1. Goal and objectives

1.1 Goal: Establishment of a mega resources bank of Hong Kong biodiversity information, for biology education and environmental education.

1.2 Objectives:

(i) Provide an interactive platform for teachers and students to access comprehensive information of native biodiversity information for teaching and learning.

(ii) Enhance teachers to use native examples in biology education and environmental education.

(iii) Enrich teachers' and students' knowledge on local biodiversity and arouse students' awareness on conserving the nature.

(iv) Provide comprehensive guidance and reference material for students conducting investigation projects related to Hong Kong nature.

2. Needs Assessment

2.1 Educational policy

In the biology Curriculum and Assessment Guide (Secondary 4-6). Students are expected to **appreciate the wonders and complexity of nature and show respect for all living things and the environment**(p.9)", "**observe distinguishing features for identifying organisms, ...(p.23)**", **identify organisms from a local habitat (P.27)**", "**conduct and report an ecological study of a local habitat(p.35)**".

One of the 15 units of Science (Secondary 1-3) syllabus content is " **Looking at Living Things**", the content is :Living things: characteristics of living things; Observing an animal: observing carefully over a long period of time and drawing conclusions ; Diversity of plant and animal life: wide variety of living things and the variation within the same kind of living things; Sorting things into groups: using and constructing simple keys for identification; Endangered species: wild life, man's impact on the environment and conservation

In the General Studies for Primary Schools Curriculum Guide (Primary 1 - Primary 6), students are expected to **develop a keen interest in observing the environment instead of focusing on the study of textbook content, and have hands-on experiences to cultivate a sense of curiosity in the natural and human world** (p.12). It is also clearly stated that students are expected to **recognize the features of living things through observing and interacting with nature, to know the characteristic features of our immediate environment, and to understand how local human activities and natural environment may affect each other** (p.23).

2.2 Government environmental Policy

One of the specific conservation measures included in "The New Nature Conservation Policy" proposed by the Government in 2004, is "promoting public awareness and participation in nature conservation through publicity and **educational activities**". The "Hong Kong Biodiversity Information System" is a foundation for the teachers and students to develop a better understanding of our local nature environment.

2.3 Limited existing resources

For a long time, due to the unavailability of comprehensive local resources, teachers and textbook authors have to use oversea examples to illustrate concepts involving biodiversity. Today, local examples of animals and plants are still not widely, or correctly used. For example, in many textbooks on General Studies for Primary Schools, the very common tree in our city - Camel's Foot Tree (*Bauhinia canidia* 宮粉羊蹄甲) is wrongly described as having "pink" petals, actually its petals are violet! And the very common Gairo Morning Glory (*Ipomoea cairica* 五瓜金龍) is incorrectly named as "牽牛花". In biology textbooks, oversea examples are still widely used to illustrate the concepts of diversity of life forms, classification of organisms, origin of life, habitat destruction and

restoration, endangered species, symbiosis, etc.. These would definitely retard students' understanding of knowledge and their development of interest on local biodiversity.

Although teachers are highly recommended to bring the students to the wild environment to study the real nature and apply their knowledge to the real situation, and all teachers agree the need of doing so, it is still a general phenomenon that teachers are quite reluctant to take their students to the wild or let their students to do investigation projects on local biodiversity. One of the main reason is lack of enough knowledge on local wildlife and not confident to give satisfactory response to students' enquiry on these information.

The mother nature provides unlimited resources as well as the most interesting learning environment to our students, and Hong Kong has exceptional high diversity of wildlife. It is a very unfortunate fact that we do not have a good support and encouragement to assist the teachers and students to do more learning activities about our nature.

3. Applicant's capability

3.1 About the applicant

Ho Koon Nature Education cum Astronomical Centre (Sponsored by Sik Sik Yuen) is an aided school (funded by EDB) specialized on nature education, has been provided field study courses and developing nature education resources since 1995.

3.2 Experience on producing education resource:

a. "Interactive Field Studies For Higher Form Geography "teaching resources kit with interactive learning program CD-Rom for all geography teachers (2000)

b. " Ecology Field Study Resource Kit" for all biology teachers (2000)

c. " Freshwater Stream Ecosystem of Hong Kong" poster to all biology teachers (2001)

d. "Diagnosing Freshwater Strem" (為河流看病) teaching resources kit with VCD to all secondary schools (2001)

e. " Establishing Butterfly Garden in Schools" (在學校建造蝴蝶園) book to all secondary and primary schools. (2002)

f. " Freshwater Stream Organisms" identification guide to all biology teachers (2003)

g. " Small animals in School" poster to all secondary and primary schools (2004)

h. " Various plant characteristics" poster to all secondary and primary schools (2004)

i. " School and Urban Plants of Hong Kong" book to all secondary and Primary school. (2005)

j. " Field Study Handbook - Wildlife Pictorial Guide" to all biology teachers (2006)

k. "200 species of Hong Kong Wild Plants" poster to all secondary schools (2007)

l. " School of Wild Plants" (野生植物學堂) web site (iflora.info) (2007)

m. " Field Study Handbook - Wildlife Pictorial Guide and Field Sites" to all biology teachers (2008)

o. "200 species of Hong Kong Butterflies" poster to all secondary schools (2009)

p. "200 species of Hong Kong Birds" poster to all secondary schools (2009)

q. "200 species of Seashore animals and plants" poster to all secondary schools (2009)

r. " Investigatory Field Study" learning resources web site (ifieldstudy.net)(2009)

s. "Biology Field Study Implementation and School-based Assessment Handbook - Freshwater stream" to all biology teachers (2009)

t. "Biology Field Study Implementation and School-based Assessment Handbook - Mangrove" to all biology teachers (2009)

s. "Biology Field Study Implementation and School-based Assessment Handbook - Tai Po Kau Nature Reserve" to all biology teachers (2010)

t. "Biology Field Study Implementation and School-based Assessment Handbook - Rocky Shore" to all biology teachers (2010)

u. "Biology Field Study Implementation and School-based Assessment Handbook - Sand Flat" to all biology teachers (2010)

3.3. Experience on handling educational project/programs

a. Higher-Form Nature Education Teaching Kit (1999 - 2001), funded by QEF ($480,740), completed.

b. Constructing Butterfly Garden in School (2002)(construction, publications, training seminars), funded by Sik Sik Yuen, completed.

c. Active Learning of Our World and the Universe (2000 -2003), funded by QEF ($2,913,200), completed.

d. A Journey to the Nature (2001), funded by QEF ($54,800), completed.

e. Constructing Nature Education Trails in School(2003 - 2005), funded by QEF (320,760), completed.

f. Energy Study Centre (2005), funded by Energy Innovation Fund, CLP ($245,800), completed.

g. Enhancing of IT Infrastructure (2005 - 2006), funded by QEF ($110,300), completed.

h. "清新能源幼苗培育計劃" (2006), funded by Hongkong Electric Clean Energy Fund($99,800), completed.

i. Pre-school Education Development Project, funded by Sik Sik Yuen ($470,000), completed.

j. AEON Smart Environmental Home Scheme, funded by AEON Education and Environment Fund (200,000), completed.

k. Teacher Development Project on New Senior Secondary Liberal Study Curriculum of "Energy and the Environment" (2008 - 2010), funded by QEF (1,591,000), completed.

l. Development Project on "Astronomy and Space Science" in the Senior Secondary Physics Curriculum (2010 -), funded by QEF (2,158,400), ongoing.

m. Searching for Nature Stories (Field study investigation competition for biology students, co-organized with CUHK and EDB)(2008, 2009, 2010, 2011), funded by Sik Sik Yuen ($ 30,000 each year)

n. Geopark Independent Enquiry study Competition (2010, 2011), funded by Sik Sik Yuen ($25,000 each year

4. Targets and expected number of beneficiaries

All biology teachers, general studies teachers, environmental education teachers; all students and curriculum developers. Expected number of beneficiaries: 800 biology teachers, 1200 general studies teachers, 500 environmental education teachers, 18000 secondary students, 30000 primary students, totally 50500 individuals.

5. Conceptual framework

How would a student act on our local nature environment depends on his/her attitude towards the nature environment as well as his/her values on conservation, which are influenced by his/her understanding of he local nature. The 3 domains are interdependent and largely affected by how is the local nature environment be perceived or studied. The process involves 5 kinds of knowledge, namely: i) local animals and plants, ii) ecological concepts, iii) status of local habitats, iv) factors affecting biodiversity, v) local human impacts, and 4 kinds of skills: i) observing & recording, ii) organizing information, iii) analyzing information and iv) presenting information. Knowledge and skills are not independent, they affect each other.

For Hong Kong students, they are most deficient in knowledge: i) local animals and plants, iii) status of local habitats, iv) local human impacts; and skill: i) observing and recording. Breakage of one or more contributing factors would greatly reduce the quality and quantity of the study of local nature. The purpose of the biodiversity information system is to fill the gaps in order to facilitate students' and teachers' understanding of our nature environment.
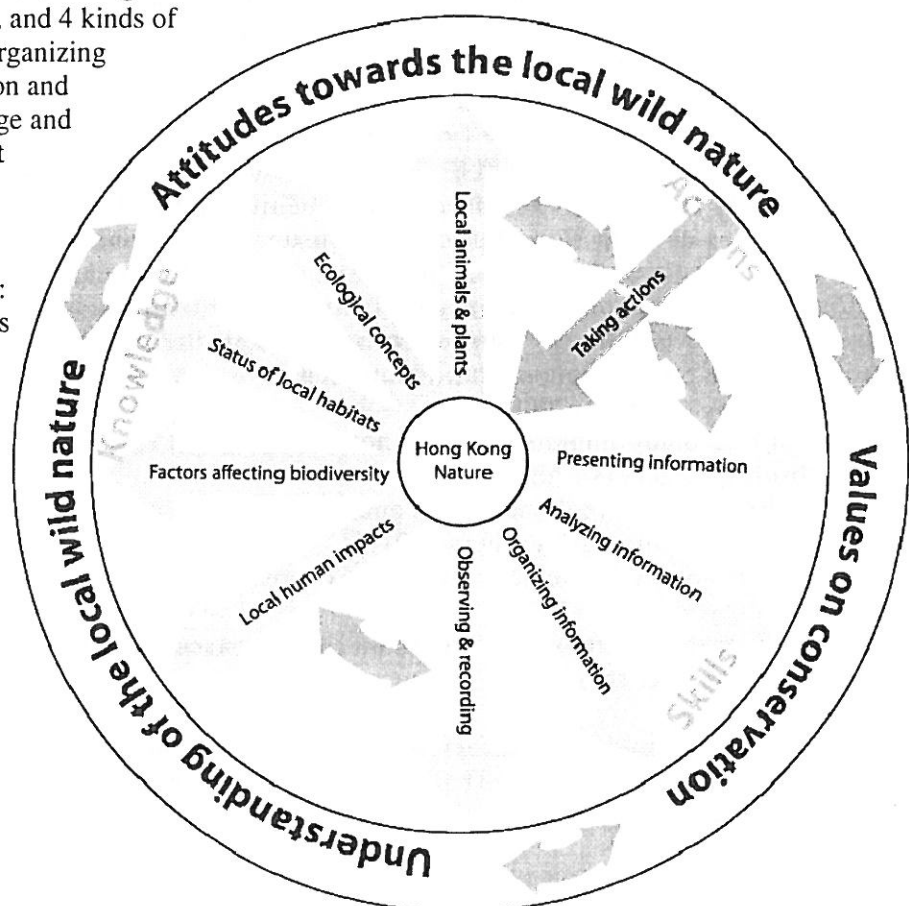
6. Innovation

There have never been any similar project been done in the education sector. Agricultural, Fisheries and Conservation Department has developed the "Hong Kong Biodiversity Database". However, the database contains only totally about 1000 animal species, far from representative of about 30,000 - 50,000 animal species actually occurring in Hong Kong. The scope is also very limited to vertebrates (mammals, fishes, birds, amphibians and reptiles), for invertebrates, only butterflies, dragonflies, coastal crabs and coastal snails are included. No information of habitats, biodiversity concepts, human impacts are provided, and only very low-resolution photos are provided. The content is far from fulfilling teachers' and students' educational needs. Further development of the database is not announcement and not foreseeable.

7. Extent of Teachers' & Principals' Involvement in the Project

7.1 School Principal
The idea of this project was first proposed by the Principal and then consolidated by the project team members. The Principal is an experienced biology teacher and had been teaching biology in a secondary school for more than 20 years. He had been in charge of numerous educational programs.

7.2 Biology subject panel Chairman (Teacher in charge of the project)
He has been teaching in Ho Koon since its establishment in 1995. He had been in charge of most of the programs listed above and authored most of the publications listed above. He is also knowledgeable in entomology, he found the HK Lepiodoterists' Society and the HK Entomological Society. He authored about 10 books on Hong Kong insects.

7.3 Biology teacher
He has been teaching in Ho Koon for 6 years. He had been in charge of numerous projects recently. He is also an expert on coastal animals, birds and spiders. He had worked as Chief Editor of HK Discovery magazine.

7.4 Biodiversity survey manager
Responsible for administration work of the project, editorial work and biodiversity survey. Should possess a recognized University degree on biology or equivalent, knowledgeable on animal and plant taxonomy and identification, experience on outdoor survey work and skillful on macro photography.

7.5 Biodiversity survey officer
Assist the Biodiversity survey manager. Responsible for data entry. Should be experienced on outdoor survey work and macro photography.

8. Implementation Plan with Time-line

8.1 Duration: December, 2012 to December, 2015

8.2 Process / Schedule:

2012	2013	2014	2015
1. Employing biodiversity survey manager and biodiversity survey officer			
2. 1st stage biodiversity survey			
3. Process field data and building the framework of HKBIS			
4. 1st stage computer program compilation			

2012	2013	2014	2015
5. 2nd stage biodiversity survey	———————	——	
6. 1st stage data entry	————		
7. Database testing and modification		——	
8. 2nd stage data entry		———	
9. Announcement of database beta version		–	
10. Teacher workshops and seminars			————
11. Finalization of database			——
12. Evaluation of project			————

8.2 Foreseeable difficulties:

    8.2.1 Biodiversity survey manager and biodiversity survey officer need special knowledge and skills and very few suitable candidates are currently available in the market. Mitigation: The salary should not be less than the market price. Provide good working environment and strong support to their work.

    8.2.2 Many of the recorded animals and plants are not able to be identified. Mitigation: Invite experts in different taxonomical groups to help.

    8.2.3 Many uncommon plants and animals are not found in the surveys and no photo taken. Mitigation: Invite relevant groups (e.g. HK Bird Watching Society, HK Reptiles and Amphibian Association, Ichthyological Society of HK, HK Lepidopterists', HK Entomological Society, HK Wildlife.net forum), and other individuals to provide information and photos.

9. Project content

9.1 The concept
Establishment of the HKBIS is to increase the opportunity of the students and teachers to learn about biodiversity in a local context, and to promote the incorporation of the information into students' learning material and teachers' teaching material.

9.2 Details
Components

    9.2.1 **Habitats:** Not less than 200 events of outdoor biodiversity surveys in not less than 80 localities in Hong Kong, will be carried out in the 2 years. Totally there would be about 200 habitats included in the HKBIS.

    9.2.2 **Organisms:** In average, 10 species of plants and 20 species of animals can be recorded and photographed in each event of field survey. Ecological and biological information of the photographed will be noted and positions geotagged. Identification of the plants and animals will be done by comparing with available literature on taxonomy, as well as by consulting different experts. It is estimated that half of the plants and animals photographed could be identified, totally 1,000 species of plants and 2,000 species of animals. For each species, high resolution photos (copyright information bookmarked), ecological information, biological information and morphological information will be provided. Users can search by latin names, Chinese or English common names, through classification hierarchy or by browsing thumbnails or localities. More than 3,000 species with more than 10,000 photos would be included.

    9.2.3. **Biodiversity concepts and glossaries**: They would be illustrated by local examples. For instance, local examples of mutualism, threatened species, alien species, ecological hotspots,

would be added as many as possible; hundreds of local examples of different habitat types will be included.

9.2.4 Studying Hong Kong Biodiversity: The complete process by which biodiversity is done in a scientific way. A step by step guidance, assisted by computer program, will be provided. Collection of literature on Hong Kong biodiversity.

Features

9.2.5 The database is restricted to current students and teachers. Users need to get access by registration using their HKedCity account name.

9.2.6 An application for portable devices would also be designed. Users with HKedCity account could download and install in their portable devices. The application gives an easier and faster interface to browse the database in outdoor environment.

9.2.7 Series of teacher workshops and training seminars will be organized for promoting the database, deliver basic knowledge on identifying animals and plants in local habitats, as well as gathering teachers' opinions on the database, such that the database could be adjusted accordingly.

10 Expected deliverables and outcomes

10.1 Deliverables

10.1.1 A web-based mega database of Hong Kong animals and plants accessible by teachers and students.

10.1.2 An application for installation on portable devices.

10.1.3 At least 10 workshops/seminars for training teachers on skills for exploring Hong Kong biodiversity, knowledge on Hong Kong biodiversity as well as how to use the HKBIS for teaching. Preliminary topics:

a. Exploring natural habitats of Hong Kong series - Freshwater Stream
b. Exploring natural habitats of Hong Kong series - Sandflat
c. Exploring natural habitats of Hong Kong series - Scrubland
d. Exploring natural habitats of Hong Kong series - Fung Shui Wood
e. Skills and safety of nature exploration
f. Potentially dangerous wild animals and plants
g. Exploring wildlife in the school
h. Ecology in city gardens
i. Biological classification - practice in the wild
j. Field study in Tai Po Kau Nature Reserve
k. Knowing common insects in the countryside
l. Wild flowers and fruits of Hong Kong
m. Identifying wild plants
n. Learning biology glossaries in the wild

10.2 Outcomes

10.2.1 Teachers and students could easily access information of local animals and plants for preparing teaching materials and doing project learning.

10.2.2 Teachers and students could easily identify wild animals and plants, and become more willing to go out to learn in the nature.

10.2.3 Teachers and students become more interested and concerned on our nature environment.

11) Budget

11.1 Cost breakdown

Item catergories	Items	Budget	Sub-total
A. Staff cost [1]	Biodiversity survey manager salary + MPF : 36 months x (22,240 + 1112) (entry point for Graduate Master)	840,672	1,277,262
	Biodiversity survey officer salary + MPF : 36 months x (11,550 + 577.5) (equivalent to an assistant teacher and Contract base Forestry Inspector in AFCD)	436,590	
B. Equipment [2]	2 sets of mid-level single lens reflex camera with macro lens	34,000	68,600
	1 telephoto Zoom lens and 1 wide angle lens	12,000	
	2 GPS logger (for adding GPS data to all photos taken)	2,500	
	Memory cards, camera bags, flash lights, other accessories	4,500	
	Computer servers for storing database	9,600	
	computer softwares for photo organization and retouching	6,000	
C. Service [3]	Program design for the database	90,000	170,500
	Program design for application for portable devices	80,000	
	Domain name registration fee for 3 year	500	
D. General expenses	Audit fee	15,000	55,000
	General Expenses such as Travelling expenses, Printing cost, Postal cost, Stationery, etc.	40,000	
E. Contingency		8838	8838
		Total	1,580,200

Remarks:

1. Many of the 200 events of field surveys are taken place in remote areas. There is potential danger. To ensure safety, there should be at least 2 persons working together in all time.

2. Animals move and run in the wild, only Single lens reflex camera with interchangeable lens could capture reasonable proportion of them in acceptable quality. Macro lens are for small insects, wide angle lens for plants and habitats. Telephoto lens is for sensitive animals (e.g. butterflies, dragonflies, birds, etc.) which cannot not be approached. Two sets of camera and lens could greatly improve the surveying efficiency in the field.

3. For portable devices, different applications are needed for different operating systems, 2 main different operating systems are widely adopted in the market currently, namely: iOS and Andriod.

11.2 Asset usage plan after completion of the project

Category (in alphabetical order)	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment (Note)
audio and video equipment	mid-level single lens reflex camera with macro lens	2 sets	34,000	For continue update of the database
	Telephoto zoom lens and wide angle lens	1	12,000	For continue update of the database
	GPS logger	2	2,500	For continue update of the database
	Memory cards, camera bags, flash lights, other accessories	1	4,500	For continue update of the database
computer hardware	Computer servers for storing database	2	9,600	For continue storage of the database to be accessed by users through internet
computer software	computer softwares for photo organization and retouching	1	6,000	For continue update of the database

12) Evaluation parameters and method

12.1 Biodiversity survey.

Performance indicator and monitoring:

i. Number of surveys : There should be around 10 surveys a month, depends on weather conditions. Each survey should be recorded on a form and the records would be checked once a month by the person in charge of the project.

ii. Number of species recorded: All photos taken from the surveys are geotagged (exact location and time embedded to the photo) and loaded to the server immediately. The teacher in charge of the project would check the photos in the server once a month to ensure the quantity and quality meet the requirement. The teacher in charge of the project would also attend the field survey at least once 3 months to ensure that the survey are done in proper way. A progress report form need to be filled to note down how many species have been recorded. The form would be checked periodically.

iii. Habitats, biological concepts & glossaries: Photos are checked at least a month to make sure that 70 % of the required photos are captured in the first years, and the remaining 30% in the second year.

12.2 The Biodiversity Information System:
Performance indicator and monitoring:

i. The web-based resources bank: The program itself includes usage recording function. i.e. hit rate for individual pages, source of visitors, data flow, time of visiting, etc. are recorded and statistic reports could be generated at any time. In the first 3 months after announcement of the web site, weekly reports would be generated and analyzed. To obtain users opinions, there is also a user friendly opinion collecting function in the program so that users could easily express their comments. The target is 200 biology teachers and 3,000 students register and login to use the BIS, in the first year after establishment, and more than 60% of the users who give comments, express that the BIS has positive impacts to them and achieve the 4 objectives.

ii. Applications for portable devices: Apps. are available to be downloaded upon registration. One of the performance indicator is the download rate, which could be clearly shown on the server and closely monitored. Another performance indicator is users feedbacks. The apps. would include a function of giving comments and sent o the server for records. Students attending field study courses organized by HKNEAC are also provided with portable devices. Besides giving comments through the program, they would also be asked directly when they are using the apps. and after they finish using the apps.. The target is 60% of the users who give comments, express that the apps. has positive impacts to their learning/teaching

12.3 Teacher workshop & seminars:
There would be totally 10 workshops/seminars for training teachers on skills for exploring Hong Kong biodiversity and knowledge on Hong Kong biodiversity. Participation rate is one of the performance indicators. It is targeted that there would be in average 20 teachers participating in each workshop/seminar. Another performance parameter is whether the training has positive impact to their knowledge and skills. Questionnaires shall be used to collect their opinions.

13) Sustainability of the Outcomes of the project

The Biodiversity Information System is a long lasting resources bank which would be kept open to students and teachers. Students participating in the biology field study courses organized by HKNEAC (about 3,000 students a year) would intensively use the BIS continuously. The system would also be kept updating by the staff of HKNEAC.

14) Dissemination/Promotion

A large-scale dissemination activity will be organized for promoting the HKBIS. Press release to news reporters of local media will also be done. We will also join QEF promotion activities. In every year, HKNEAC send invitation letters to all biology teachers about the field study courses application. The information about he HKBIS could also be delivered at the same time. We should also try to cooperate with HKedcity to have our information added to their website or hyperlinked in their website.

15) Report Submission Schedule

My school commits to submit proper reports in strict accordance with the following schedule:

Project Management 計劃管理		Financial Management 財政管理	
Type of Report and covering period 報告類別及涵蓋時間	Report due day 報告到期日	Type of Report and covering period 報告類別及涵蓋時間	Report due day 報告到期日
Progress Report 計劃進度報告 1/12/2012 - 31/5/2013	30/6/2013	Interim Financial Report 中期財政報告 1/12/2012 - 31/5/2013	30/6/2013
Progress Report 計劃進度報告 1/6/2013 - 30/11/2013	31/12/2013	Interim Financial Report 中期財政報告 1/6/2013 - 30/11/2013	31/12/2013
Progress Report 計劃進度報告 1/12/2013 - 31/5/2014	30/6/2014	Interim Financial Report 中期財政報告 1/12/2013 - 31/5/2014	30/6/2014
Progress Report 計劃進度報告 1/6/2014 - 30/11/2014	31/12/2014	Interim Financial Report 中期財政報告 1/6/2014 - 30/11/2014	31/12/2014
Progress Report 計劃進度報告 1/12/2014 - 31/5/2015	30/6/2015	Interim Financial Report 中期財政報告 1/12/2014 - 31/5/2015	30/6/2015
Progress Report 計劃進度報告 1/6/2015 - 30/11/2015	31/12/2015	Interim Financial Report 中期財政報告 1/6/2015 - 30/11/2015	31/12/2015
Final Report 計劃總結報告 1/12/2012 - 31/12/2015	31/3/2016	Final Financial Report 財政總結報告 1/12/2015 - 31/12/2015	31/3/2016