

The University of Tokyo
Center for Spatial Information Science

Self Assessment Report

January 1, 2013

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Introduction

Center for Spatial Information Science (CSIS) at the University of Tokyo was established as an internal joint-use facility by the University of Tokyo in 1998, and since April 2006, as official national joint-use facility, CSIS has offered support for researchers in Spatial Information Science related fields both inside and outside of the university. Moreover, since April 2010, CSIS made a new beginning as a joint usage/research center, “Spatial Information Science Research Center”. In order to summarize the actual achievements of the CSIS objectively, we made Self-Assessment Report this time.

We would like to ask for your candid comments and suggestions on the actual achievements and future activity plans of CSIS.

Chapter 1. Overview of the Center

Foundation of the center

Establishment of the center goes back to a “recommendation for a national cartography museum (tentative name)” given at the 104th meeting of the Science Council of Japan in 1989. In 1996, the “National Geographical Information Science Research Center Establishment Preparation Committee” was created along with a sub organization the “Establishment Preparation Association for the Geographical Information Science Research Center-at the University of Tokyo”. A request to establish the center was submitted to the Former Ministry of Education by various related fields conferences and abroad research centers in 1997, and on April 9, 1998, this center was established as Inter-Joint Research center at the University of Tokyo. In September, 2004, it was recognized by Ministry of Education, Culture, Sports, Science and Technology and Council for Science and Technology as tentative national joint usage center, and in 2005, as tentative usage center, and in 2006, as official national joint usage center. In April, 2010, it made a new beginning as “Joint Usage/Research Center” (Spatial Information Science Research center) aiming to strengthen the foundation of academic research and to develop new academic research of our country, and remains in operation now.

Spatial Information Science

Spatial Information Science is a field that develops systematic methods for constructing, managing, analyzing, integrating, and communicating spatial data (i. e., natural, social, economic, and cultural data with location information) and that studies their applications to other fields. It is a core study field to realize the “construction of knowledge” focusing the Spatial, recapturing the perspective of spatial position, extent, and transition of the information, of the universe, of nature, society, economy, and culture.

The typical example of recapturing the existing information from the perspective of spatial position is crime incidence map. By plotting the information of crime incidence on a map, it can show the characteristics of the areas where specific types of crimes were concentrated, and it enabled not only the police but the local citizens to take effective anticrime measures. The expectations of Spatial Information Science are very high in present society. Today, there is an urgent issue of how one can find new knowledge and values from tremendous amount of data and information, and use them to solve the problems of present society/ human beings.

Goals of establishment of the center

Center for Spatial Information Science contributes the goal achievements as follows.

1. Creating, developing, and spreading Spatial Information Service

By conducting the advanced research of Spatial Information Science with high creativity and originality in order to form a base, and also by the integration of cross-disciplinary study and the interdisciplinary collaboration, Creating, developing, and spreading the new field of study will be conducted.

2. Developing spatial databases for research purposes

Research in Spatial Information Science requires a large amount of spatial data. However, a great deal of time, labor, and expense is necessary for producing this data. It is difficult for individual researchers to gather such resources; moreover, it would result in inefficient reproduction of work. For that purpose, the center will create common spatial databases, develop and implement systems to be able to use them freely, thus it will support work in many fields that use spatial databases.

3. Promoting Joint Industry-Government-University research

Research in Spatial Information Science has the character of basic scientific research as well as applied and policy-oriented scientific research. Joint research between industry, the government, and universities is essential to the field. For example, research on the standardization of spatial data requires joint work with related government agencies, while venture research in new industries requires partnerships with private sector research institutions. The center will provide a space to foster these kinds of research.

National Joint Research support system

Research in Spatial Information Science requires various spatial data, but most of the time it is difficult for the private facilities/researchers to gather a large amount of various spatial data. Therefore the center is providing the systems and the frameworks as below. Offering spatial databases etc. for research purposes

1. Providing spatial data base etc. for research purposes

The center is amassing a large amount of various spatial data for research purposes which is impossible for private facilities and researchers to gather, and providing it to joint researchers as the spatial databases for research purposes. Joint research can be applied, and the evaluation by the evaluation committee is done electronically as needed, and one can start the research and use the spatial data for research purposes anytime. At the same time the center is promoting joint research by disclosing the processing/analysis tool of spatial data etc, preparation tool of spatial information contents, and systems for e-learning.

2. Research Advisory Board

The center is operating a Research Advisory Board which mainly consists of nationwide partner universities etc. (21 universities, 1 government agency) and the researchers representing the various research fields, and conducting needs survey on recorded data items and contents/forms of provided services, and the evaluation of the services.

Chapter 2. Organization

Faculty members

As of July 2012, the organizational structure of the center is as follows.

Affiliation of CSIS	
Professor (Full time)	6
Project Professor	2
Professor (Joint-Appointment)	2
Associate Professor (Full time)	3
Associate Professor (Joint-Appointment)	1
Assistant Professor	3
Project Assistant Professor	3
Project Researcher	2
(Names of the other members are omitted)	
Administrative Staff	2
Affiliation of domestic Bases	
Visiting Professor (partner)	15
Visiting Associate Professor(partner)	4
Visiting Researcher (partner)	6

Research division

CSIS promotes Spatial Information Science by establishing the following research divisions, and also it prepares the domestic joint research support system and conduct joint research activity.

1. Division of Spatial Information Analysis

This division investigates methods for analyzing and modeling the shape, distribution and spatial relationships of spatial objects. The division also applies these methods to analyses of human spatial phenomena, such as urban activities and human behavior, and to natural spatial phenomena, such as landforms, hydrology and vegetation in order to understand and visualize the spatial characteristics of these features and to uncover the underlying mechanisms, which can then be used to predict future phenomena and to analyze spatial policies.

2. Division of Spatial Information Engineering

By collecting and integrating various data types and information generated in

the real world using spatio-temporal keys, researchers can recreate real world conditions and the changes that occur therein, generate information with greater added value, and examine methods for creating services based on that information. For example, research is being conducted on sophisticated methods that can be applied to obtaining, integrating, and mining spatial data that corresponds to the real world, as well as on systems that connect various sensors dispersed throughout a real space to collect and integrate spatiotemporal data.

3. Spatial Socio-Economic Research

The aim of this division is to promote theoretical and empirical studies into diverse social and economic phenomena, paying special attention to their spatio-temporal characteristics. The ultimate goal is to understand and develop solutions to economic problems. Furthermore, we develop new econometric tools for analyzing spatiotemporal data. The division also constructs spatio-temporal socio-economic databases that are made available to researchers in a variety of fields. This will greatly enhance empirical research in the social sciences, in particular, in urban and regional economics.

4. Division of Joint Usage and Research

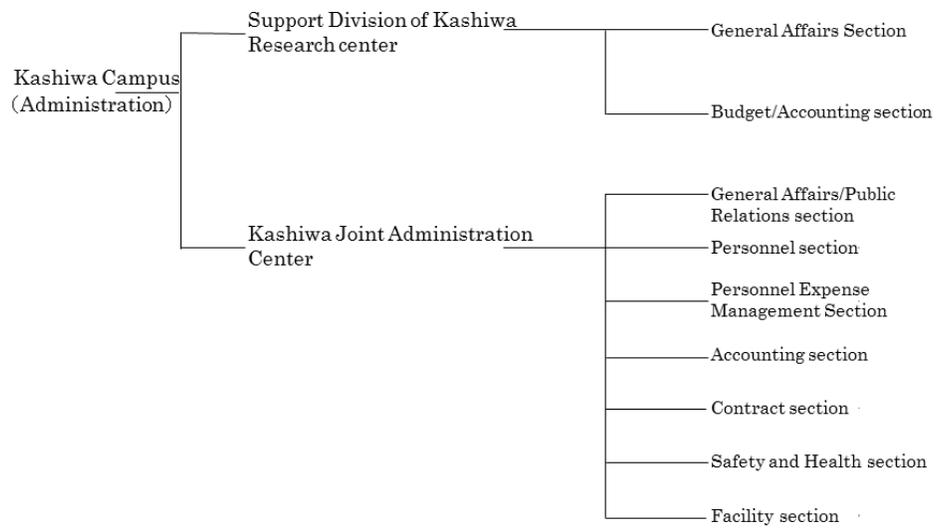
This division reconstructs scattered spatial data and spatial knowledge to compile a spatial information base. It also conducts research and development on environments that support research and educational activities related to these data and that use them in sophisticated applications. In addition to designing, implementing, and validating initiatives directed at the development of research communities, this division studies the environments, methods, and systems needed for promoting social applications of the spatial information base.

5. Division of Next-generation Management of Infrastructure Data Corporate Sponsored Research Programs

This division, supported by 8 private companies (as of June, 2011), was established in June, 2011. It aims to bring social experiment for geospatial information technology and contents to more effectively used in infrastructure of various fields, and technical development and policy proposal, and finally contribute to educate people engaged in the community. In particular, we set two important research tasks; “Development of technical basis concerning circulation and high-level usage of geospatial information data” and “Creating community where industry, government, academia can smoothly exchange geospatial information data”. As it contributes to establish political, technical and academic foundation of our country, we aim to educate practitioners and researchers equipped with comprehensive and multidisciplinary ability, who can plan and implement maintenance, sending/circulation, high-level usage, research/development of geospatial information.

Organization Chart

Center for Spatial Information Science



Chapter 3. Budget, Account and External Funds

Amount of expenditures of year 2011

[Unit: ¥ Million]

Item	Amount of Closing Account	
		Operating Cost Grant
Personnel Expenses	184	166
Supplies Expenses	272	122
Total	456	288

The amount of expenditures is 4.56 hundred million yen, and personnel expenses makes up about 40% of it. 2.88 hundred million yen is received from operating cost grant, and external funds cover 37% of total amount of expenditures.

Research cost

Research cost per person is about 15 million yen, and most of it is from external funds.

[Unit: ¥ Million]

	Year 2011
No. of researchers (a)	13
Total amount of research fund (b) (Including external funds)	447
Total amount of research fund (c) (excluding external funds)	174
Amount distributed to each research division (d) (researcher as research fund)	15
Research fund per researcher (b)/(a) (Including external funds)	34
Research fund per researcher (c)/(a) (excluding external funds)	13
Research fund per researcher (d)/(a) (amount distributed to each research division (researcher) as research fund)	1

*Definition of research fund of (b,c) and each expense is synonymous as in Report on the Survey of Research and Development(Statistics Bureau, Ministry of Internal Affairs & Communications)

*Research fund of (d) is the actual amount distributed as research fund to research divisions and researchers etc. among basic expenses of operating cost grants (excluding special expenses among grants, external funds such as service fees etc., and operating cost grants)

Adoption situation of Grant- in-Aid for Scientific Research

There are 18 cases that received Grant-in-Aid for Scientific Research, which totals 62 million yen. The number of adoption per person is more than one case.

Division	Year 2011		
	(Top) No. of applied cases	Amount	(Top) Direct expense
	(Bottom) No. of Adopted cases		(Bottom) Indirect expense
Fundamental Research(A)	1	9	7
	1		2
Fundamental Research(B)	4	22	17
	3		5
Fundamental Research(C)	8	7	5
	5		2
Challenging Exploratory Research	4	8	6
	3		2
Youth Scientists(A)	2	4	3
	1		1
Youth Scientists(B)	9	12	9
	5		3
Total	28	62	47
	18		15

External Funds

External funds received in 2011 are as follows.

1. Joint research with private sectors etc.

		2011	[unit: case, ¥ Million]		
No. of cases		14			
Amount		56			
No.	Research Title	Name of partner organization	Received amount	Period	
1	Study of usability and its usage promotion of drawing administration tool "LMD"	Japan Construction Information Center	10	2011~2012	
2	Study of usability and application of infrastructure information of restoration	Japan Construction Information Center	10	2011~2012	
3	Study of detection/tracking method by using laser	Hitachi Information & Communication Engineering, Ltd.	9	2011	
4	Basic study of passenger-flow measured data analysis by using high accuracy and low cost type sensor	East Japan Railway Company JR East Research & Development Center	5	2011~2012	
5	Development of effective method when using fields	Hitachi Information & Communication Engineering, Ltd.	4	2011	

2. Commissioned research

		Year 2011	[Unit: ¥ Million]	
No. cases		9		
Amount		82		
No.	Research Title (system name)	Name of organization	Received amount	Period
1	Maintenance of toll road map using GIS	Japan Expressway Holding and Debt Repayment Agency	7	2009-2011
2	Study on maintenance, renewal, application technology of sustainable common map infrastructure	Ministry of Land, Infrastructure, Transport and Tourism, National Institute for Land and Infrastructure Management	19	2011
3	Study of issues etc. concerning application technology of new geo-spatial information	Ministry of Land, Infrastructure, Transport and Tourism, National and Regional Planning Bureau	19	2011
4	Development of damage measurement scale, investigation of actual damage	Japan Science and Technology Agency	7	2010-2011
5	Development of Archive of Survey and Planning for Reconstruction of Towns Struck by the Great East Japan Earthquake	Ministry of Land, Infrastructure, Transport and Tourism, National and Regional Planning Bureau	20	2011

3. Scholarship Contribution

		Year 2011	[Unit: ¥ Million]	
No. of case		16		
Amount		30		
No.	Contribution from	Received amount	Received year	
1	Nippon Koei Co.Ltd.	8	2011	
2	Aero Asahi Corporation	2	2011	
3	CIT Engineering Co.Ltd.	2	2011	
4	Zenrin Co.Ltd.	5	2011	
5	Secom Science and Technology Foundation	8	2011	

Chapter 4. Research Activities

CSIS promotes research activities for the purpose of spreading and developing Spatial Information Science, and has achieved the results as below.

1. Research Achievements of Articles, Publications etc.

The number of refereed articles published in 2011 was 94, and 52 of them were published in international academic journals. The number of published articles per researcher was 6, and thus the center is maintaining high standards. The main International Journals in which our articles were published were, Annals of Statistics, Applied Cognitive Psychology, Habitat International, Journal of Urban Economics, Proceedings of the UBICOMP 2011 Workshop on Ubiquitous Crowdsourcing, IEEE Pervasive Computing, Proceedings of IEEE PerCom12 etc. The fields of conferences where the articles were presented have highly wide range; Economics, Psychology, Geography, Medicine, Information-Communication Engineering, City planning, Civil Engineering, and Environmentology etc., thus it shows the nature of CSIS: interdisciplinary and advanced research.

Main journals are as follows.

Name of Journal	Main Research	Name of presenter
Annals of Statistics	Fully Bayes Factors with a Generalized g-prior	Yuzo Maruyama Edward, I. George
Applied Cognitive Psychology	Working memory in spatial knowledge acquisition: Differences in encoding processes and sense of direction	Wen Wen Toru Ishikawa Takao Sato
Habitat International	Preferential size of housing in Beijing	Xiaolu Gao Yasushi Asami
Journal of Urban Economics	Directional imbalance in transport prices and economic geography	Takaaki Takahashi
Proceedings of the UBICOMP 2011 Workshop on Ubiquitous Crowdsourcing	Beyond Mobile Collaboration: Toward Metropolitan-Scale Geocentric Crowdsourcing	Konomi Shinichi
IEEE Pervasive Computing	PFLOW: Reconstruction of people flow by recycling large-scale fragmentary social survey data	SekimotoYoshihide Shibasaki Ryosuke Kanasugi Hiroshi Usui Tomitaka Shimazaki Yasunobu
Proceedings of IEEE PerCom12	Navigate Pedestrians for Comfort Using Multi-modal Environmental Sensors	Congwei Dang Masayuki Iwai Kazunori Umeda Yoshito Tobe Kaoru Sezaki

2. Overview of research results

Overview of major research results of the center in 2011 is as follows.

Date	Overview of research results	Academic significance or socio-economic-cultural significance	Names of related researcher
March, 2012	Presented joint paper with Congwei Dang et al., "NaviComf: Navigate pedestrians for comfort using multi-modal environmental sensors" at IEEE Percom2012, held in March, 2012.	This was selected as the best paper candidate of this international international conference for showing the possibility of participatory sensing to be applied to mHealth and Navigation systems. This is the top rung conference with acceptance rate of 11%.	Kaoru Sezaki
May, 2011	Presented a joint paper, "Relation of similarity and spatial distances between housing properties" at Japan Association for Real Estate Science in 2009. For this achievement, research paper award was given by Japan Association for Real Estate Science in 2011.	The paper clarified the spatial distribution of similar properties which would be suitable for appraisal in the housing market. It brings a fundamental review of the concept of appraisal, and will help revise the future appraisal methods.	Yasushi Asami
April, 2011 – March, 2012	He has been working as one of the three Editors-in-Chief for the Journal, Geomorphology; published by Elsevier since 2003 (the other two are British and American). He handled more than 150 submitted articles a year.	Journal, Geomorphology, has the highest Impact Factor (2,520), in a current field of Geomorphology, and widely recognized internationally. It is a great contribution to choose and edit the articles to be published in this journal for the development of Geomorphology.	Takashi Oguchi
March, 2012	The study visualized the commuters unable to get home and the evacuation situations from Tsunami and nuclear accident right after the great earthquake in 2011 by analyzing the mobile history information (at 5 minute intervals) of 1.5 million people nationwide with GPS-equipped mobile phone over the past one year. It showed that there was a continuous wave of people walking home until late at night in the metropolitan area, the evacuation situation accompanied by Tsunami arrival in Sendai Plain etc, the evacuee in Fukushima Plant surrounding area, not only within Fukushima prefecture, but spreading also to Niigata, Tokyo, and Saitama prefectures and the situation of people moving with the passing of time. In case of Fukushima Nuclear Plant, the returning rate to local area is low, and it was particular compared to many of the evacuee in other areas returning to the former areas of residence in about a half year.	It has great social significance that the research explains the detailed evacuation behavior characteristics at the earthquake by obtaining the history of location information of large-scale population for long term.	Ryosuke Shibasaki, Yoshihide Sekimoto

December, 2012	Prof. Shibasaki, collaborating with National Museum of Emerging Science and Innovation, developed and premiered permanent exhibition about Spatial Information Science, "Songs of ANAGURA, missing Researchers & Their remained devices" (http://www.miraikan.jst.go.jp/sp/exhibition/anagura.html), and won the Excellence Award at Japan Media Art Festival (Entertainment division) hosted by the Agency for Cultural Affairs.	In this exhibition, one can learn the social issues concerning the acquisition, management, usage of location information and its coping strategies in the form of game. In other words, the visitors all are constantly tracked with ID and based on the "personal information", various services and questionings will take place. Also by having interaction with the other visitors, they can achieve the final stage of "Festival". Furthermore, "selection device" is imbedded in this exhibition, and each visitor will make decision about disclosing and sharing of anonymized personal information etc. This exhibition won the Excellence Award at Japan Media Art Festival (Entertainment division) hosted by the Agency for Cultural Affairs. It is extremely rare for science technology exhibition to receive this award.	Ryosuke Shibasaki
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3. Received Awards

Received Awards of the center in 2011 are as follows.

Name of winner	Name of award	Date	Research title etc.
Mari Tanaka Yasushi Asami	Japan Real Estate Association Award in 2010	May, 2011	Relation of similarity and spatial distances between housing properties
Mamoru Amemiya	Bestpaper award at Japanese Institute of Landscape Architecture National Conference	May, 2011	Example of installation of network type street security cameras in city parks and behavior of the locals in Ichikawa city, Chiba prefecture
Ryosuke Shibasaki	Excellence Award at Japan Media Arts Festival (Entertainment division)	December, 2011	Songs of ANAGURA (Joint project with The National Museum of Emerging Science and Innovation)

4. Implementation status of conferences and symposiums

Hosted and Joint hosted by the center in 2011, there were 6 international conferences/symposiums, 5 seminars, 11 workshops, 1 other, and total of 2930 people participated. The implementation status of symposiums is as follows.

Period	Form (division)	Target	Name of conference etc.	Overview	The number of participants (foreigners)
June 17, 2011	Symposium	Domestic, Overseas, Public	CSIS-i Final result briefing session: What we achieved and did not achieve	Accomplishment report and panel discussion with participants Hosted by CSIS-i	200
September 14 -16, 2011	International Conference	Domestic, Overseas	STGIS2011	International Conference, Spatial Thinking and Geographic Information Sciences	700
September 27, 2011	Symposium	Domestic Overseas, Public	CSIS-i The 1 st Open Symposium "Aiming to develop and merge spatial information as infrastructure - we opened 'next generation data' corporate sponsored research program"	Presentation of activity overview and case examples Hosted by CSIS-i	250
November 10-11, 2011	Symposium	Domestic, Overseas, Public	CSIS DAYS 2011	Research presentation of Spatial Information Science Hosted by CSIS	120
January 17, 2012	Symposium	Domestic, Overseas, Public	CSIS-i The 2 nd Open Symposium "No Smartphone, No Life -bids of Smartphone learned from case examples"	Presentation of activity overview and case examples Hosted by CSIS-i	250
January 31, 2012	Symposium	Domestic, Overseas, Public	The 14 th CSIS Symposium "Social Interface of Spatial Information Science"	Research introduction of Spatial Information Science Hosted by CSIS	300

5. Activity status of Corporate Sponsored Research Program

Corporate sponsored research program of “Next-generation Management of Infrastructure Data” was established, based on the funds from 10 private corporations in June 2011, pursuing the following activities; (1) Development of technology infrastructure regarding the distribution/higher level usage of Infrastructure data, (2) Creating the community where industry-government-academia can smoothly share infrastructure data. In September, 2011, “Association for Promotion of Infrastructure Geospatial Information Distribution” based especially on above corporate sponsored research program began operating with members of 80 organizations, providing about 40 kinds of stored data and data from 400,000 observation points, and put out a news release from the University of Tokyo. Also, it is providing the real estate information data and consumer behavior data etc., which were owned by private corporations, to joint research. Furthermore, in 2011, it was entrusted with archive project of survey data of Earthquake restoration support survey project which was conducted by Ministry of Land, Infrastructure, Transport and Tourism, City Bureau, and by disclosing the website, it enabled the public to access to the survey data easily. Targeting the researchers and students in various universities, it is sending out information regarding joint research via website, and distributing newsletter by e-mail. Also it is conducting public relation activities via meetings where various researchers gather, such as symposiums with presentation of national joint usage research (CISIS DAYS), and workshops etc.

Chapter 5. International Exchanges

Center for Spatial Information Science is actively supporting International Exchanges in the field of Spatial Information Science. Currently, the center is signing International Agreements on Academic Exchange with 17 organizations as follows.

Also under foreign visiting professor system, the center is actively accepting foreign researchers, and is signing MOU with international organizations to promote research exchanges. It also actively invites the foreign researchers who wish to do research presentation in our center, and is hosting seminars. Prof. Asami participated KAGIS which is the conference of GIS in Korea, presented a keynote speech, and discussed the further exchanges.

Contract date	Concluded date	Partner countries and Institutes	Name of Agreement
January, 2005	Updated	Ireland, National Centre for Geocomputation,	International Agreements on Academic Exchange between National Centre for Geocomputation, Ireland and Center for Spatial Information Science (CSIS) at the University of Tokyo
March, 2005	Updated	England, University College London, Centre for Advanced Spatial Analysis	International Agreements on Academic Exchange between University College London, Centre for Advanced Spatial Analysis, England and Center for Spatial Information Science (CSIS) at the University of Tokyo
March, 2005	Updated	England, Centre for Ecology and Hydrology	International Agreements on Academic Exchange between Centre for Ecology and Hydrology, England and Center for Spatial Information Science (CSIS) at the University of Tokyo
March, 2005	Updated	Italy, Universita d'Annunzio International Research School of Planetary Sciences,'	International Agreements on Academic Exchange between Universita' d'Annunzio International Research School of Planetary Science, Italy and Center for Spatial Information Science (CSIS) at the University of Tokyo
March, 2005	Updated	India, Department of Geography, University of Pune	International Agreements on Academic Exchange between University of Pune Department of Geography, India and Center for Spatial Information Science (CSIS) at the University of Tokyo
May, 2005	Updated	China, Tongji University College of Agricultural city Planning,	International Agreements on Academic Exchange between Tongji University College of Agricultural city Planning, (College of Architecture and Urban Planning), China and Center for Spatial Information Science (CSIS) at the University of Tokyo
April, 2005	Updated	Korea, Seoul National University Department of Korea area studies	International Agreements on Academic Exchange between Seoul National University Department of Korea area studies, Korea and Center for Spatial Information Science (CSIS) at the University of Tokyo
May, 2005	Updated	Korea, Yonsei University Department of Civil and Environment Engineering	International Agreements on Academic Exchange between Yonsei University Department of Civil and Environment Engineering, Korea and Center for Spatial Information Science (CSIS) at the University of Tokyo

January, 2006	Updated	Korea, University of Seoul, School of Urban Science	International Agreements on Academic Exchange between University of Seoul, School of Urban Science, Korea and Center for Spatial Information Science (CSIS) at the University of Tokyo
September, 2006	Updated	Taiwan, National Taiwan University Department of Geoscience	International Agreements on Academic Exchange between National Taiwan University Department of Geoscience, Taiwan and Center for Spatial Information Science (CSIS) at the University of Tokyo
January, 2007	Updated	Taiwan, National Taiwan University Department of Geography	International Agreements on Academic Exchange between National Taiwan University Department of Geography, Taiwan and Center for Spatial Information Science (CSIS) at the University of Tokyo
July, 2007	Updated	China, Chinese Academy of Science	International Agreements on Academic Exchange between Chinese Academy of Science, China and Center for Spatial Information Science (CSIS) at the University of Tokyo
February, 2008	October, 2013	China, Wuhan University, Department of Geodesy and Survey Engineering /GIS National Emphasis Research Center	International Agreements on Academic Exchange between Department of Geodesy and Survey Engineering /GIS National Emphasis Research Center, China and Center for Spatial Information Science (CSIS) at the University of Tokyo
August, 2009	Updated	China, Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences	International Agreements on Academic Exchange between Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, China and Center for Spatial Information Science (CSIS) at the University of Tokyo
December, 2009	December, 2013	Bangladesh, Division of Civil Engineering, Presidency University	International Agreements on Academic Exchange between Presidency University, Division of Civil Engineering, Bangladesh and Center for Spatial Information Science (CSIS) at the University of Tokyo
December, 2009	Updated	Korea, Environmental and Marine sciences and technology, Pukyong National University	International Agreements on Academic Exchange between Pukyong National University, Environmental and Marine sciences and technology, Korea and Center for Spatial Information Science (CSIS) at the University of Tokyo
July, 2009	June, 2013	Philippines, Asian Development Bank	International Agreements on Academic Exchange between Asian Development Bank, Philippines and Center for Spatial Information Science (CSIS) at the University of Tokyo

Chapter 6. Educational Activity and Staff Training

Educational Activity

Center for Spatial Information Science (CSIS) is also participating in student education through the cooperative program system etc. Among the students who were instructed by CSIS staff in 2011, there were 20 Ph.D. students (13 of them were foreigners), 44 Master's students (4 of them were foreigners), and 8 Undergraduate students (1 of them was a foreigner). 18 international students are accepted from Asia. Also, the number of students who received Ph.D. in 2011 was 15.

Spatial Information Science is conducting the development of versatile method and theory that are applicable to various academic disciplines in a cross-sectional manner, but mostly due to its rather recent field, the user researchers and practitioners of related fields tend not to have enough knowledge and experiences about processing and management of spatial data, and it is becoming one of the causes of impeding the progress of Spatial Information Science. As the basic knowledge and skills of statistics is providing the grounding in many academic disciplines, "re-education" of the researchers and practitioners besides education of the students etc. is also becoming an important issue.

On the other hand, the number of specialists in Spatial Information Science (geography information science) is small, and scattered around except our center. It is quite difficult to develop educational curriculum and materials targeting the students, researchers, and practitioners with various backgrounds. Then, the center developed systematical and comprehensive educational curriculum/ contents as "Study of Development of Sustainable Collaborative Web Library Systems for providing the Standard Curricula of Geographic Information Science" (Grants-in-Aid for Scientific Research A, 2005-2007) led by Prof. Okabe, who was the former Director of the center. And now, "Development of Educational Method/Materials of Geographic spatial thinking Based on Standard Curriculum for Geographic Information Science" (Grants-in-Aid for Scientific Research A, 2009-2013) is being conducted, led by the current Director, Prof. Asami, and the center is developing instructional texts and educational materials.

Staff Training

Center for Spatial Information Science (CSIS), is conducting the training of young researchers including the students as follows.

1. Allocation of research funds to young researchers

For young researchers without any budget such as school funds etc. (Example: institutional researchers), our center is allocating research funds to their study proposals, promote voluntary research effort, and support their working environments at the same time. Also we host research presentations by young researchers periodically to provide a space for them to receive frank and concrete advice on research procedures etc.

2. Presentation support of graduate students at international conferences

The center stimulates graduate students to submit the paper to international symposiums etc. as first authors, and give full support of their travel expenses and participation fees as well. The number of articles presented at international symposiums etc. by our students as the first authors exceed 50 per year, which makes up about 25% of the number of articles by the whole center (refereed journal articles and published articles such as international conference presentation). The total number of graduate students in the center is 30 to 50, therefore one student is doing international conference presentations about a little over one once in two years, on average. Also as a result, there are many cases of graduate students receiving encouragement prizes etc, and on average, 4 to 5 cases win awards per year.

3. Financial Aid for Ph.D. Students

Coordinating with partner divisions, we hire Ph.D. students as RA/TA etc. under GCOE etc. system, and give them financial support.

4. Promotion of paper submission by students and young researchers as first authors

When students submit the paper instructed by the staff of Center for Spatial Information Science, we try as much as possible to make students as first authors in order to stimulate their continuing motivation towards research. As a result, there are more than 100 articles of which the students being the first authors, and the educational effect is quite big.

Chapter 7. Current Activities of Joint and Usage Research Center

CSIS is conducting and supporting joint research with nationwide universities as joint usage/research center. Participation framework of joint research is indicated clearly and precisely on our center website (http://www.csis.u-tokyo.ac.jp/japanese/research_activities/joint-research.html), and we also conduct public relations activity to nationwide researchers through social media such as Twitter and Facebook. We are distributing presentation guidelines/participation guidance of CSIS DAYS symposium which is a meeting for presenting joint research application guidelines and joint research, via ML of related conferences every year. Also we are distributing the brochure which explains the framework of joint research through the related conference meetings and direct mail.

In close cooperation with top international researchers of Spatial Information Science, the center is conducting research exchanges, and it plans many public seminars. For example, besides above mentioned CSIS DAYS and CSIS symposiums, the center hosted and held Spatial Thinking and Geographic Information Science, an international conference with top researchers as operating committee, in September 2011. The best articles were chosen among the general articles submitted to this international conference, and we edited the special issue in international journal, "Environment and Planning B: Planning and Design". Other than this, we are actively contributing to editing activity of international journals and international academic organizations.

GIS (Geographic Information System) which is the system of processing geospatial data, and also geospatial data such as residential map and local statistic data etc. are generally expensive. The center realized the research environment where academic researchers can use GIS and geospatial data without any cost via joint research framework. Also the core curriculum of Spatial Information Science in Japan was organized mainly by the center, and thus it is actively conducting the development of educational materials and e-Learning system of Spatial Information Science.

There are two distinctive attempts made by joint research as follows.

1. Tohoku renovation mapping project (Duration: March 23, 2011-March 31, 2012, Collaboration with: Tohoku University Graduate School of Engineering, Disaster Control Research Center)

We made a database of building damage caused by the earthquake and tsunami, clarifies the cause of the damage and comprehend the whole damage picture regarding Tohoku Region Pacific Coast Earthquake, occurred on March 11 2011, which attacked the whole Eastern Japan. By using the detailed residential map, we made building damage map and disclosed in URL below.

http://www.tsunami.civil.tohoku.ac.jp/tohoku2011/mapping_damage.html

2. Establishing an Empirical Basis to Measure and Prevent Crimes against Children (Duration: April, 2007 to March, 2012, Collaboration with: National Research Institute of Police Science, Surugadai University, Nihon University, Meiji Gakuin University, Otomon Gakuin University, Sagami Women's University, ESRI Japan Corporation, Placemaking Institute Inc)

By measuring the temporal/spatial distribution of the crime damage of children by the scale equipped with credibility and validity, study research is conducted to establish methods to plan/assess effective and sustainable measure adapted to the environment situation of the crime and the characteristic of local community/individual residents. (Representative organization of research: National Research Institute of Police Science).

Chapter 8. Future Plan of CSIS

Since the establishment of the center in 1998, Spatial Information Science has been developed greatly, and its technology is being used in various fields in society as the mobile phones/devices are widely used and location information service develops. The environment where anyone can send out and use the detailed spatial information to ubiquitous anytime and anywhere will seem to be realized more in future. Also there are many social issues which cannot be dealt without spatial information: Effective and reliable maintenance management of social infrastructure facility, Regeneration/Reconstruction of urban space in aging society, Sophistication/Environmental load reduction of logistics, Prompt action and advanced restoration of wide-scale disaster such as earthquake and tsunami, and Dealing with global warming.

In order to respond to such social demands towards Spatial Information Science, the center needs to lead the research and actively get involved with the sophistication of Spatial Information Science. For example, these are some of important research subjects need to be worked on: Study of integrating tremendous amount of various spatial data effectively and how to analyze and deepen the understanding of various aspects of all kinds of transformation in a real world, Study on how to link the results of analysis and obtained content of transformation with proactive support and implementation of social services, Study of securing privacy and national security of detailed human behavioral data and national environmental/institutional data which will be exchanged and used on a large scale during the process. Therefore, the center set the goal as below, and summarized the future plan.

Activity goal

1. Enhancement/Expansion of joint research

The center will enhance/expand joint research further, and proceed to deepen/spread Spatial Information Science and to integrate it with the other academic fields.

2. Promotion of pioneering research

The center will realize the breakthrough in deepening/spreading of spatial information by promoting research that is pioneering creating a considerable ripple effect.

3. Staff Training

Collaborating with the other organizations, the center conducts training and re-education of the researchers/practitioners who can effectively conduct to deepen the Spatial Information Science, to integrate it with various academic fields, and to apply it to the solution of actual social issues.

Future plan

With the above activity goals, we summarize the future plan as practical action programs.

1. Strengthening/Expansion of Joint research

1a. Enhancement of data contents etc. for Joint research purpose

Besides the traditional data contents that were mainly the regional statistic data, the center will assess/record the contents of high academic values that are owned by government/municipality/private corporations, and personal contents made by researchers. Also the center will conduct the discovering/editing of the past data etc, and enhance it as time-series archive. It will also provide tool/knowledge/information that is necessary to proceed the research of Spatial Information Science such as the concept, understanding of methods, and usability of tools.

1b. Establishment of “Joint research producer”

The center will appoint “Joint research producer” who will excavate and promote the joint research more effectively in order to conduct to excavate the theme and recruit the members of joint research, collect/record the necessary data, use control of data etc, and proceed effective outreach of the results, under organic collaboration.

1c. Further enhancement of collaboration with international research organizations

Not only to further enhance/activate the joint research with domestic partner universities, but also to deepen the collaboration with international research organizations, thus it enhances the role of CSIS as international research center.

2. Promotion of pioneering research

The center will select the academic research areas that are important for Spatial Information Science and social/academic, launch model joint research project, and make it as a model case of deepening of advanced Spatial Information Science. Research themes will be discussed through Research Advisory Board etc.

About Spatial Information Science itself, important research subjects will be as follows: 2a. Study of measuring and integrating considerable amount of various spatial data effectively and how to discover/analyze its changes/transformation in a real world from various aspects, and how to deepen the understanding of its mechanism through modeling task (2b) What kind of proactive support and social services can we realize based on the results of analysis on real-world data and acquired changes/transformation information, (2c) How to secure the privacy and national security of detailed data of spatial human behavior, national environment/institution, and of high-resolution images etc.

3. Staff training

Other than continuing to systemize, prepare educational materials of, collect/make archive of the currently proceeding curriculum and support Spatial Information Science education and training at partner universities, the center will accept more young researchers and train them through joint research project with center faculties, collaborating with domestic partner universities and overseas partners.

4. Reassessment of research division structure

The center will reassess research division structure in order to conduct the above actions effectively and efficiently.