Webology (ISSN: 1735-188X)
Volume 19, Number 2, 2022

Factors Influencing The Development Of Digital Literacy Skills In Thailand According To The Thailand 4.0 Policy

Vichian Puncreobutr[1*], Somjate Waiyakarn[2], Wannee Tapaneeyakorn[3], and Apichaya Chuepan[4]

[1,2]Faculty of Education, St Theresa International College, Nakhon Nayok, Thailand.

[3]Faculty of Nursing, St Theresa International College, Nakhon Nayok, Thailand.

[4]Faculty of Business Administration, St Theresa International College, Nakhon Nayok, Thailand.

*****Corresponding Author, Email**:** vichian@stic.ac.th

Received on 2 January 2022, Revised and Accepted on 5 February 2022, and Published 26 February 2022

ABSTRACT

This research aims to study the current level of Digital Literacy Skills in Thailand and the factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy. This research is a quantitative research, in which the sample group was obtained from people of early working age (18-29 years for Thailand) in Bangkok and the suburban areas. According to the Krejcie & Morgan table, a total of 384 people were sampled through stratified sampling, using the provinces as criteria for classification. The statistics used in the research were Mean, S.D., and Multiple Regression Analysis. The results of the study are as follows: 1) The current level of Digital Literacy Skills of Thai people is high, the specific skills which were at a very high level included the skill of choosing the appropriate technology and the skill involving relationships between digital social groups. 2) The level of influence of all 4 factors associated with the development of Digital Literacy Skills in Thailand was found to have a very high level of influence. This comprised of the following factors: the development of workforce towards the digital age, uplifting the economy in the digital age, driving the community towards a digital society, and infrastructure development to support the digital society. 3) All 4 factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy, with a predictive efficiency coefficient of 47.0% (R^2 = 0.470), can be modelled and written in the form of a linear

equation: Digital Literacy Skills = .565 + .224(Digital Society) + .253(Digital Economy) + .218(Workforce Development) + .171(Infrastructure)

Keywords Digital Literacy, Digital Skill, Factors for the development of Digital Literacy

Background Information

Thailand has formulated a strategy to become Thailand 4.0 (Leenaraj, 2017; Puncreobutr, 2017) with the aim of developing the country to simultaneously grow with 21st century changes (Thanormchayathawat et al., 2016; Puncreobutr et al., 2018). Other countries around the world are rapidly driving economic, social, political, and educational systems with the use of digital technology (Office of the Education Council, 2019; Siriboonyakarn and Sumpong, 2019).

The principal driving force for Thailand is the articulation of a five-year Digital Development Plan (2017-2022), in order to shift from an economy that is reliant on agriculture and industries, to a dynamic digital economy. This shift can occur through the use of 4 strategies consisting of the development of workforce towards the digital age, uplifting the economy in the digital age, driving the community towards a digital society, and infrastructure development to support the digital society (Digital Economy Promotion Agency, 2017). This is done to promptly elevate the Digital Literacy of Thai people, to correspond with Thailand 4.0 (Siriboonyakarn and Sumpong, 2019).

Digital Literacy Building is a holistic development for people; it is a continuous process which affects the understanding, beliefs, perspectives, and emotions, including the expression through different actions. This in turn affects the identity of a person, as a member of society (Soby, 2003). The core of Digital Literacy is the ability to synthesize and integrate by linking literacy related to the basics of computer use, Information and Communication Technology skills, social skills (soft skills), conscience in using the internet, as well as the protection of privacy and intellectual property rights (Bowden, 2007).

Educational management to create Digital Literacy requires an emphasis on the digitally literacy person knowledge in five areas: 1) Possessing the skills, thinking processes, and techniques necessary to discover, understand, assess, create, and communicate. 2) Selecting appropriate and efficient technologies and having the ability to apply it in decision-making. 3) Understanding the relationship between digital social groups, lifelong learning on privacy, and appropriate stewardship of information. 4) Selecting the appropriate technology to communicate and co-work with surrounding people and public groups. 5) The use of digital literacy in community activities, to induce responsible community movements (Cordell, 2013). Thailand has assigned the Ministry of Digital Economy and Society to implement a movement enabling Thai people to develop digital literacy skills rapidly, since 2017 onwards (Siriboonyakarn and Sumpong, 2019).

Higher education institutions are considered another important mechanism in elevating the level of Digital Literacy Skills in Thailand, from graduate production in the management of educational systems, to the development of communities/societies through providing academic services (Wattanasan et al., 2018). In addition, the development of teachers within primary, secondary and vocational levels, to have sufficient Digital Literacy, in order to

transfer to children and juveniles in schools, this is an alternative method to create Digital Literacy (Prommalee, 2019)

In order to follow up on the results of the Digital Literacy development in Thailand, the researcher believes that the current level of Digital Literacy Skills in Thailand, as well as the factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy should be studied. This would be beneficial towards those involved in the development or improvement of the plan to elevate the Digital Literacy Skills in Thailand to a higher level.

Research Objectives

1. To study the current level of Digital Literacy Skills in Thailand
2. To study the factors influencing the development of Digital Literacy Skills in Thailand, according to the Thailand 4.0 policy.

Research Methodology

This research is a quantitative research.

The population consists of 100,000 people of early working age in Thailand, aged 18-29 years, from Bangkok and the suburban areas. The sample group was obtained from people of early working age, referring to the Krejcie & Morgan table, a total of 384 people were selected through stratified sampling, with the provinces used as criteria for classification.

The variables studied were as follows:

1) The independent variables are the factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy (Digital Economy Promotion Agency, 2017), consisting of 4 factors: the development of workforce towards the digital age, uplifting the economy in the digital age, driving the community towards a digital society, and infrastructure development to support the digital society.

2) The dependent variables are Digital Literacy Skills of Thai people who are digitally literacy persons, according to the 5 factors (Cordell, 2003) which are 1) Possessing the skills, thinking processes, and techniques necessary to discover, understand, assess, create, and communicate digitally. 2) Selecting, from a wide range, appropriate and efficient technologies, interpreting search results and making suitable decisions. 3) Understanding the relationship between digital social groups, lifelong learning on privacy, and appropriate stewardship of information. 4) Selecting the appropriate technology to communicate and co-work with friends, families, and public groups. 5) The use of digital literacy in community activities and contributing to create responsible community movements.

Research tools and statistics - the instrument used was a questionnaire created by the researcher, with a discriminant index between .381-.892, and a reliability index of .89. The statistics used in the research were Mean, S.D., and Multiple Regression Analysis.

The study period was between January 2021– December 2021.

Research Results

The results obtained from the study are as follows:

1. The current level of Digital Literacy Skills in Thailand

The study of the level of Digital Literacy Skills in Thailand, as shown in Table 1.

Table 1. Current Digital Literacy Skills in Thailand (N=384)

Specifications	Mean	S.D.	Level
Possessing the skills, thinking processes, and techniques necessary to discover, understand, assess, create, and communicate digitally.	4.455	.4986	High
Selecting from a wide range, appropriate and efficient technologies, interpreting search results and making suitable decisions.	4.492	.5005	High
Understanding the relationship between digital social groups, lifelong learning on privacy, and appropriate stewardship of information.	4.518	.5003	Very high
Selecting the appropriate technology to communicate and co-work with friends, families, and general public groups.	4.523	.5001	Very high
The use of digital literacy in community activities and contributing to create responsible community movements.	4.500	.5006	High
Overall Digital Literacy Skills	4.497	.3861	High

As shown in Table 1, the overall current Digital Literacy Skills in Thailand are at a very high level (4.497). When considering each individual aspect, it was found that the specifications with a very high level of Digital Literacy Skills consisted of 2 specifications: 1) Selecting the appropriate technology to communicate and co-work with friends, families, and general public groups (4.523) and 2) Understanding the relationship between digital social groups, lifelong learning on privacy, and appropriate stewardship of information (4.518). There are 3 specifications with a high level of Digital Literacy Skills, which are 1) The use of digital literacy in community activities and contributing to create responsible community movements (4.500), 2) Selecting from a wide range, appropriate and efficient technologies, interpreting search results and making suitable decisions (4.492), and 3) Possessing the skills, thinking processes, and techniques necessary to discover, understand, assess, create, and communicate digitally (4.455).

2. The level of influence of each factor on the development of Digital Literacy Skills in Thailand

The study on each factor influencing the development of Digital Literacy Skills in Thailand yielded the following results:

2.1 A study on the influence level of the development of workforce towards the digital age.

The influence level of the development of workforce towards the digital age is shown in Table 2.

Table 2. Influence level of the development of Thailand's workforce towards the digital age

Specifications	Mean	S.D.	Level
Retrieving information from digital sources using a variety of techniques	4.455	.4986	High
Using search results to communicate with family	4.583	.4936	Very high
Using search results in communicating with friends and public groups	4.515	.5004	Very high
Using search results in daily work and career development	4.476	.5001	High
Responsibly using digital information in society	4.526	.4999	Very high
Overall development of workforce	4.511	.3463	Very high

As observed in Table 2, the overall influence level for the development of workforce towards the digital age is at a very high level (4.511). When considering each individual aspect, it was found that the specifications with a very high influence level on Digital Literacy Skills consisted of 3 specifications: 1) Using search results to communicate with family (4.583), 2) Responsibly using digital information in society (4.526), and 3) Using search results in communicating with friends and public groups (4.515). There are 2 specifications with a high influence level on Digital Literacy Skills, which are 1) Using search results in daily work and career development (4.476) and 2) Retrieving information from digital sources using a variety of techniques (4.455), respectively.

2.2 A study on the influence level of uplifting the economy in the digital age.
The influence level of uplifting the economy in the digital age is shown in Table 3.

Table 3. The influence level of uplifting Thailand's economy in the digital age

Specifications	Mean	S.D.	Level
The ability to make transactions through digital platforms	4.580	.4940	Very high
Transactions of agricultural products through digital platforms	4.468	.4996	High
Transactions of industrial products through digital platforms	4.539	.4991	Very high
Transactions of SME products through digital platforms	4.489	.5005	High
Transactions of food products through digital platforms	4.536	.4993	Very high
Overall elevation of the digital economy	4.522	.3767	Very high

According to Table 3, the overall influence level of uplifting the economy in the digital age is at a very high level (4.522). When considering each individual aspect, it was found that the specifications with a very high influence level on Digital Literacy Skills consisted of 3 specifications: 1) The ability to make transactions through digital platforms (4.580), 2) Transactions of industrial products through digital platforms (4.539), and 3) Transactions of food products through digital platforms (4.536). There are 2 specifications with a high influence level on Digital Literacy Skills, including 1) Transactions of SME products through digital platforms (4.489) and 2) Transactions of agricultural products through digital platforms (4.468), in respective order.

2.3 A study on the influence level of driving the community towards a digital society.
The influence level of driving the community towards a digital society is shown in Table 4.

Table 4. The influence level of driving the community towards a digital society in Thailand

Specifications	Mean	S.D.	Level
Using the digital society to improve standards of living	4.630	.4833	Very high
Using the digital society to improve the quality of work	4.591	.4922	Very high
Using the digital society to improve the quality of the community/society	4.612	.4879	Very high
Using the digital society to generate income	4.599	.4907	Very high
Using the digital society to access government services	4.526	.4999	Very high
Overall drive of the community towards a digital society	4.591	.3623	Very high

As observed in Table 4, the overall influence level for driving the community towards a digital society is at a very high level (4.591). When considering each individual aspect, it was found that all 5 specifications had a very high influence level on Digital Literacy Skills: 1) Using the digital society to improve standards of living (4.630), 2) Using the digital society to improve the quality of the community/society (4.612), 3) Using the digital society to generate income (4.599), 4) Using the digital society to improve the quality of work (4.591), and 5) Using the digital society to access government services (4.526), in the respective order.

2.4 A study on the influence level of infrastructure development to support the digital society.
The influence level of infrastructure development to support the digital society is shown in Table 5

Table 5. The influence level of infrastructure development to support the digital society in Thailand

Specifications	Mean	S.D.	Level

Digital technology and content	4.570	.4956	Very high
Digital learning and knowledge	4.559	.4970	Very high
Digital health	4.510	.5005	Very high
Digital/cyber security	4.539	.4991	Very high
Digital service	4.609	.4885	Very high
Overall infrastructure supporting the digital society	4.557	.3605	Very high

According to Table 5, the overall influence level for infrastructure development to support the digital society is at a very high level (4.557). When considering each individual aspect, it was discovered that all specifications had a very high influence level on Digital Literacy Skills: 1) Digital service (4.609), 2) Digital technology and content (4.570), 3) Digital learning and knowledge (4.559), 4) Digital/cyber security (4.539), and 5) Digital health (4.510), respectively.

3. Factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy.

The results of the study on factors influencing the development of Digital Literacy Skills were obtained through multiple regression analysis, as shown in Table 6.

Table 6. Multiple regression analysis results of factors influencing the development of Digital Literacy Skills in Thailand

Independent variable (predictor)	b	Beta	t	p
C: Driving the community towards a digital society	.224	.210	3.134	.002
B: Uplifting the economy in the digital age	.253	.247	4.923	.000
A: Development of workforce towards the digital age	.218	.195	3.905	.000
D: Infrastructure development to support the digital society	.171	.160	2.489	.013
Constant	.565		2.599	.0.10
$R = 0.686$ $R^2 = 0.470$ $F = 84.075$ p value <0.000				

As observed in Table 6, the multiple regression analysis results of factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy, it was found that the factors positively influencing the development of Digital Literacy Skills, with the statistical significance level of .01, consists of 3 factors. These factors were uplifting the economy in the digital age ($\beta = 0.247$), driving the community towards a digital society ($\beta = 0.210$), and the development of workforce towards the digital age ($\beta = 0.195$). The factors positively influencing the development of Digital Literacy Skills, with the statistical

significance level at .05, consisted of one factor, namely, infrastructure development to support the digital society (β = 0.160).

The results displayed the value of R^2 = 0.470, indicating that the predictive efficiency coefficient for factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy, which consists of 4 factors: driving the community towards a digital society (C), uplifting the economy in the digital age (B), the development of workforce towards the digital age (A), and infrastructure development to support the digital society (D), accounted for 47.0%. The remaining 53.0% predictive efficiency was attributed to other variables which were not included in the study.

Derived from the statistical analysis results of the coefficients of the four independent variables, a representative linear equation can be written, obtained from the multiple regression analysis at the .01 significance level, in order to predict the Digital Literacy Skills of Thailand as follows:

Digital Literacy Skills = .565 + .224(Digital Society) + .253(Digital Economy) + .218(Workforce Development) + .171(Infrastructure)

The equation can also be written in the standard score form as follows:

$Z_{\text{Digital Literacy Skills}} = 0.210\ Z_{\text{Digital Society}} + 0.247\ Z_{\text{Digital Economy}} + 0.195\ Z_{\text{Workforce Development}} + 0.160\ Z_{\text{Infrastructure}}$

Conclusion

The results of the study can be summarized as follows.

1. The current level of Digital Literacy Skills in Thailand

The overall current level of Digital Literacy Skills in Thailand is high. When considering each individual aspect, it was found that the skills which are at a very high level are selecting the appropriate technology to communicate and co-work with others and the relationship between digital social groups, which requires lifelong learning on privacy and appropriate stewardship of information.

2. Factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy

A study on the level of influence of various factors affecting the Digital Literacy Skills in Thailand is as follows:

2.1 The overall influence level of the development of workforce towards the digital age is very high. When considering each individual aspect, it was found that the specifications influencing Digital Literacy Skills at a very high level were 1) Use of search results to communicate with family, 2) Responsible use of digital information in society and 3) Using search results to communicate with friends and public groups, respectively.

2.2 The overall influence level of uplifting the economy in the digital age is very high. When considering each individual aspect, it was found that the specifications influencing Digital Literacy Skills at a very high level were 1) The ability to make transactions through digital platforms, 2) Transactions of industrial products through digital platforms and 3) Transactions of food products through digital platforms, in the respective order.

2.3 The overall influence level of driving the community towards a digital society is very high. When considering each individual aspects, it was found that the specifications

influencing Digital Literacy Skills at a very high level were communities using the digital society to 1) improve the standards of living, 2) improve the quality of communities/societies, 3) generate income, 4) improve the quality of work, and 5) access government services, respectively.

2.4 The overall influence level of infrastructure development to support the digital society is very high. When considering each individual aspects, it was found that the specifications influencing Digital Literacy Skills at a very high level were infrastructures relating to 1) Digital service, 2) Digital technology and content, 3) Digital learning and knowledge, 4) Digital/cyber security, and 5) Digital health, in the respective order.

2.5 Factors influencing the development of Digital Literacy Skills by Multiple Regression Analysis found that:

2.5.1 The factors positively influencing the development of Digital Literacy Skills, with the statistical significance level of .01, were uplifting the economy in the digital age ($\beta = 0.247$), driving the community towards a digital society ($\beta = 0.210$), and the development of workforce towards the digital age ($\beta = 0.195$). It was also found that infrastructure development to support the digital society ($\beta = 0.160$) is a positively influencing factor, with the statistical significance level at .05.

2.5.2 The predictive efficiency coefficient represents 47.0% ($R^2 = 0.470$). This can be written as a linear equation: Digital Literacy Skills = .565 + .224(Digital Society) + .253(Digital Economy) + .218(Workforce Development) + .171(Infrastructure).

Discussion of Results

From the study, it was found that $R^2 = 0.470$, the 4 factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy which are driving the community towards a digital society (C), uplifting the economy in the digital age (B), the development of workforce towards the digital age (A), and infrastructure development to support the digital economy (D), has a predictive coefficient of 47.0%. The remaining 53.0% of the predictive efficiency is a result of other variables not included in the study. This indicates that it the Ministry of Digital Economy and Society's plan to drive Thailand towards a digital economy, through the use of 4 strategies consisting of: the development of workforce towards the digital age, uplifting the economy in the digital age, driving the community towards a digital society, and the infrastructure development to support the digital society, according to Thailand's digital development plan 2017-2022 (Digital Economy Promotion Agency, 2017), there is only 47.0% contribution. This suggests that there are still issues or strategies that may not be defined as driving strategies. To make Thailand's digital development plan 2017-2022 successful, those involved must set up an urgent plan to formulate more concrete strategies which would contribute to it. This is consistent with the concept of Digital Literacy development, which must consider both the ability to synthesize and the ability to integrate information from a variety of sources (Bowden, 2007: Martin, 2006), based on media literacy, media studies and media education (Soby, 2003). Moreover, the fundamental of knowledge needed in digital contexts, appropriate perspectives on the protection of privacy, intellectual property rights and critical thinking and social skills of people (Leenaraj, 2017). Survey of Precision Medicine Strategy Using Cognitive Computing

International Journal of Machine Learning and Computing and A dataset for automatic contrast enhancement of microscopic malaria infected blood RGB images, Data in brief and Image Segmentation Technique Using SVM Classifier for Detection of Medical Disorders also included in digital literacy era to understand the digital literacy in health aspects (Ramu et al, 2018, somasekar et al, 2019, Janardhan et al, 2019).

Recommendations

Recommendations for applying the research results:

According to the study, it was revealed that the overall Digital Literacy Skills of Thailand were at a high level. When considering each individual aspect, it was found that the specifications for selecting the appropriate technology and the relationship between digital social groups are the skills which Thai people have performed at a very high level. Therefore, improving other skills in which there was a high level of performance to be better will enable the increase of Digital Literacy Skills of Thailand as a whole to a higher level. These include skills in using digital literacy to induce responsible community movements, selecting from a wide range, appropriate and efficient technologies, interpreting search results and making effective decisions, and to assess, create, and communicate digitally.

The study discovered that factors influencing the development of Digital Literacy Skills according to the 5-year Digital Development Plan (2017-2022) through the use of 4 strategies consisting of uplifting the economy in the digital age, driving the community towards a digital society, the development of workforce in the digital age, and infrastructure development to support the digital society, can elevate Thailand's Digital Literacy Skills. This shows that the implementation of the 5-year Digital Development Plan (2017-2022) has an effect to a certain extent. However, the study also found that all four factors can predict Digital Literacy Skills by only 47.0%, therefore, the people involved, and related agencies should review, improve, or develop the 5-year Digital Development Plan (2017-2022), in order to elevate the Digital Literacy Skills in Thailand to a higher level.

Recommendations for further research:

As observed in the study of factors influencing the development of Digital Literacy Skills in Thailand according to the Thailand 4.0 policy, it was revealed that the predictive efficiency coefficient contributed to 47.0%. The remaining 53.0% is due to other variables not included in the study. Therefore, other factors influencing the development of Digital Literacy Skills in Thailand should be further studied, in order to increase the predictive efficiency, henceforward.

References

Bowden, D. (2007). **Origins and Concepts of Digital Literacy. In Lan Kshear**, C. & Knobel, M.(Eds.). Digital Literacies: Concepts, Policies and Practices. New York: Lang Pub.

Cordell, R. (2003). **Information Literacy and Digital Literacy: Competing or Complementary?** Communication in Information Literacy. 7(2): 177-183.

Leenaraj, B. (2017). **Digital Literacy Skill for Developing Quality**. T.L.A. Bulletin. 61(2): 76-92.

Martin, A. (2006). **Literacies for the Digital Age.** In Martin, A. & Madigan, D. (Eds.) Digital Literacies for Learning. London: Facet Pub.

Office of the Education Council. (2019). **Guidelines for Creating and Promoting Digital Literacy among Thai Teachers. Bangkok**: Ministry of Education.

Prommalee, B. (2019). **Analysis of Higher Education Academic Staff's Digital Literacy using Classification and Regression Tree: A Case Study of Praboromrakchanok Institute, Ministry of Public Health.** Thesis for Master of Pharmacy (Health Informatics). Bangkok: Silpakorn University.

Puncreobutr, V. (2017). **The Policy drive of Thailand 4.0.** St Theresa Journal of Humanities and Social Science. 3(1): 91-102.

Puncreobutr, V., Dhamasiri, M., Suwanaruji, N., Dwiptendra, B. (2018). **Developing the Role of Thailand's Educational Administrators in the 21st Century of Administration Change** Anthropology of Education e Journal. 3(26): March 07, 2018, pp. 1-6

Siriboonyakarn, A. and Sumpong, S. (2019). **Role of Ministry of Digital Economy and Society to Driving Strategic of Digital Economy and Society**. Journal of MCU Social Science Review. 8(3): 255-268.

Soby, M. (2003). **Digital Competence- from education policy to pedagogy: The Norwegian Context.** In Lan Kshear, C. & Knobel, M.(Eds.). Digital Literacies: Concepts, Policies and Practices. New York: Lang Pub.

Thailand Digital Economy Promotion Agency. (2017). Thailand Digital Economy Promotion Plan (2018-2022). Bangkok: Ministry of Digital Economy and Society.

Thanormchayathawat, B., Vanitsuppavong, P., Niemted, W., Portjanatanti, N. (2016). 21st Century Skills: **A Challenge for student Development. The Southern College Network** Journal of Nursing and Public Health. 3(2): 208-222.

Wattanasan, P., Chansong, A., Puncreobutr, V., Iqbal, H. M. (2018). **The Proficiency of Thai Accounting Graduates Working in the Profession According to the Standard of Accounting in the ASEAN Community.** Behavioral & Experimental Accounting e Journal. 10(42): October 30, 2018 pp. 1-6.

G. Ramu, P. Dileep Kumar Reddy, Appawala Jayanthi .(2018). "**A Survey of Precision Medicine Strategy Using Cognitive Computing**" International Journal of Machine Learning and Computing, Vol. 8, No. 6, December 2018 DOI: 10.18178/IJMLC2018.8.6.741 530 to 535.

J. Somasekar a, , G. Ramesh , Gandikota Ramu, P. Dileep Kumar Reddy, B. Eswara Reddy, Ching-Hao Lai, (2019) "**A dataset for automatic contrast enhancement of microscopic malaria infected blood RGB images**", Data in brief, Elsevier. https://doi.org/10.1016/j.dib.2019.104643, 2352-3409

Ummadi Janardhan Reddy, Pandluri Dhanalakshmi, Pallela Dileep Kumar Reddy. (2019). **Image Segmentation Technique Using SVM Classifier for Detection of Medical Disorders** Ingénierie des Systèmes d' Information, 24 (2): 73-176. https://doi.org/10.18280/isi.240207