 5. HOT-Fit Evaluation Framework¹²

From the Figure 5, there are fit between technological, human, and organisational factors. Moreover, there are two-way relationships between these dimensions: Information Quality and System Use, Information Quality and User Satisfaction, Structure and Environment, Structure and Net Benefits, Environment and Net Benefits¹⁵.

The fit between human, organisation and technology is illustrated by the thick arrows in Figure 5. Fit can be measured and analysed using a number of measures define in these three factors including ease of use, usefulness, relevancy, attitude, training, user satisfaction, culture, planning, strategy, management and communication. HIS depends on human, organisational and technological aspects. The impact of HIS can be assessed in term of the net benefits of human, organisational and technological components. However, the influence of each dimension to the net benefit can vary. One study that employed this framework showed that each aspect varies in its influence on the net benefit depending on the implementation setting¹⁶.

2) Development of an Evaluation Framework for Health Information Systems (DIPSA) Framework

DIPSA is a framework that was developed from the HOT-fit framework and used by Stylianides et al. (2018). This framework proposed to develop an evaluation framework for hospital utilising Integrated Health Information System (IHIS)¹⁶⁻¹⁷. There are three factors, within the same three main areas as with HOT-fit framework identified as Human, Technology and Organisation. However, the dimensions of DIPSA are slightly different from HOT-fit framework.

In the human aspect, there are two dimensions (1) collaboration; (2) satisfaction. In the technology aspect, there are two dimensions (1) system quality; (2) safety. In the organisation aspect, there is one-dimension, namely procedures. The five categories measure different aspects of IHIS. The category ‘Satisfaction’ measures if users of IHIS were satisfied with the system, by considering effort spent, quality of information provided and the performance. Quality of the system is measured by considering availability, reliability, access and quality of information of the system. The category ‘collaboration’ measures if the system supported collaboration among healthcare professionals. The category ‘procedures’ examined the daily procedures of healthcare professionals, and finally the last category was related to the ‘safety of the system’, that would benefit the patient’s safety and prevent any errors ¹⁶.

In summary, there are some differences between DIPSA and HOT-fit framework. Both frameworks offer human, technological, and organisational aspects, but their dimensions in each aspect are different as shown in table 1 below;

Table 1 Comparison between HOT-fit and DIPSA frameworks

Frameworks	Aspects/dimensions		
	Human	Organization	Technology
HOT-fit	<ul style="list-style-type: none"> • system use • user satisfaction 	<ul style="list-style-type: none"> • structure • environment 	<ul style="list-style-type: none"> • system quality • information quality • service quality
DIPSA	<ul style="list-style-type: none"> • collaboration • satisfaction 	<ul style="list-style-type: none"> • procedures 	<ul style="list-style-type: none"> • system quality • safety

Overall, these frameworks show the relationship of human, organizational and technological aspects in having an effective HIS. HIS should operate according to human needs and it should assist humans in performing their task within the organization using safe technology with quality. Similarly, humans should possess appropriate knowledge and attitude to be able to use HIS in performing their task to support the organizational needs. Likewise, healthcare organizations should be equipped with appropriate technology and infrastructure in order to realize the potential of HIS. Further, healthcare organizations should have the capacity to prepare their staff members to adapt to any changes resulting from the uptake of HIS to reduce the challenges in managing transformation¹⁴⁻¹⁸. Based on its comprehensive dimensions and outcome measures, the framework could be used to evaluate the performance, effectiveness, and impact of HIS or IT in healthcare settings.

3.5 Conceptual framework for this research project

Based on our review, we have developed the following research framework. The diagram in Figure 6 below shows an outline of key elements incorporated in this study to generate evidence-based recommendations and support real-time monitoring system implementation. The framework is adapted from Yusof et al. (2006)¹⁴⁻¹⁵ and Stylianides et al. (2018)¹⁶⁻¹⁷.

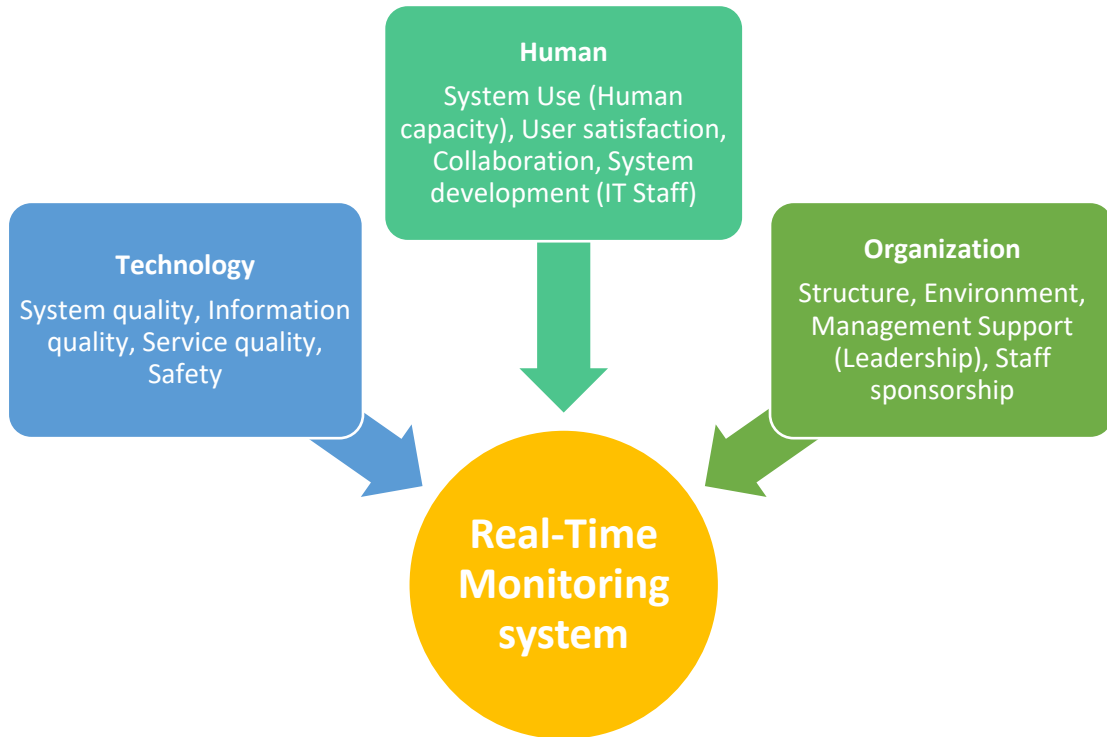


Figure 6. Outline of key components and framework of the research project

As shown in Figure 6, there are three aspects that involve the RTMS and the implementation of RTMS: (1) Human; (2) Organisation; and (3) Technology. The fit between them impacts the net benefit (positive and negative impact) on the system. Furthermore, in each of aspects, there are different dimensions which influence one another. Under the Human aspect, there are System use (human capacity), User satisfaction, Collaboration, Leadership, and System development (IT Staff). System use measures about human capacity on using this system. It measures the level of use and the knowledge of the user. User satisfaction measured from perceived usefulness and the user satisfaction depends on User Experience (UX) and User Interface (UI) when using HDC TTM Services. The collaboration aspect measures whether the system supported collaboration among healthcare professionals. System development assess information systems in term of system development carried out by the IT team for an application, related to the propose of making the application, development starting from initial planned, implementation and evaluation. For the organisational aspect, there are structure, environment,

management support and staff sponsorship. Organization structure can measure from the culture, politics, regulations, strategy and communication. The staff sponsorship assessed by the acceptance of using RTMS and the last dimension, Management Support (Leadership) assessed from the organization support for training the use of HDC TTM Service software and this dimension can be an important measure of RTMS success. The environment of the organizational aspect can be assessed through its financing source, management, relationships between organisations and the beneficiaries. Lastly, the technology aspect, there are system quality, information quality, service quality and safety. The system quality dimension measured ease of use, ease of learning, response time and security. Information quality measured completeness of information, availability, timeliness, and compatibility. Service quality measured overall support from service providers, which can be accessed from the speed of response, guarantees, empathy, technical support and follow-up services to system users. Safety was related to the safety of the system, that would benefit the patient's safety and prevent any errors^{13-15,19}.

3.6 Research Methodology

3.6.1 Research design

This study is qualitative research which will employ a range of research approaches such as key informant interviews, focus group discussion, and stakeholder consultation meetings. We will conduct interviews with stakeholders in the creation and development of the HDC TTM service system, which consist of IT staff or developer, policy makers in creating the system and those who want to bring information about Thai traditional medicine and alternative medicine to use, etc., which are divided into two groups as follows: (1) program developer (2) program implementor and (3) program user. Users mean executives, inspectors, supervisors, and people in charge of Thai traditional medicine, including the National Health Security Office (NHSO) and those who wish to bring information on the situation of Thai traditional medicine services and alternative medicine in Thailand to continue to use, for example, for service development, policy direction for Thai traditional and alternative medicine. or can be used to allocate the budget in each area. Developer means IT staff or the creator and developer of various Application / Software to use as needed and write it out in the form of a convenient program and easy to use including system design, work plan, put into practice and improve until complete¹⁹⁻²⁰. Whereas the program implementor means those who involve in the implementation process of such program by taking the program to its use following the plan. This group may involve those from both groups of developer and user. The research flowchart can be found in Figure 7 below.

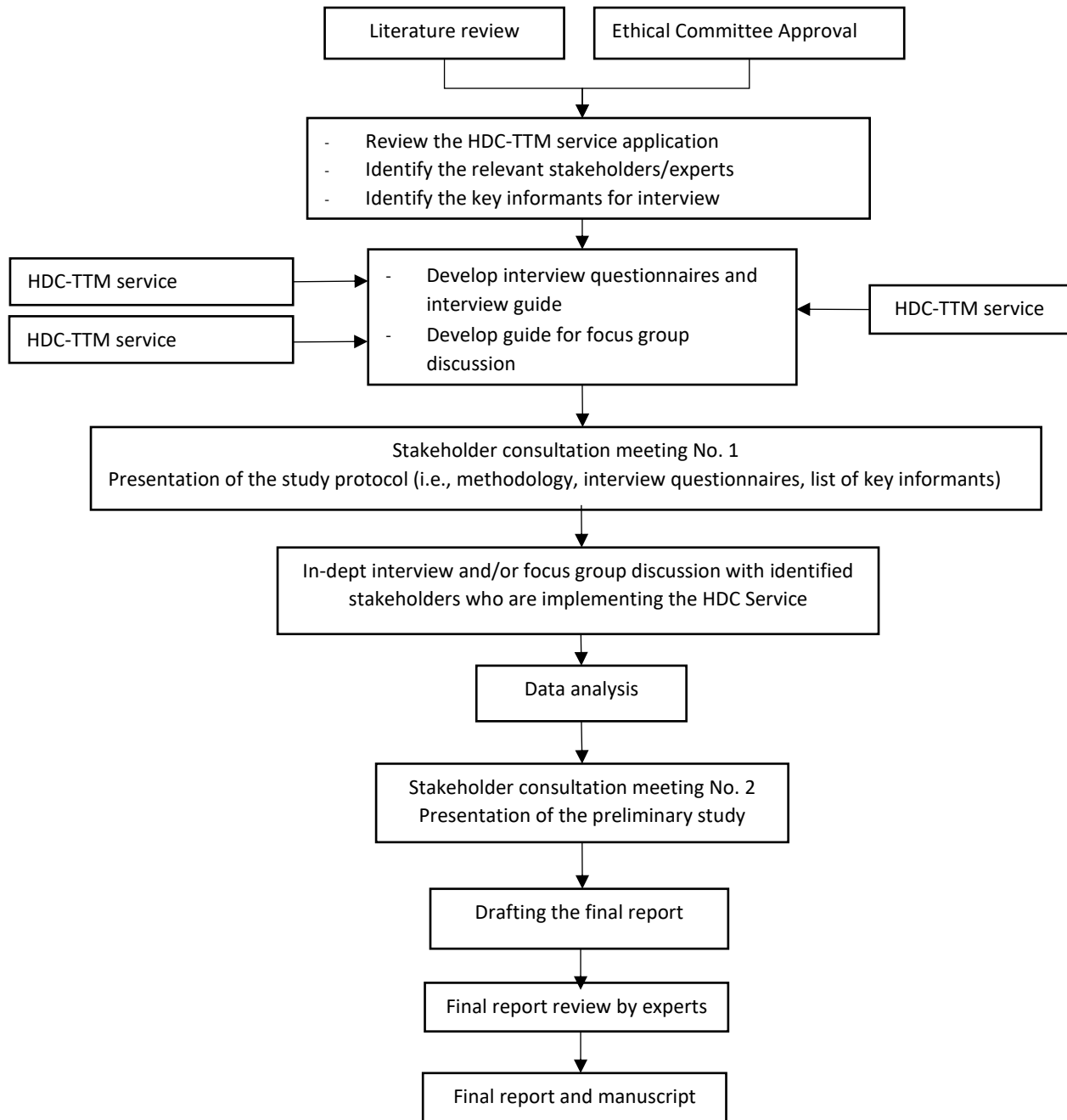


Figure 7. Flowchart of the study activities

3.6.2 Population and Sample

1) Key informant interview

This study plan to invite approximately 15 key informants from different groups of stakeholders for the interview to gain diverse perspectives. Prior to the key informant interview, the research team held a meeting with DTAM officers to identify the relevant key

informants. Details for the participants of the focus group discussion can be found in table 2 (see Appendix for interview guide).

Table 2 Details for key informant interview

Interview groups	Key informants	Number*
HDC TTM service developers who have involved in the development of HDC TTM application including the IT staff and policymakers who led to the initiation of such services.	Policymakers (e.g., Director of Academic Division and Programs)	2
	Head of Thai Traditional and Alternative Medicine Division from different health regions	3
	DTAM officer or IT staff who involved in the development of the HDC TTM service.	2
	Consultants or experts in Thai Traditional and Alternative Medicine	2
HDC TTM service users and implementors who use the information from the HDC TTM service.	DTAM officer who are maintaining the HDC TTM data or DTAM office who are using the information on HDC TTM service for monitoring and evaluation.	2
	Hospital director, doctor, or clinicians in Thai Traditional and Alternative Medicine	2
	Representative from Thai Traditional Medicine Associations including private and public sector	1
Total		15

* Number was chosen based on list of participants received from the key informant identification meeting with DTAM officers.

2) Focus group discussion

We plan to invite 10 key informants for the focus group discussion. However, this activity is subject to the preliminary finding(s) highlighted from the key informant interviews. This activity will focus on synthesising the issues and recommendations for the development of the HDC TTM service to enhance the use of such application (See draft questions in Appendix). Details for the participants of the focus group discussion can be found in table 3 below:

Table 3 Details for the focus group discussion

Focus groups	Key informants	Number*
HDC TTM service developers including high-level officer, IT staff and experts.	Head of Thai Traditional and Alternative Medicine Division from different health regions	1
	High-level DTAM officer or IT staff who involved in the development of the HDC TTM application.	2
	Consultants or experts in Thai Traditional and Alternative Medicine	2
HDC TTM service users including DTAM officer who are currently using the information from the HDC TTM application. The potential stakeholders can be representatives from private sector or relevant TT&AM associations.	DTAM officer who are maintaining the HDC TT&AM data or DTAM officer who are using the information on HDC TTM application for monitoring and evaluation.	2
	Hospital director, doctor, or clinicians in Thai Traditional and Alternative Medicine	2
	Representative from Thai Traditional Medicine Associations including private and public sector	1
Total		10

* This number is subject to the input from the key informant interview.

3) Stakeholder consultation meetings

We intend to hold two stakeholder consultation meetings, detail for these can be found in table 4 below:

Table 4 Detail for stakeholder consultation meetings

No.	Stakeholder consultation meeting details	Key informants	Quantity*
1	Research team to present the study plan, methodology and data collection tools including	DTAM officers (e.g., Director of Academic Division and Programs, IT staff, expert, or consultant)	8

No.	Stakeholder consultation meeting details	Key informants	Quantity *
	questionnaires, interview guide etc.	Head of Thai Traditional and Alternative Medicine Division from different health regions	5
		Researchers and research assistant from HITAP	5
	Total		18
2	Research team to present preliminary finding from the data analysis. Final report revision will be done after receiving inputs from the stakeholders.	DTAM officers (e.g., Director of Academic Division and Programs, IT staff, expert, or consultant)	8
		Head of Thai Traditional and Alternative Medicine Division from different health regions	5
		Researchers and research assistants from HITAP	5
	Total		18

* Number was chosen based on list of participants received from the key informant identification meeting with DTAM officers.

3.6.3 Inclusion and exclusion criteria

This study has outlined the inclusion and exclusion criteria in table 5 below:

Table 5 Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Key informants for the interview	<p>The key informants who have first-hand knowledge in developing, implementing and using HDC TTM service will be invited to the interview including;</p> <ul style="list-style-type: none"> IT staff who have involved in the development of HDC-TTM application, Policymakers who involved in the initiation of the application and use the information for planning and resource allocation, 	<p>Key informant who does not comply with the inclusion criteria will be excluded from the study. In addition, participants will be excluded if they are not aged at least 18 years old.</p>

	Inclusion criteria	Exclusion criteria
	<ul style="list-style-type: none"> DTAM officers who use the information from the HDC TTM application. 	
Key informants for focus group discussion	<p>The key informants who have first-hand knowledge in developing, implementing and using HDC TTM service will be invited to the interview including;</p> <ul style="list-style-type: none"> High-level DTAM officer and IT staff, Expert or consultant in TTM, DTAM officer who are currently using the information from the HDC-TTM application, Clinicians or doctors in TTM, Representatives from private sector or relevant TT&AM associations. 	<p>Key informant who does not comply with the inclusion criteria will be excluded from the study. In addition, participants will be excluded if they are not aged at least 18 years old.</p>
Stakeholders for the stakeholder consultation meeting	<p>The stakeholders who have involved or have potential to involve in developing, implementing and using HDC TTM service will be invited to the interview including;</p> <ul style="list-style-type: none"> DTAM officers (e.g., Director of Academic Division and Programs, IT staff, expert, or consultant), Head of Thai Traditional and Alternative Medicine Division from different health regions, Researchers and research assistant from HITAP. 	<p>Stakeholder who does not comply with the inclusion criteria will be excluded from the study. In addition, participants will be excluded if they are not aged at least 18 years old.</p>

3.6.4 Data collection

1) Data collection tools

A set of questions/probing questions was developed to collect data in the key information interview. The key informant interview tool was developed based on a framework provided by the Center for Health Policy and Research at the University of California, Los Angeles (UCLA). The developed list of questions follows the study conceptual framework by focusing on 3 aspects: (1) human, (2) organization and (3) technology. The interview is expected to take at least 45 minutes to collect all information regarding three dimensions of the programme. The interview

participant will receive 500-baht remuneration once completed the interview (see Appendix for interview guide).

Subsequently, the stakeholder consultation meeting will be organised to gather inputs from relevant stakeholders who have involved in the developing of the system and the users of the system. If the stakeholders deem the focus group discussion is needed to further collect more information on the highlighted issues/findings from the key informant interview. The research team will revise the questions based on the key informant interview guide and the preliminary finding.

2) Study sites

Department of Thai Traditional Medicine and Alternative Medicine (DTAM) and the Health Intervention and Technology Assessment Program (HITAP)

3) Data collection method

This study aims to collect data by inviting the key informant for the in-dept interview following by the focus group discussion (if applicable) and organising two stakeholder consultation meetings to receive inputs and feedback from the relevant stakeholders. The first stakeholder meeting consultation will be organized to gather inputs on the study methodology and study tools including the interview guides, and list of key informants. Once the ethical committee approval has been granted, the research team will start conducting the interview.

4) Ethical consideration

This study will seek for ethical approval from the Ethic Committee for Research in Human Subjects in the Fields of Thai Traditional and Alternative Medicine, Thailand. This will supplement the study as some qualitative approach will be employed using interview, focus group discussion and stakeholder consultation with system developer and system users who have been involved in the developing and using this real-time monitoring system. On the other hand, representatives from non-direct stakeholders, such as, any association or pharmaceutical company related to TT&AM, and Thai Traditional Medical Council will be invited for the study.

5) Specify potential risks and mitigation

The study will not cause potential physically, mental, or financial damage to the study subjects. The study will collect data on socio-demographic characteristics of the participants as well as on experience and opinion with the HDC TTM service. Data will be reported in the aggregate and individual responses will not be identifiable.

Due to the COVID-19 pandemic, all study activities will adhere strictly to the most up to date COVID-19 regulations announced by the Thai government.

6) Identification information and compensation

Identifiers of respondents will be kept confidential and will be anonymised for data analysis. Participants may also be invited for follow-up focus group discussion. Respondents may

be compensated for their participation in the interview and/or focus group discussion, which will be approximately, THB 500 or USD 17.

All data is anonymised and will be stored by HITAP. The data will be accessible to only individuals related to this study only as per agreement with the data custodian.

None of the personal information will be revealed in any subsequent research output. The researchers will be responsible for data safekeeping. This personal data will be kept confidentially in a separate file accessible only to the research team and will be password protected. The research team in each study location i.e., HITAP and DTAM, Ministry of Public Health, Thailand, will seek ethical approval from the appropriate authority.

3.6.5 Data analysis

Content analysis of the interviews will be conducted by the research team as per the conceptual framework proposal. Results will be presented in summary tables and graphs as well as quotations, as appropriate.

3.6.6 Study Duration

The expected timeline for this collaboration is nine months. This work is expected to commence on 1 July 2022 and completed by 31 March 2023.

3.7 Action plan

The proposed activities for this study can be found below:

Activities	Deliverables/Milestone	Timeframe (months)								
		1	2	3	4	5	6	7	8	9
Concept note development and finalisation	<ul style="list-style-type: none"> Concept note 									
Submit the EC application for the EC approval	<ul style="list-style-type: none"> EC certificate 									
Identifying framework and key stakeholders	<ul style="list-style-type: none"> Study protocol developed Stakeholder consultation meeting, if needed 									
Desk-based review	<ul style="list-style-type: none"> List of raw data used/charted Summary of findings 									

Activities	Deliverables/Milestone	Timeframe (months)								
		1	2	3	4	5	6	7	8	9
Key informant interviews and/or focus group discussions (depending on time/resources available)	<ul style="list-style-type: none"> Summary of findings from the interview and/or focus-group discussion 									
Stakeholder consultation and dissemination of results	<ul style="list-style-type: none"> Stakeholder Consultation meeting held Report completed Webinar/information session (TBC) 									

3.8 Expected Benefits

- ✓ Policy

This study will contribute to increasing the understanding of the current and potential future use of the RTMS for traditional medicines. It will also serve as a case study for other countries, notably in Asia, to implement such systems to strengthen their programme on traditional medicines.
- ✓ Academic

This study will contribute to the literature on evaluating a health information system and offer lessons to the academic community. The use of health information systems is growing and the current literature on evaluating these is still limited.
- ✓ Social/Community Development

The study is expected to proffer lessons that can improve the use of the health information system (RTMS) and enhance the capabilities of the Thai MoPH to better manage and provide traditional medicine services in the country and improve the lives of the Thai population.

3.9 Benefit for the funding organisation

This study is being supported by the World Health Organisation Southeast Asia Regional Office (WHO-SEARO) and is being proposed to the Health Systems Research Institute (HSRI), Thailand. WHO SEARO will use the results of this study to share with countries in the region and promote

learning from countries. HSRI promotes research in Thailand to strengthen health systems and given that this is an under researched area, this study could be foundational and also help promote the use of TT&AM in Thailand and beyond.

3.10 Output

Expected output has been summarise in the table below:

Output	Indicators	
	Quantitative	Qualitative
Report/manuscript	No. of reports/manuscript: 1	Knowledge and lessons learned from Thailand's experience.

3.11 Outcome

Expected outcomes has been summarise in the table below:

Outcome	Indicators	
	Quantitative	Qualitative
Increased understanding of the use of RTMS in Thailand and in the region	<ul style="list-style-type: none"> - No. of participants who report increased understanding of RTMS in Thailand - No. of countries who report using recommendations from study for TT&AM in their country 	-
Strengthening development or provision of TT&AM services in Thailand using RTMS	<ul style="list-style-type: none"> Increased utilisation of RTMS by users: No. of users Increased utilisation of information from RTMS to inform strategic and management of TT&AM in Thailand: Report by DTAM 	Feedback from leadership on recommendations
Increased capacity of research to conduct evaluation and contribute to knowledge base on TT&AM in Thailand	<ul style="list-style-type: none"> No. of citations Presentations on study 	-

3.12 Funders

Organization: World Health Organization South-East Asia Region (WHO SEARO).

Address: World Health Organization, Global Service Centre Block 3510 Jalan Teknokrat 6
63000 Cyberjaya, Malaysia.

Corresponding person: Dr Kim Sungchol **E-mail:** kims@who.int

3.13 Research Organisations

Department of Thai Traditional and Alternative Medicine (DTAM) and Health Intervention and Technology Assessment Program (HITAP), Ministry of Public Health, Thailand.

3.14 Percent contribution of researchers

The team for this collaboration will include:

Sr. No.	Name	Position	Role	Accounted for (%)	FTE	Organisation
1	Assoc. Prof. Dr. Wanrudee Isaranuwachai	Program Leader, senior researcher	Principal Investigator	15	0.2	Health Intervention and Technology Assessment Program (HITAP)
2	Saudamini Dabak	Head of International unit	Co-Investigator	25	0.3	
3	Kanchanok Sirison	Project Associate	Co-Investigator	30	0.4	
4	Benjamaporn Eiamsakul	Research Assistant	Co-Investigator	30	0.4	

Other team members may be identified from DTAM and HITAP or their networks.

3.15 Research dissemination plan

We will publish results in a manuscript or report format and host knowledge sharing sessions as appropriate.

3.16 Conflict of interest

The research team does not have any conflicts of interest to declare.

3.17 Acknowledgement

We would like to thank Miss Kronggarn Wandj, a pharmacist trainee from Silpakorn University, for her support in developing this protocol.

3.18 References

1. World Health Organization. WHO traditional medicine strategy: 2014-2023 [Internet]. World Health Organization. 2013 May [cited 2022 Apr 18]. Available from: <https://www.who.int/publications/i/item/9789241506096>
2. Department of Thai Traditional and Alternative Medicine. Thai Public Health Report 2017-2023 [Internet]. Technical and Knowledge bank Working Group. 2022 [cited 2022 Apr 18]. Available from: <https://tpd.dtam.moph.go.th/index.php/news-ak/pr-ak/689-2560-2563>
3. Presentation by Dr. Rutchanee Chantraket, Department of Thai Traditional and Alternative Medicine, "Management Information System for the Monitoring of TT& CM Services in the Health Service System of Thailand".
4. Almunawar MN, Anshari M. Health Information Systems (HIS): concept and technology. 2012. <http://arxiv.org/abs/1203.3923>
5. Ikram RR, Abd Ghani MK, Ab Hamid NR, Salahuddin L. Enabling Ehealth in Traditional Medicine: A Systematic Review of Information Systems Integration Requirements. *Journal of Engineering Science and Technology*. 2018 Dec 1;13(1(2):4193-205.
6. Mirzaeian R, Sadoughi F, Tahmasebian S, Mojahedi M. Progresses and challenges in the traditional medicine information system: A systematic review. *Journal of Pharmacy & Pharmacognosy Research*. 2019 Aug 10.
7. Shamsolmaali, A. Real Time Knowledge Based System: The Next Step. In Tzafestas, S.G. (eds). *Engineering Systems with Intelligence (Microprocessor-Based and Intelligent Systems Engineering)* [Internet]. 1991 [cited 2022 Aug 21]; vol 9 : 25-26 Available from: https://doi.org/10.1007/978-94-011-2560-4_2
8. Brailer DJ. Interoperability: The Key To The Future Health Care System: Interoperability will bind together a wide network of real-time, life-critical data that not only transform but become health care. *Health affairs*. 2005;24(Suppl(1):W5-19.
9. Office of International Cooperation, Department for Development of Thai Traditional and Alternative Medicine. *Thai Traditional Medicine at a Glance*. Nonthaburi. 2016. 28 p.
10. Triamchaisri S, Barbara M, Artsanthia J. Development of a Home-Based Palliative Care Model for People Living With End-Stage Renal Disease. 2015.
11. Nualyam A, Wangdee A, Kreakaew C, Teerachaisakul M, Pongpiruth K. A Study of the Effectiveness of Health Care with Maneevej: A Systematic Review of Research Findings. *J Thai Trad Alt Med*. 2021 Sep.
12. Disayavanish C, Disayavanish P. Introduction of the treatment method of Thai traditional medicine: its validity and future perspectives. *Psychiatry Clin Neurosci*. 1998 Dec;52 Suppl:S334-7. doi: 10.1111/j.1440-1819.1998.tb03261.x. PMID: 9895186.
13. Eslami Andargoli A, Scheepers H, Rajendran D, Sohal A. Health information systems evaluation frameworks: A systematic review. *Int J Med Inform*. 2017 Jan;97:195-209. doi: 10.1016/j.ijmedinf.2016.10.008. Epub 2016 Oct 15. PMID: 27919378.

14. Maryati Mohd. Yusof, Anastasia Papazafeiropoulou, Ray J. Paul, Lampros K. Stergioulas, Investigating evaluation frameworks for health information systems. *International Journal of Medical Informatics*, Volume 77, Issue 6, June 2008, Pages 377-385.
15. Erlirianto LM, Ali AH, Herdiyanti A. The implementation of the Human, Organization, and Technology–Fit (HOT–Fit) framework to evaluate the electronic medical record (EMR) System in a Hospital. *Procedia Computer Science*. 2015 Jan 1;72:580-7.
16. Stylianides A, Mantas J, Roupa Z, Yamasaki EN. Development of an evaluation framework for health information systems (DIPSA). *Acta Informatica Medica*. 2018 Dec;26((4):230.
17. Stylianides A, Mantas J, Pouloukas S, Roupa Z, Yamasaki EN. Evaluation of the Integrated Health Information System (IHIS) in Public Hospitals in Cyprus Utilizing the DIPSA Framework. *Acta Informatica Medica*. 2019 Dec;27((4):240.
18. Maryati Mohd. Yusof, Ray J. Paul, Lampros K. Stergioulas. Towards a Framework for Health Information Systems Evaluation. *Proceedings of the 39th Hawaii International Conference on System Sciences 2006*; 2006 Jan 4-6; Hawaii;2006
19. Department of Thai Traditional and Alternative Medicine. Criteria and guidelines for applying the Government Service Award of the year 2021.
20. Application developer [Internet]. 2021 [cited 2022 Aug 20]. Available from: <https://www.spu.ac.th/contents/2021/09/08/%E0%B9%80%E0%B8%88%E0%B8%B2%E0%B8%B0%E0%B8%A5%E0%B8%B6%E0%B8%81-%E0%B8%AD%E0%B8%B2%E0%B8%8A%E0%B8%B5%E0%B8%9E%E0%B8%99%E0%B8%B1%E0%B8%81%E0%B8%9E%E0%B8%B1%E0%B8%92%E0%B8%99%E0%B8%B2-application/>
21. Agus Bandiyono, M Naufal. Hot-Fit Framework In Central Government Employee Data Management Systems. *International Journal of Scientific & Technology Research*, Volume 9, Issue 01, January 2020.

3.19 Appendix

Key informant interview guide Case study of the real-time monitoring system of Thai Traditional and Alternative Medical Services in Thailand

Research question: What are the challenges and lesson learned from the development and use of the real-time monitoring system of Thai Traditional and Alternative Medical Services in Thailand?

Methods: The key informant interview will last approximately 45 minutes. As a key informant, you can refuse to answer any question or stop the interview at any time. The key informant will receive 500-baht remuneration for participating in this interview. In reporting the survey results, research team will only present aggregate data. The interview recording will be kept confidential and will only be used for the purpose of the study by the researchers. The interviews will be conducted either face-to-face or online via Zoom. The list of questions below has been developed based on a key informant interview framework provided by the Centre for Health Policy and Research at the University of California, Los Angeles (UCLA)¹. Please note that these questions are examples that will be asked but must not be considered as an exhaustive list at this stage. They will be further refined and revised based on our preliminary desk-review, other expert opinions, and feedback during the data collection process.

Key informants:

- Eligible participants will include HDC TTM service developers who have involved in the development of HDC TTM application including the IT staff and policymakers who led to the initiation of such services. This also includes HDC TTM service users who use the information from the HDC TTM service.
- The initial recruitment strategy will utilise existing DTAM staff to identify potential key informants. Then the formal invitation letters will be forwarded directly to potential key informants or their organization to request their participation in the key informant interview. However, some participants will be identified by the research team through the desk-based review for the potential key informants who are expert in the field but may have not been engaged with DTAM to diversify the interviewee. The snowball technique will be used during the interview to identify additional potential interviewees.

[INTERVIEWER NOTE]: Please record ID code at the beginning of the recording and on your notes. Do not say interviewee's name. Remember, questions are indicative only, as some topics will be new or irrelevant for some participants.]

READ: *Please confirm that the participant has been informed about this study, that his/her questions have been answered and the participant understands that if he/she wishes to avoid a question or stop at any point, he/she may do so, and participate willingly.

¹ https://healthpolicy.ucla.edu/programs/health-data/trainings/Documents/tw_cba23.pdf

(English version) Interview guide for the Case study of the real-time monitoring system of Thai Traditional and Alternative Medical Services in Thailand

Name of interviewer: _____ Date: _____ Interview ID code: _____

No.	Questions/probes
Introduction/consent	
	<p>Hello!</p> <p>Thank you for taking time to join the key informant interview. This interview is being conducted as part of the study <i>'Case study of the real-time monitoring system of Thai Traditional and Alternative Medical Services in Thailand'</i>.</p> <p>This study aims to understand the performance of the real-time monitoring system or RTMS of Thai Traditional and Alternative Medical services in Thailand. This study involves conducting literature review, key informant interview, focus group discussion and stakeholder consultation meetings. You have been included in the study because you either involve in the development of HDC TTM service or use the information from the HDC TTM service. This interview covers questions to explore your general information and your experience in related to the RTMS system in 3 dimensions, human, organization, and technology. By reviewing the key features, facilitators, and challenges of developing and implementing the RTMS system, the lessons learned, and recommendations will be formulated as a result of this study for the development of this service in Thailand and for other countries.</p> <p>This interview will take approximately 45 minutes and will be recorded for further analysis. You can refuse to answer any question or stop the interview at any time. As a key informant, you will receive 500-baht remuneration for participating in this interview. The information regarding your personal information will be kept confidential and will only be used for the purpose of the study by the researchers.</p> <p>Can you please confirm that you understand the statement and consent to this interview being audio recorded [PAUSE for response]?</p> <p>[No] Thank you for your time and apologize for the inconvenience caused.</p> <p>[Yes] Thank you, move to next section.</p>
Section 1. General information	
1	What is your name?

No.	Questions/probes
2	How old are you?
3	What is your organisation?
Section 2. Questions for HDC-TTM Please answer Section 2 based on your role.	
4	Are you familiar with HDC TTM service? If so, please briefly describe your experience with the HDC TM service. Do you identify yourself as a programme developer, implementor, or program user?
5	What, according to you, have been the main challenges faced while developing, implementing, or using of HDC TTM service?
6	What, according to you, have been the main facilitators in developing, implementing, or using of HDC TTM service?
7	Overall, what has been your experience in developing, implementing, or using of HDC TTM service?
Section 3. Questions for the developing, implementing or using of HDC TTM service	
In Human aspect, there are four dimensions: System Use (Human capacity), User satisfaction, Collaboration, and System development (IT Staff)	
8	In your opinion, how would you describe the HDC TTM service?
9	Does your organization use information on HDC TTM service? If so, how?
10	Do you find this HDC TTM service to be satisfactory? Please explain.
11	Has the HDC-TTM application facilitated collaboration between departments or units of your organization? Please explain.
12	How did your organization use the information from HDC TTM service for system development? Please explain.
In Organization aspect, there are four dimensions: Structure, Environment, Management support, and Staff sponsorship	
13	What information does the HDC TTM service allow you to access?
14	Does HDC TTM service support the structural development within your organization? If so, how?

No.	Questions/probes
15	Does your organization support the use of HDC TTM service? (e.g., providing incentives, program training or software) If so, how?
16	Do you receive the support from management team to use the HDC TTM service? If so, how?
17	Based on your experience, how has the information from HDC-TTM been used in your organization?
18	Has HDC-TTM service help improve the performance of your work or organization? Please explain.
<p>In Technology aspect, there are four dimensions: System quality, Information quality, Service quality, Safety</p>	
18	How would you describe the quality of information of HDC TTM service?
19	How would you describe the safety of information of HDC TTM service?
20	How would you describe the user friendliness of HDC TTM service?
21	Based on your experience, does the HDC TTM service provide sufficient information for your needs? If not, what other information should it provide?
<p>Conclusion</p>	
22	In your opinion, what have been the major outcomes or achievements of implementing HDC TTM service in Thailand? Why do you think so?
23	If you could go back to the beginning, when the HDC TTC service was introduced, what would you do differently?
24	Are there any other aspects of HDC TTM service that you would like to comment on or have suggestions for its use?
25	If other countries are looking to develop similar system to HDC TTM service, what would be your advice?

Closing the interview: “Thank you for taking the time to answer these questions today. We appreciate your patience and cooperation during this time.

(Thai version) แบบสัมภาษณ์สำหรับกรณีศึกษาโดยใช้ระบบแสดงผลแบบเรียลไทม์สำหรับการให้บริการแพทย์ทางเลือก และการแพทย์แผนไทยในประเทศไทย

ชื่อผู้สัมภาษณ์: _____ วันที่สัมภาษณ์: _____ รหัส ID code: _____

ลำดับ	คำถาม/บทสัมภาษณ์
	<p>แนะนำโครงการวิจัยและการยินยอมเข้ารับการสัมภาษณ์</p>
	<p>สวัสดีค่ะ/ครับ</p> <p>ขอขอบคุณที่ท่านสละเวลาเข้าร่วมการสัมภาษณ์วันนี้ การสัมภาษณ์นี้เป็นส่วนหนึ่งของกรณีศึกษาระบบแสดงผลแบบเรียลไทม์สำหรับการให้บริการแพทย์ทางเลือกและการแพทย์แผนไทยในประเทศไทย โดยโครงการประเมินเทคโนโลยีและนโยบายสุขภาพ (HITAP) ร่วมกับ กรมการแพทย์แผนไทยและการแพทย์ทางเลือก กระทรวงสาธารณสุข</p> <p>โครงการวิจัยนี้จัดทำขึ้นเพื่อศึกษาข้อคิดเห็นของผู้ร่วมวิจัยต่อระบบแสดงผลแบบเรียลไทม์สำหรับการให้บริการแพทย์ทางเลือกและการแพทย์แผนไทยในประเทศไทย วิธีการศึกษาวิจัยแบ่งเป็นการค้นคว้าข้อมูล การสัมภาษณ์ผู้ให้ข้อมูลสำคัญ การอภิปรายรูปแบบกลุ่มระหว่างผู้พัฒนาระบบและผู้ใช้งานระบบและการประชุมผู้มีส่วนได้ส่วนเสีย ซึ่งท่านได้รับเชิญให้เข้าร่วมการวิจัยด้วยเพราะว่าท่านมีส่วนเกี่ยวข้องกับระบบ HDC-TTM service ด้วยการเป็นหนึ่งในกลุ่มผู้พัฒนาระบบหรือผู้นำข้อมูลจากระบบ HDC-TTM service ไปใช้ โดยการสัมภาษณ์จะประกอบไปด้วย 3 ส่วน ส่วนแรกคือ ข้อมูลทั่วไป และ ส่วนที่สองคือ การสัมภาษณ์เกี่ยวกับความคิดเห็นและประสบการณ์การใช้ระบบแสดงผลแบบเรียลไทม์ หรือระบบ HDC-TTM และในส่วนที่สามคือ ด้านบุคลากร องค์กรและเทคโนโลยี ซึ่งการศึกษานี้มีวัตถุประสงค์เพื่อให้เข้าใจผลการปฏิบัติงานของระบบติดตามและประมวลผลการบริการทางการแพทย์แผนไทยและการแพทย์ทางเลือกแบบเรียลไทม์ในระบบบริการสุขภาพของประเทศไทย เพื่อค้นคว้า ทบทวนประสบการณ์และความท้าทายของการพัฒนาระบบและการนำระบบติดตามและประมวลผลแบบเรียลไทม์ของการบริการทางการแพทย์แผนไทยและการแพทย์ทางเลือกมาใช้ในระบบบริการสุขภาพของประเทศไทย ทั้งนี้การศึกษานี้จะจัดทำข้อเสนอแนะให้เป็นบทเรียนสำหรับประเทศไทยและประเทศอื่นๆ ในภูมิภาคเอเชียตะวันออกเฉียงใต้</p> <p>การสัมภาษณ์นี้จะใช้เวลาทั้งสิ้น 45 นาที ในระหว่างการสัมภาษณ์ ท่านสามารถขอยกเลิกการมีส่วนร่วมในโครงการเมื่อไหร่ก็ได้ ถ้าท่านสมัครใจเข้าร่วมสัมภาษณ์ท่านจะได้รับค่าตอบแทนจำนวน 500 บาท ทั้งนี้ ทีมวิจัยจะขออนุญาตบันทึกการสนทนาเพื่อนำไปวิเคราะห์ข้อมูลในภายหลัง โดยทีมวิจัยจะนำเสนอข้อมูลโดยรวมเพื่อจุดประสงค์ของงานวิจัยเท่านั้น โดยข้อมูลทั้งหมดที่ถูกบันทึกจะเป็นความลับและไม่มีการเผยแพร่ข้อมูลส่วนบุคคลผู้ให้สัมภาษณ์หรือผู้ที่ถูกกล่าวถึง</p> <p>ท่านเข้าใจการชี้แจงข้อมูลและยินยอมทางวาจาเข้าร่วมการสัมภาษณ์พร้อมให้บันทึกเทปการสัมภาษณ์นี้หรือไม่</p> <p><i>(ในกรณีที่ไม่ยินยอม) "ขอบคุณที่สละเวลา และขอภัยในความไม่สะดวกครับ/คะ"</i></p> <p><i>(ในกรณีที่ยินยอม) สัมภาษณ์ต่อในส่วนถัดไป</i></p>

ลำดับ	คำถาม/บทสัมภาษณ์
ส่วนที่ 1 คำถามทั่วไป	
1	ชื่อ - สกุล
2	อายุ
3	องค์กรหรือหน่วยงานที่สังกัด
ส่วนที่ 2 คำถามเกี่ยวกับระบบ HDC TTM service กรุณาตอบคำถามในส่วนที่ 2 ตามประสบการณ์ของท่าน	
4	ท่านมีความคุ้นเคยกับการใช้งานระบบ HDC TTM service หรือไม่ ถ้าใช่ ท่านจะนิยามตนเองว่าเป็นผู้พัฒนาโปรแกรม ผู้นำโปรแกรมไปปฏิบัติ หรือผู้ใช้งานโปรแกรม
5	จากมุมมองของท่านในข้อ 4 อะไรคือความท้าทายหลักในการพัฒนา การนำโปรแกรมไปปฏิบัติ หรือ การใช้งานระบบ HDC TTM service
6	จากมุมมองของท่านในข้อ 4 อะไรคือปัจจัยสนับสนุนในการพัฒนา การนำโปรแกรมไปปฏิบัติ หรือ การใช้งานระบบ HDC TTM service
7	โดยภาพรวมแล้ว ประสบการณ์การพัฒนา การนำโปรแกรมไปปฏิบัติ หรือ การใช้งานระบบ HDC TTM service เป็นอย่างไร
ส่วนที่ 3 คำถามเกี่ยวกับการพัฒนา การนำโปรแกรมไปปฏิบัติ หรือ การใช้งานระบบ HDC TTM service	
ในมุมมองด้านบุคคล เราจะประเมินผลการใช้งานระบบ HDC TTM service ทั้งหมด 4 ด้าน ได้แก่ ความสามารถของผู้ใช้ในการใช้งาน ความพึงพอใจของผู้ใช้งาน การให้ความร่วมมือในการใช้งาน และการพัฒนาระบบ (ในส่วนของเจ้าหน้าที่ IT)	
8	ในความคิดของท่าน กรุณาอธิบายลักษณะของระบบ HDC TTM service
9	หน่วยงานของท่านใช้ข้อมูลจากระบบ HDC TTM service บ้างหรือไม่ ถ้าใช่ กรุณาอธิบายว่ามีการใช้อย่างไร
10	ท่านพึงพอใจต่อระบบ HDC TTM service หรือไม่ อย่างไร
11	ระบบ HDC TTM service ช่วยให้เกิดความร่วมมือกันระหว่างหน่วยงานหรือองค์กรหรือไม่ กรุณาอธิบาย
12	หน่วยงานของท่านใช้ข้อมูลจากระบบ HDC TTM service ในการพัฒนาองค์กรอย่างไร กรุณาอธิบาย
ในมุมมองด้านองค์กร เราจะประเมินทั้งหมด 4 ด้าน ได้แก่ ด้านโครงสร้าง, ด้านบริบทแวดล้อม, ด้านระบบสนับสนุนการบริการจัดการ และด้านการสนับสนุนคณะทำงานขององค์กร	
13	ระบบ HDC TTM service อนุญาตให้ท่านเข้าถึงข้อมูลอะไรบ้าง
14	ระบบ HDC TTM service สนับสนุนให้เกิดการพัฒนาภายในองค์กรของท่านอย่างไรบ้าง กรุณาอธิบาย

ลำดับ	คำถาม/บทสัมภาษณ์
15	องค์กรของท่านสนับสนุนการใช้ระบบ HDC TTM service หรือไม่ อย่างไร (ตัวอย่างเช่น มีการให้คำรางวัล มีการให้ฝึกอบรมการใช้งานโปรแกรมหรือซอฟต์แวร์ เป็นต้น)
16	หัวหน้าหรือผู้นำในองค์กรของท่านสนับสนุนการใช้ระบบ HDC TTM service หรือไม่ อย่างไร
17	จากประสบการณ์ของท่าน ข้อมูลจากระบบ HDC TTM service ถูกนำไปใช้อย่างไรบ้างในหน่วยงานของท่าน
18	ระบบ HDC TTM service ช่วยปรับปรุงการทำงานของ ท่าน หรือองค์กรท่านหรือไม่ อย่างไร
ในมุมมองด้านเทคโนโลยี เราจะประเมินทั้งหมด 4 ด้าน ได้แก่ ด้านท่านภาพของระบบ ด้านท่านภาพของข้อมูล ด้านคุณภาพของการให้บริการ และด้านความปลอดภัยในการใช้งานแอปพลิเคชัน HDC-TTM	
18	กรุณาอธิบายท่านภาพของข้อมูลในระบบ HDC TTM service
19	กรุณาอธิบายความปลอดภัยของข้อมูลในระบบ HDC TTM service
20	กรุณาอธิบายความเป็นมิตรของผู้ใช้งานระบบ HDC TTM service
21	จากประสบการณ์ของท่าน ระบบ HDC TTM service ให้ข้อมูลเพียงพอต่อความต้องการของท่านหรือไม่ ถ้าไม่ ข้อมูลอื่นอะไรบ้างที่ระบบ HDC TTM service ควรจะมี
สรุป	
22	ในความคิดของท่าน อะไรบ้างคือผลลัพธ์สำคัญหรือผลสำเร็จหลักของระบบ HDC TTM service ในประเทศไทย กรุณาอธิบายว่าทำไมท่านถึงให้คำตอบเช่นนั้น
23	หากท่านสามารถย้อนเวลากลับไปได้ในตอนที่กำลังเริ่มต้นระบบ HDC TTM service ท่านอยากจะเปลี่ยนแปลงอะไรบ้าง
24	จากคำถามข้างต้นทั้งหมด ท่านคิดว่ายังมีมุมมองในด้านอื่น ๆ เกี่ยวกับการใช้งานระบบ HDC TTM ที่ท่านอยากจะแสดงความคิดเห็นหรือให้คำแนะนำเพิ่มเติมอีกหรือไม่
25	ถ้าต่างประเทศต้องการพัฒนาระบบข้อมูลที่คล้ายกับระบบ HDC TTM service ท่านจะมีข้อเสนอแนะอย่างไรบ้าง

สิ้นสุดการสัมภาษณ์

ขอบคุณที่ท่านสละเข้าร่วมการสัมภาษณ์ค่ะ/ครับ