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# **Study on the ILC Central Campus**

## Interim Report on Study Results

30 May 2013

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**KEK Linear Collider Project Office**

Akira Yamamoto

Masanobu Miyahara

# Introduction

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## Background

- Research company: **NRI/NOMURA-SOKEN com.**
- Cooperation company: **FUKUYAMA Consultant com.**
- Investigation period: Oct 2012~Mar 2013

## List of Research Institutes visited investigation

- **ITER** in Cadarache (France)
- **SACLE** in Sacley (France)
- **OIST** (OKINAWA International Science & Technology)
- **Univ.** TOHOKU, KYUSHU, SAGA
- **Inst.** JAEA(ROKKASHO),TOSU Synchrotron Center, KEK

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- I . Requirement for the Creation of Global Science City  
with ILC as the Core**
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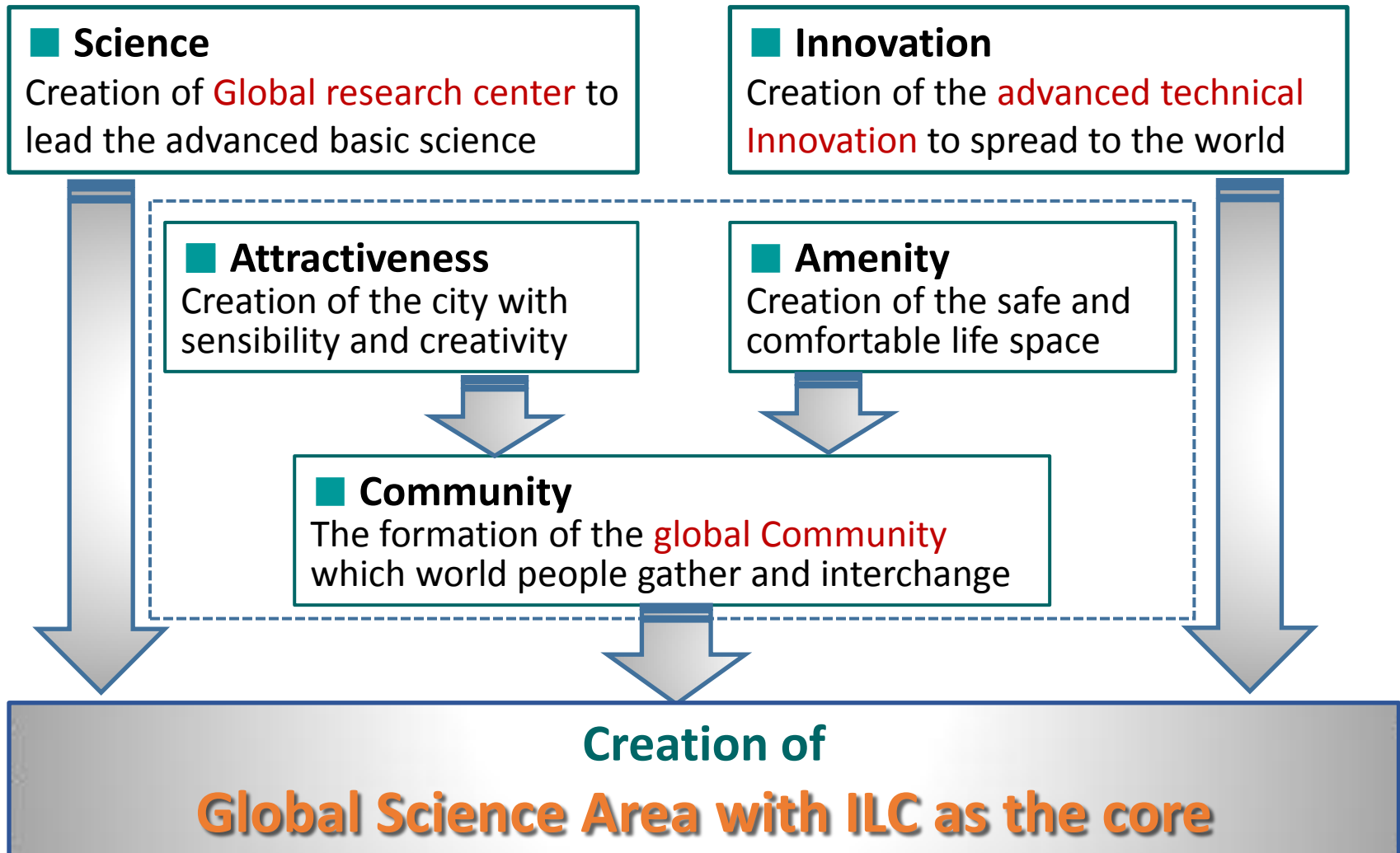
## **I . Requirement for the Creation of Global Science City with ILC as the Core**

1. Basic Concept
2. Living Environment Requirements
3. Social Infrastructure Requirements

# I . Requirement for the Creation of Global Science City with ILC as the Core

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## 1. Basic Concept of the Global Science City



# I . Requirement for the Creation of Global Science City with ILC as the Core

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## 2. Living environment requirements (1)

- Security and Improvement of living environment requirements in the field of “Residence and House”, “Childcare and Education”, “Medical care and Insurance” are required towards the formation of the Global Science city

### Main requirements of Living environment

Residence Housing	<ul style="list-style-type: none"><li>- Assumption of <b>the residence range</b> in consideration of the life style of foreigners (examination of the commuting time)</li><li>- High-quality accommodations and residential facilities</li></ul>
Childcare Education	<ul style="list-style-type: none"><li>- Global childcare support service (<b>nursery school</b> inside campus)</li><li>- Global education service (<b>International School</b>, public school)</li></ul>
Medical care Insurance	<ul style="list-style-type: none"><li>- Globalization in the medical institution (Clinic , Hospital)</li><li>- Development of the <b>medical insurance</b> to cover foreigners</li></ul>
Life Support	<ul style="list-style-type: none"><li>- Improvement of supporting group and service for the everyday life of the foreigner (<b>Users service office</b>)</li><li>- globalization in local government and community</li></ul>

# I . Requirement for the Creation of Global Science City with ILC as the Core

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## 2. Living environment requirements (2)

- Security and improvement of the living environment requirements in the field of “Finance”, “life Traffic”, “Shopping and Foods”, “Culture and recreation” are required towards the formation of the Global Science city

### Main requirements of Living environment

<b>Finance Settlement</b>	<ul style="list-style-type: none"><li>- Improvement of the international cashing service by the ATM (Globalization of the Bank service)</li><li>- Improvement to aim at the ease the credit card acquisition service</li></ul>
<b>Life Traffic</b>	<ul style="list-style-type: none"><li>- Improvement of public transport services (commuting bus in-house)</li><li>- Support for acquisition of a private car and driver's license</li></ul>
<b>Shopping Foods</b>	<ul style="list-style-type: none"><li>- Assortment of goods and foods corresponding to foreigners needs</li><li>- Offer of the various menus considered to the foreigner's taste</li></ul>
<b>Culture Recreation</b>	<ul style="list-style-type: none"><li>- Offer of the accessibility to Japanese culture and overseas culture</li><li>- Improvement of sports and recreational facilities for foreign family</li></ul>

# I . Requirement for the Creation of Global Science City with ILC as the Core

## 2. Social Infrastructure requirements

- Security and improvement of the social infrastructure requirements in the field of “Transportation”, “Information”, “Energy supply”, “recreation” are required towards the formation of the Global Science City

List of social infrastructure requirements

Field	Item	Requirements
Transportation	Airport	International and domestic airport having high convenience
		Public transportation service of airport connection
	Harbor	Core harbor corresponding to the international distribution
		International container acceptance system
	Road	Access road of enough standards (width, weight, etc. )
Railroad	Proximity to a wide area railway network	
Information Communication	Broadband Mobile	Broadband information network connected to the world
		Mobile call environment connect to the world
Energy supply	electric	Security of an/the electric power supply base
	Water	Security of water supply and drainage facilities



# Contents

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## **II. Basic Condition of ILC Research Center formation**

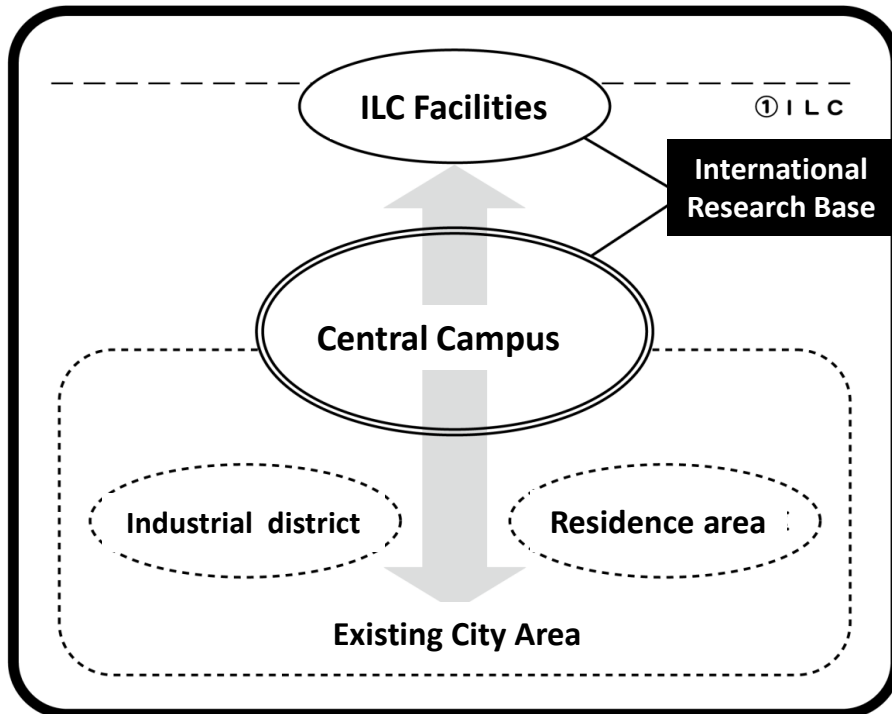
1. Basic composition of ILC Global Research Area
2. Assumption of the population scale in ILC
3. Residential Facilities required in the research area
4. Service Functions required in the research area

# II. Basic condition of ILC Research Center formation

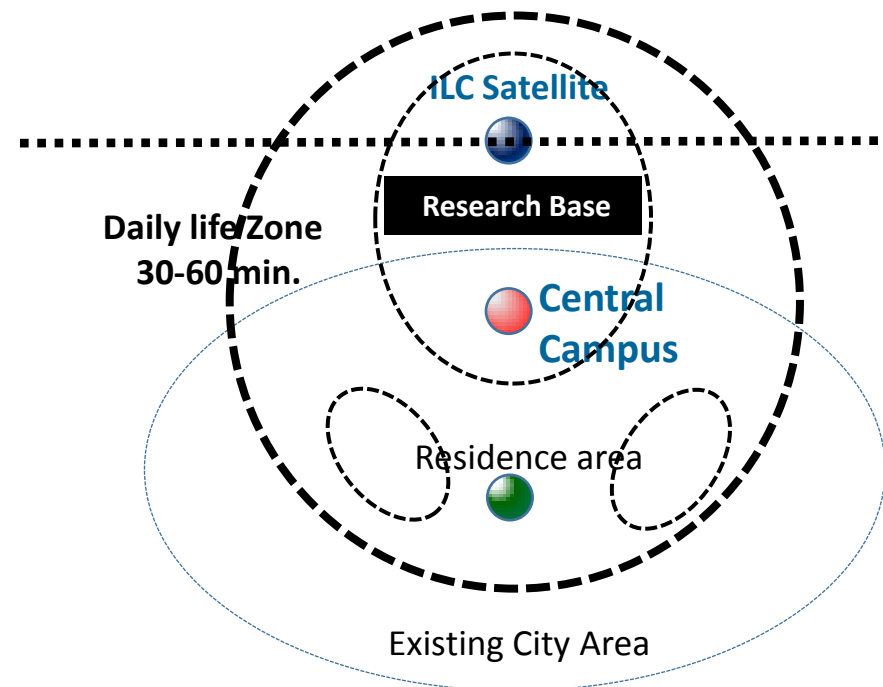
## 1. Basic Composition of ILC Global Research Area

- Global research area is composed of “International Research Base”, “Residential area“, and “Advanced Industrial area”
- Residential (commuting) range generally assume that about 30–40 minutes from the International Research Base

Global Research Area (city)



Global Research Area



# II. Basic condition of ILC Research Center formation

## 2. Assumption of the population scale in ILC (1)

Estimation of population in the ILC research center (total population including family)

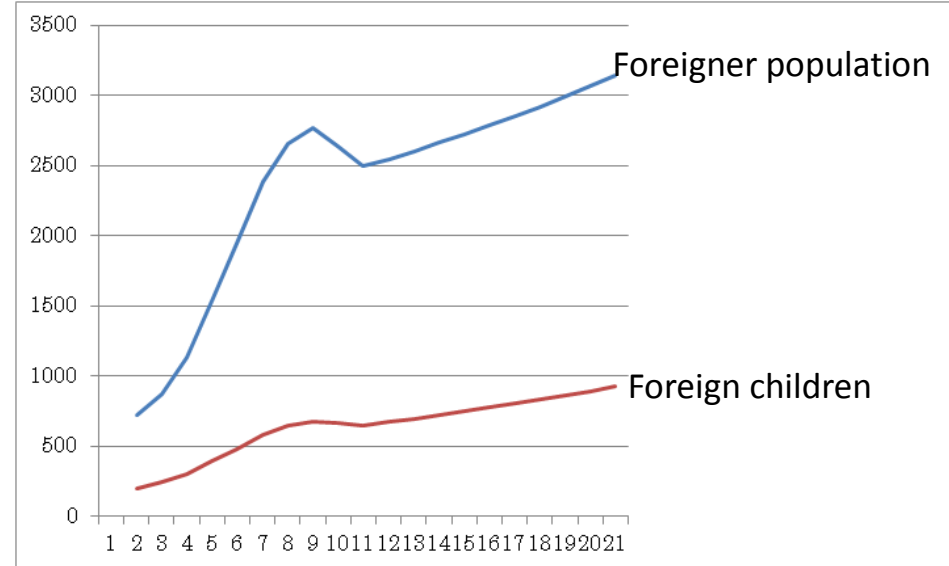
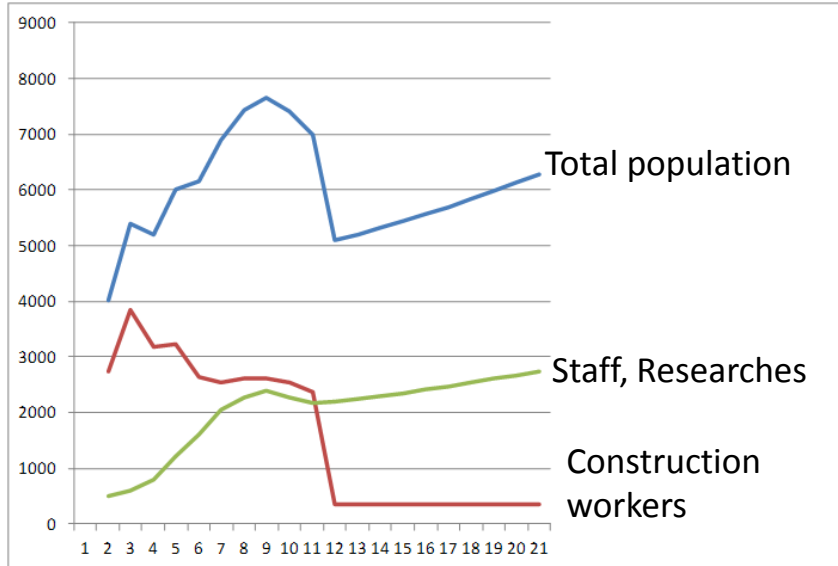
Annual Fiscal year	Construction period										Operational Period									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
■ Researcher, Engineer, Office worker Subtotal	500	600	800	1,203	1,605	2,049	2,267	2,388	2,282	2,362	2,200	2,251	2,303	2,358	2,415	2,476	2,540	2,606	2,677	2,751
(1) ILC Laboratory staff (parmanent+temporary)	500	600	800	1,000	1,200	1,400	1,600	1,600	1,400	1,400	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
①Permanent staff	400	500	600	700	800	900	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
-Research staff	200	250	300	350	400	450	500	500	500	500	500	500	500	500	500	500	500	500	500	500
-Technical staff	140	175	210	245	280	315	350	350	350	350	350	350	350	350	350	350	350	350	350	350
-Management staff	60	75	90	105	120	135	150	150	150	150	150	150	150	150	150	150	150	150	150	150
②Temporary staff (postdoctoral)	100	100	200	300	400	500	600	600	400	400	200	200	200	200	200	200	200	200	200	200
(2) Experiment participant Subtotal				203	405	649	667	788	882	962	1,000	1,051	1,103	1,158	1,215	1,276	1,340	1,406	1,477	1,551
①Reseacher				91	182	292	300	354	397	433	450	473	496	521	547	574	603	633	665	698
②Student (graduaite student)				71	142	227	234	276	309	337	350	368	386	405	425	447	469	492	517	543
③Experiment supporter				41	81	130	133	158	176	192	200	210	221	232	243	255	268	281	295	310
■ Construction, Maintenance worker Subtotal	2,730	3,835	3,180	3,240	2,630	2,550	2,610	2,610	2,550	2,360	360	360	360	360	360	360	360	360	360	360
(3) Construction worker (Including supervisor)	2,580	3,655	2,940	2,940	2,270	2,130	2,130	2,130	2,130	2,000	0	0	0	0	0	0	0	0	0	0
(4) Maintenance outsourcing workers	150	180	240	300	360	420	480	480	420	360	360	360	360	360	360	360	360	360	360	360
■ Incidental family Subtotal	782	956	1,215	1,571	1,927	2,303	2,570	2,668	2,580	2,481	2,536	2,599	2,662	2,728	2,996	2,866	2,940	3,015	3,094	3,175
(1) Family of ILC staff	710	870	1,100	1,330	1,560	1,790	2,020	2,050	1,936	1,818	1,844	1,871	1,897	1,923	1,949	1,975	2,001	2,027	2,053	2,079
(Parmanent staff with family)	320	400	480	560	640	720	800	800	800	800	800	800	800	800	800	800	800	800	800	800
(Temporary staff with family)	35	35	70	105	140	175	210	210	140	70	70	70	70	70	70	70	70	70	70	70
(2) Family of experiment participants	0	0	0	97	194	311	320	384	436	482	509	542	577	614	653	695	740	787	837	890
Experiment participants with family	0	0	0	49	97	156	160	189	212	231	240	252	265	278	292	306	322	338	355	372
(3) Family of construction worker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(4) Family of maintenance outsourcing workers	72	86	115	144	173	202	230	234	208	181	183	186	188	191	194	196	199	201	204	206
■ Total	4,012	5,391	5,195	6,014	6,162	6,902	7,447	7,666	7,412	7,203	5,096	5,210	5,325	5,446	5,771	5,702	5,840	5,981	6,131	6,286

# II. Basic condition of ILC Research Center formation

## 2. Assumption of the population scale in ILC (2)

- Estimated that approximately 5,100 people (11 years) ILC start of operations, the total population in accordance with the international research bases, to be approximately 6,300 people (20 years) ILC operation steady state
- Foreign population, estimated about 2,550 people in the ILC operation at the start, to be approximately 3,140 people in the steady state operation

Estimation of the population in the ILC research center



# II. Basic condition of ILC Research Center formation

## 2. Assumption of the population scale in ILC (3)

- The number of the workers in ILC international Institute assumes 2,200 people in (the eleventh year) at operative start time, 2,700 people in (the 20th year) at operative steady time.

Estimation of the ILC laboratory personnel

	Construction Peak (8Th year.)	Operation started (11Th year.)	During operation (15Th year.)	During operation (20Th year.)
Laboratory Staffs #1	1,600 p	1,200 p	1,200 p	1,200 p
Experiment participants #2	500 p	700 p	800 p	1,000 p
Laboratory Supporters #3	300 p	300 p	400 p	500 p
Total	2,400 p	2,200 p	2,400 p	2,700 p

#1: "Laboratory Staff" include the regular employment staff and temporary employment staff

#2: The Researchers, Engineers and Graduate-Students to participate in the two experiments (ILD & SID)

#3: Various Specialists engaged in experiment support business (subcontractor)

# II. Basic condition of ILC Research Center formation

## 3. Residential Facilities required in the research center

- The high quality residence for the personnel and the researchers who work at an international research center is supplied in campus inner and outside.
- We need the housing supply about 2,100 units at the starting time of ILC operation (11th year), and about 2,450 units (20th year) steady-state operation

Housing units required in each stage

		Total		In Campus		Off Campus	
		11 <sup>th</sup>	20 <sup>th</sup>	11 <sup>th</sup>	20 <sup>th</sup>	11 <sup>th</sup>	20 <sup>th</sup>
■ Housing units for family household		1,196	1,329	50	75	1,146	1,254
	Type-A (100m <sup>2</sup> ) 2~3LDK	897	997	50	75	847	922
	Type-B (160m <sup>2</sup> ) 3~4LDK	299	332	0	0	299	332
■ Housing units for live-alone		888	1,114	300	450	588	664
	Type-A (40m <sup>2</sup> ) 1LDK	666	835	300	450	366	385
	Type-B (60m <sup>2</sup> ) 1~2LDK	222	278	0	0	222	278
■ Total housing units		2084	2,442	350	525	1,734	1917

# II. Basic condition of ILC Research Center formation

## 4. Service Functions required in the research area

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### ■ Service Function (Facilities)

The service function expected around the global research area

Filed	Facilities corresponding to the living environment requirements
① Childcare, Education	<ul style="list-style-type: none"><li>- Childcare Facility</li><li>- International School</li><li>- Japanese public school</li></ul>
② Medical care, Insurance	<ul style="list-style-type: none"><li>- Medical institutions internationalized</li><li>- The drugstore internationalized</li></ul>
③ Life Support	<ul style="list-style-type: none"><li>- International support office (Welcome Center, Users office, etc.)</li><li>- One-stop service window of the local government</li></ul>
④ Finance	<ul style="list-style-type: none"><li>- The financial institution (ATM) internationalized</li></ul>
⑤ Life Traffic	<ul style="list-style-type: none"><li>- In-house commuter bus, on-demand bus service</li><li>- Public bus service</li><li>- new public transport service</li><li>- For foreigners car sharing, car rental service</li></ul>
⑥ Culture, Recreation	<ul style="list-style-type: none"><li>- Supermarket and convenience store which internationalized</li><li>- Restaurant internationalized</li><li>- Various foreign country restaurants</li></ul>

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## **III. ILC Central Campus Master Plan (model)**

1. Planning condition of ILC central campus
2. Planning model of ILC central campus master plan
3. Case study of master plan



# III. ILC central campus master plan (model)

## 1. Planning condition of ILC central campus (1)

### ■ Introduction facilities

- Research Facility
- laboratory facilities
- meeting and exchange facilities
- Visitor stay accommodation
- Service facilities
- car parking facilities
- Energy plant, etc.

### ■ Assuming about 100,000 m<sup>2</sup> in total floor area

### Assuming facilities and Scale

Classification	Assuming facilities	
	Facilities	Area(m <sup>2</sup> )
Research facility	Research office University & Institute	35,000
laboratory facility	Control center Assembly hall Technology development hall	33,000
Meeting facility	Lecture hall Meeting room	3,500
Accommodation	Dormitory Visitor accommodation	23,000
Service facilities	Reception, Users office Library, exhibition hall Cafeteria, Convenient store Health care & Training center	3,200
Transportation	Parking, Bus Terminal	-
Energy plant, etc.		1,100
Total		99,800

# III. ILC central campus master plan (model)

## 1. Planning condition of ILC central campus (2)

### ■ Social infrastructure conditions of ILC central campus

Infrastructure	Requirements		
Electric Power	▪ Required Electric capacity: about 10,000kwh (26ha: Site area)		
Traffic	<ul style="list-style-type: none"> <li>▪ Traffic base reinforcement: Improvement of international airport</li> <li>▪ Public Transport reinforcement: between airport, nearest station ~ campus</li> </ul>		
Water Supply	▪ Life Water supply: 1540 m <sup>3</sup> /day		
Waste	▪ Waste Disposal amount: about 1.9t / day (684.9t / year)		
Infrastructure development	<b>Living environment infrastructure</b>	<b>On- Campus</b>	<b>Off-Campus</b>
	Childcare, Education	○ (Nursery)	○(International School)
	Medical care, Healthcare	△(Healthcare office)	○(Hospital, Drugstore)
	Life Support	○(Users Office)	○(Regional Service)
	Finance, Settlement	△(ATM, UO-support)	○(Bank, Insurance)
	Shopping, Eating	△(Café ,Stand)	○(Super, Restaurant)
	Culture, Art, Information	△(UO-support)	○(Hall, Religion relation)
	Recreation, Sport	△(Jim, Swimming Pool)	○(Regional Service)

# III. ILC central campus master plan (model)

## 1. Planning condition of ILC central campus (3)

### ■ Symbiosis condition with natural environments

Symbiosis condition with natural environment in the Campus Plan

Infrastructure	Basic Condition
Symbiosis with environment	<ul style="list-style-type: none"><li>▪ Environmental symbiosis with surrounding area for low carbonization</li><li>▪ Inflection as the environment-conscious school of the campus</li></ul>
Fusion with natural environments, etc.	<ul style="list-style-type: none"><li>▪ Plan in consideration for biological diversity</li><li>▪ Landscape plan to consider the natural environment in region</li></ul>
Facility Design	<ul style="list-style-type: none"><li>▪ Inflection of the natural energy</li><li>▪ Promotion of the energy saving</li></ul>

#### Example OIST ■

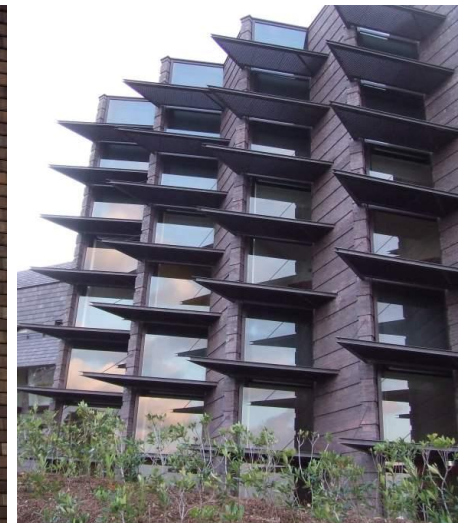


30/5/2013

#### ■ Facade design in consideration for energy saving



ECFA LC2013



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# III. ILC central campus master plan (model)

## 2. Planning model of ILC Central Campus Master Plan (1)

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■ **View Point 1: The campus, must be making stage to promote intellectual exchange and inspired on a daily basis**

- Placement of “the Core” becoming the central place of the intellectual interchange
- Setting of “the Flow line ” causing intellectual interchange, inspired by
- Securing of Flexibility and Extensibility in consideration of the future of the project

⇒ **Case study of the Skeleton Structure pattern**

■ **View Point 2: Construction of the Life Base to support the community multicultural coexistence in international**

- Placemen of “Residence zone” that isolated the place of the intellectual activity and the place of the daily life
- Offer of a variety of residence environment corresponding to the needs
- Creation of the residence environment that enables a variety of cultural life

⇒ **Case study of the Residence Zone placement pattern**

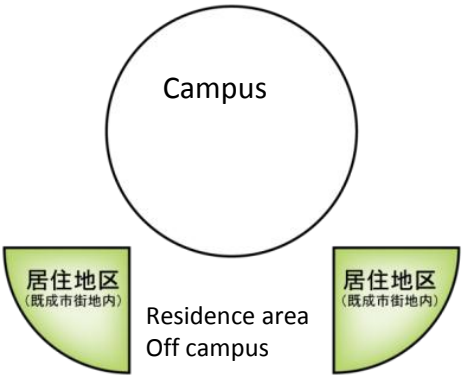
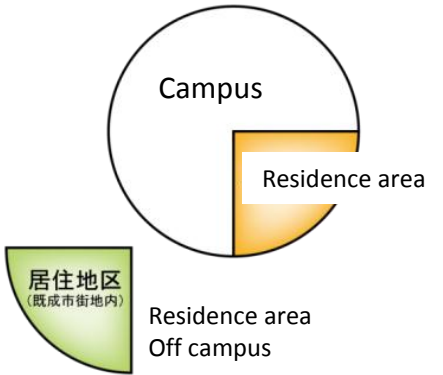
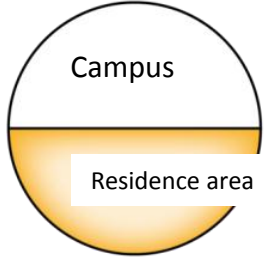
# III. ILC central campus master plan (model)

## Skeleton Structure pattern

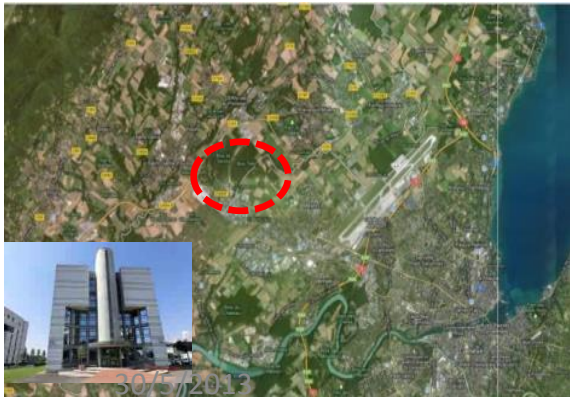
Pattern-1 : Center Core Type (Low-rise Core)	Pattern-2 : Center Core Type (High-rise Core)	Pattern-3 : Grid Type
<ul style="list-style-type: none"> <li>- Structure to be accessed laboratories group after through the core from the entrance ⇒Focus on the core</li> <li>- Possible to expand the research facilities radially around the center core</li> </ul>	<ul style="list-style-type: none"> <li>- Locating the experiment facilities in the outskirts as a core in a high-rise building</li> <li>- The neighboring experiment institutions group can be expanded radially</li> </ul>	<ul style="list-style-type: none"> <li>- Structure to be accessed in all directions such as research building and Core center from the entrance ⇒Core unclear</li> <li>- The extensibility such as research facilities is very high</li> </ul>
<p>(例) OIST</p>	<p>(例) Fermi Lab</p>	<p>(例) CERN (Meyrin)</p>

# III. ILC central campus master plan (model)

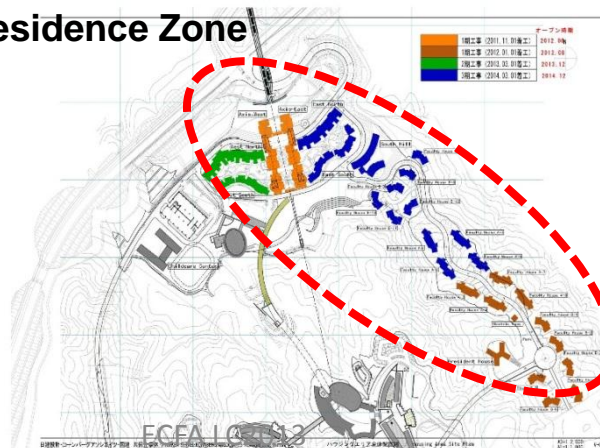
## ■ Residence zone placement pattern

Off-campus placement	Distributed Placement	In-campus placement
		
<ul style="list-style-type: none"> <li>- A residential compound is not arranged in a campus.</li> <li>- Minimum life service functions, such as a short-term stay institution and a child-care facility, are arranged.</li> </ul>	<ul style="list-style-type: none"> <li>- Residential facilities are distributed in the central campus and off Campus.</li> <li>- The necessary minimum residences such as for a single person, for short-term stays, etc. are improved in a campus.</li> </ul>	<ul style="list-style-type: none"> <li>- All the living accommodations and life service functions are arranged in a campus.</li> <li>- New living-accommodations maintenance is not performed in a built-up area.</li> </ul>

### ■ CERN, FNAL, KEK

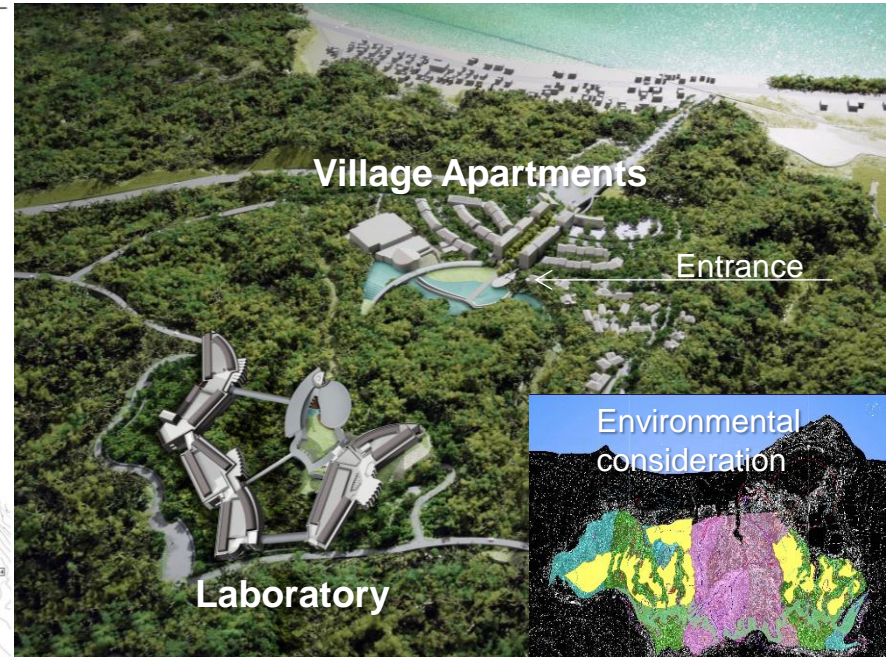
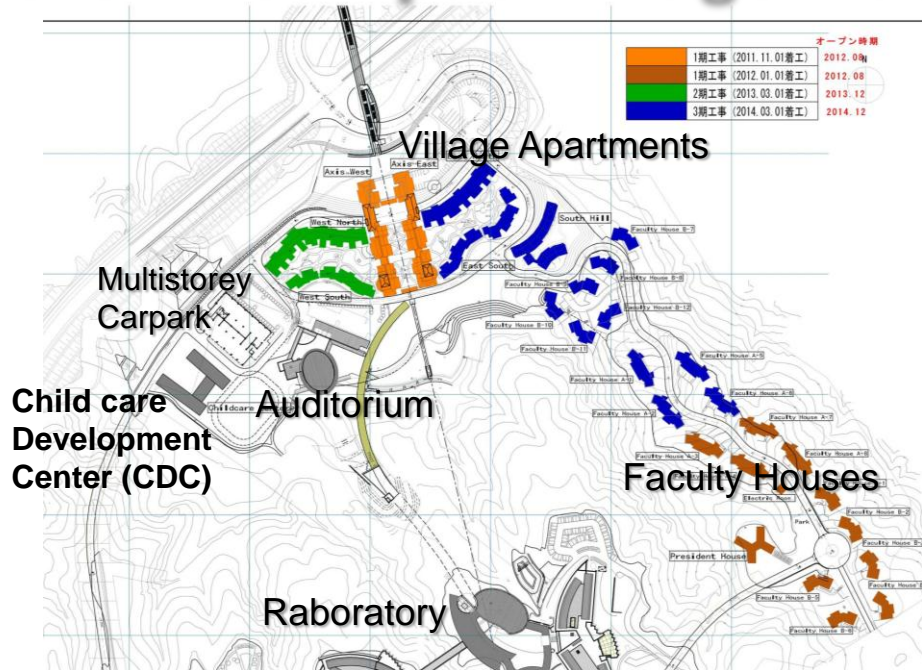


### ■ OIST Residence Zone



Reference example :

# OIST : Campus Village Master Plan



## Assumption of the Building area and Site area

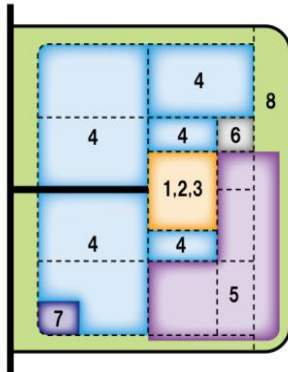
Function	Facilities		Floor area Gross (m <sup>2</sup> )	High-rise type		Low-rise type	
				Stories	Area (m <sup>2</sup> )	Stories	Area (m <sup>2</sup> )
■ Research function Function	Research Building	-	18,000	1 building 16-stories	12,850	3 stories	38,550
		-	9,000				
		-	9,450				
	Administration building	-	2,100	1 floor	110,000	1 story	110,000
	Facility	Number	25,000				
Control center	1	3,000					
■ Conference function	Lecture hall	1	1,500	1 building 16-stories	1,300	1 story	13,000
		1	600				
	Meeting	2	900				
		4	900				
■ Residence function	Visitor accommodation	300	27,000	3 stories	34,500	3 stories	34,500
	Guest house	50	7,500				
■ Service function	Reception facility	1	375	1 building 16-stories	2,008	1 story	20,083
	Exhibition facilities		900				
	Library center		450				
	Cafeteria	1	1,300				
	Medical care room		150				
	Child care facility		600				
	Recreation • Sport		750				
	Users service center	1	1,000				
Convenience shop		500					
■ Traffic function	Parking tower		3,000	-	3,000	-	3,000
■ Supply function	Electric room	1	200	1 story	3,667	1 story	3,667
	Machine room	1	700				
	Disaster control room	1	200				
<b>Total</b>			<b>120,075</b>		<b>167,325</b>		<b>222,800</b>
Green area	Park, Open space, Green belt	25.0 %	25%		79,226		105,492
Outer road	Road	20.0 %	20%		63,381		84,394
Adjust pond		2.2 %	2.2%		6,972		9,283
Site area					316,903		421,970
					Around 32ha		Around 42ha



# Case study for assuming Site area : Zoning and Facility Layout

High-Rise Type

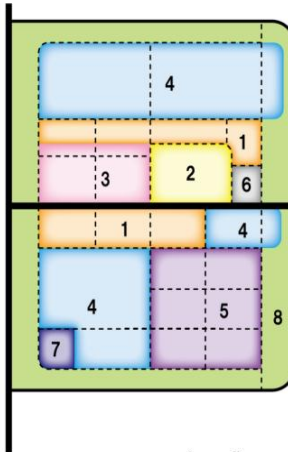
Zoning



Layout Plan



Low-Rise Type



# Image of ILC Research Center Campus for Assuming the Site scale

Draft proposal plan for discuss

