Briefing Book for the Zeuthen Workshop of the
CERN Council Strategy Group

Volume 3:

Working Group Instruments and Templates

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CERN Council Strategy Group

Preface

The CERN Council Strategy Group "*shall produce a Draft Strategy Document (DSD) addressing the main lines of Particle Physics in Europe, accelerator-based and non-accelerator based, including R&D for novel accelerator and detector technologies*". The Preparatory Group was given the task of organizing all the necessary preparatory work required to bring the Berlin meeting to a successful conclusion.

At the workshop, we have been given the task of proposing to the CERN Council a strategy of European Particle Physics. Four hundred colleagues came to Orsay as a preparation, many countries have discussed their visions and submitted them to us, and many of our colleagues have sent us their views and expectations. The challenge is to honour those expectations.

As part of the preparations for the workshop, a Briefing Book in three volumes has been produced to provide the necessary information to the Group to enable them to arrive efficiently at the strategy. The first volume contains an introductory essay on particle physics, a summary of the issues discussed at the Open Symposium, and discussions of the other themes that the Strategy should address. The second volume contains the input that the Preparatory Group has received from various sources. This, the third volume, has the templates and other instruments that will be needed to help the debate. It contains the detailed agenda for the Zeuthen workshop, a briefing on the objectives for each of the items on the agenda, a standardised vocabulary to be used to describe the initiatives, a detailed list of the working groups and the themes that they should address, and the allocation of members of the Strategy Group to the working groups.

Torsten Åkesson and Ken Peach

Geneva, 4th April 2006.

The Zeuthen Agenda

The first week of May we will enjoy the privilege of addressing the strategy of European Particle Physics. Four hundred colleagues came to Orsay as a preparation, many countries have discussed their visions and submitted them to us, and many of our colleagues have sent us their views and expectations. Thus, this meeting has a high visibility among our colleagues, who will give great attention to what we will accomplish, and ask us many questions afterwards. Our challenge is to honour those expectations.

The mandate from the Council states "… the Strategy Group shall produce a Draft Strategy Document" (DSD), and it "… shall comprise a series of ordered and concise statements, of 1-2 pages, followed by presentations and discussions of the initiatives not exceeding 25 pages".

The DSD shall address "the main lines of Particle Physics in Europe, accelerator-based and non-accelerator based, including R&D for novel accelerator and detector technologies". It shall aim "to enhance the visibility of existing European particle physics programmes; to foster increased collaboration among Europe's particle physics laboratories and institutes; to promote a coordinated European participation in world-wide projects; to reiterate the CERN Council's 2004 position on the European strategy for the International Linear Collider; to encourage knowledge transfer to other disciplines, industries, and society ".

The Preparatory Group will "organize and carry out all the necessary preparatory work required to bring the Berlin meeting to a successful conclusion". It is not the role of the Preparatory Group to prepare the strategy to be discussed at the workshop.

The agenda is structured so that it is clear that the DSD is produced by the workshop. Given the strict time limit, this means that the process must efficiently identify the "initiatives" that are described in the series of "ordered and concise statements". The "1-2 pages" implies a maximum of 15-20 statements.

The agenda for the Zeuthen workshop is given in the next section. Here we set out the objectives for each of the days, and the methodology that we propose to employ.

Tuesday May 2nd

During the Tuesday morning we will have the pleasure of listening to three distinguished speakers giving interesting talks on physics, facilities and usage of particle physics technologies in other fields.

After these, we will hear a presentation from the CERN Director General on the capacity and competences at CERN, together with an indication as to how these resources are committed today. In addition, he may indicate possible future scenarios, which he thinks the Draft Strategy Document could address. This will be followed by similar talks from the Directors of the other laboratories represented in the Strategy Group.

We have asked the Chairperson of the DESY Directorate to include in his presentation general issues from the perspective of national laboratories.

Finally, the observer states will present a brief review of the strategy for particle physics from their perspective.

The whole of this session will be open to anyone who is at Zeuthen at the time, and will be webcast as in Orsay.

After this opening session, the remainder of the workshop will be closed to everyone except the members of the Strategy Group and the invited observers. The working groups will have a preliminary meeting late Tuesday afternoon, to prepare themselves for the following day.

Wednesday May 3rd

The whole day will be devoted to six parallel working groups with the task of preparing their information for the plenary session the following day, acting on behalf of the Strategy Group as a whole.

The objective for the four physics working groups is to produce a list of possible initiatives that might be included in the DSD together with a first draft of the short (half to one page) discussion of each, using the standardised vocabulary. It is important at this stage that there is no attempt to prioritise the proposed initiatives (apart from correctly describing them using the standardised vocabulary), in part because it may well be necessary to combine initiatives from different working groups in a way that will surely have an influence. The other two working groups will address in a similar way the organizational themes (as seen from Europe) and from outside Europe (as seen by the Observer states).

We have allocated members of the Strategy Group to the Working Groups. This has not been an easy task, since there is a clear need to ensure that each working group has sufficient expertise available, and also has the appropriate balance between the member states, laboratory directors, theorists and the members of the Preparatory Group.

It is important that all of the working groups prepare the ground thoroughly for the following day's discussions. However, it must also be clear that the working groups should *not* try to define the strategy for their subject area – this must be discussed and the consensus established in the plenary session.

Thursday May 4th

The whole day will be spent in plenary session, where the output from the working groups will be discussed. The output will be the definitive list of initiatives that will form the core of the scientific elements of the strategy, and a similar list for the organizational aspects, together with the first draft of the appropriate sections of the longer document. The prioritisation of the scientific initiatives will at this stage be implicit through the use of the standardised vocabulary. It is vital for this process to work effectively that the working groups on Wednesday and the plenary session on Thursday use the standardised vocabulary as a tool to be able to arrive objectively at the science strategy.

Friday May 5th

Working in very much in the same way as Wednesday, different groups will address the other themes that must be addressed in the DSD. Here however the output should be draft concise statements in the standard form, backed up by a short (half page maximum) paragraph presenting the issues and discussing the conclusions. These will be incorporated into the DSD in plenary session on Saturday afternoon. An important separate working group, consisting mainly of theorists, will also meet to propose an initiative or initiatives on the needs of theory.

Meanwhile, the co-Chairs will take the list of initiatives from Thursday and produce the first draft of the DSD, to be circulated during the afternoon.

We will all have the opportunity to propose amendments and changes to this text, and submit them to the co-Chairs in the evening.

Saturday May 6th

The whole day will be spent in plenary session. It is only here that the DSD will be assembled and discussed, and the prioritisation of the scientific initiatives agreed. This will then be followed by the integration of the initiatives from the Friday working groups, into the full text.

We have planned a reception on Saturday evening to thank all the participants, and also our hosts, for their hard work.

Torsten Åkesson and Ken Peach
CERN Council Strategy Group co-Chairs

Strategy Group Workshop

Monday 01 May 2006 - Saturday 06 May 2006

Zeuthen, Germany

Programme

Monday 01 May 2006

Welcome reception for the Strategy Group and invited observers - Seehotel (19:00-19:30)

Dinner for the Strategy Group and invited observers (19:30-21:30)

Tuesday 02 May 2006

Boat from Seehotel to DESY/Zeuthen (08:15-08:30)

Coffee in foyer (08:30-09:00)

Open meeting: Opening talks - Room I+II+III (09:00-10:45)

- Conveners: ÅKESSON, T; PEACH, K

time	[id] title	presenter
09:00	[4] Welcome (00h05')	
09:05	[5] Physics overview (00h40')	Prof. 'T HOOFT, Gerard
09:50	[6] Research infrastructure (00h30')	Prof. FERNANDEZ, Enrique
10:25	[7] Applications of EPP technology in other fields (00h20')	Prof. AMALDI, Ugo

Coffee (10:50-11:20)

Open meeting: Laboratory presentations - Room I+II+III (11:20-12:20)

- Conveners: ÅKESSON, T; PEACH, K

time	[id] title	presenter
11:20	[8] CERN (00h30')	AYMAR, R
11:55	[9] DESY and general issues for national laboratories (00h20')	WAGNER, A

Lunch at the canteen (12:20-13:50)

Open meeting: Laboratory presentations - Room I+II+III (13:50-15:15)

- Conveners: PEACH, K; ÅKESSON, T

time	[id] title	presenter
13:50	[10] DAPNIA (00h10')	ZINN-JUSTIN, J
14:05	[11] LAL (00h10')	WORMSER, G
14:20	[12] LNF (00h10')	CALVETTI, M
14:35	[13] LNGS (00h10')	COCCIA, E
14:50	[14] PSI (00h10')	EICHLER, R
15:05	[15] RAL (00h10')	WOMERSLEY, J

Coffee (15:25-15:55)

Open meeting: Input from other regions - Room I+II+III (15:55-17:00)

- Conveners: PEACH, K; ÅKESSON, T

Closed meeting: First sessions of the working groups - WG-1 in Room VII/ WG-2 in Canteen/ WG-3 in Canteen/ WG-4 in Room IV/ WG-5 in Room V/ WG-6 in Room VI. (17:00-18:00)

Bus to Seehotel (18:45-19:00)

Strategy Group dinner at Seehotel/ room Zeuthen,Hennigsdorf (19:30-21:00)

Wednesday 03 May 2006

Boat from Seehotel to DESY/Zeuthen (08:15-08:30)

Coffee in foyer (08:30-09:00)

Closed Parallel Sessions, morning - WG-1 in Room I/ WG-2 in Room II/ WG-3 in Room III/ WG-4 in Room IV/ WG-5 in Room V/ WG-6 in Room VI. (09:00-12:30)

Available window for lunch at the canteen (12:30-14:00)

Closed Parallel Sessions, afternoon - WG-1 in Room I/ WG-2 in Room II/ WG-3 in Room III/ WG-4 in Room IV/ WG-5 in Room V/ WG-6 in Room VI. (14:00-18:30)

BBQ at DESY/Zeuthen (18:30-21:00)

Bus to Seehotel (21:00-21:15)

Thursday 04 May 2006

Boat from Seehotel to DESY/Zeuthen (08:15-08:30)

Coffee in foyer (08:30-09:00)

Closed session, plenary, morning - Room II (09:00-12:30)

time	[id] title	presenter
09:00	[22] Presentation wg 1 (00h30')	
09:30	[23] Discussion wg 1 (00h30')	
10:00	[24] Presentation wg 2 (00h30')	
10:30	[25] Discussion wg 2 (00h30')	
11:30	[26] Presentation wg 3 (00h30')	
12:00	[27] Discussion wg 3 (00h30')	

Buffé lunch in the foyer (12:30-13:30)

Closed session, plenary, afternoon - Room II (13:30-18:30)

time	[id] title	presenter
13:30	[35] Presentation wg 4 (00h30')	
14:00	[36] Discussion wg 4 (00h30')	
14:30	[37] Presentation wg 5 (00h30')	
15:00	[38] Discussion wg 5 (00h30')	
16:00	[39] Presentation wg 6 (00h30')	
16:30	[40] Discussion wg 6 (00h30')	
17:00	[41] Cross-cutting discussion (01h30')	

Bus to Seehotel (18:40-18:55)

Bus to Schloss Königs Wusterhausen (19:20-19:30)

Welcome drink and dinner at Schloss Königs Wusterhausen (19:30-22:00)

Bus to Seehotel (22:00-22:10)

Friday 05 May 2006

Boat from Seehotel to DESY/Zeuthen (08:15-08:30)

Coffee in the foyer (08:30-09:00)

Closed session, co-chairs - Room 3 (09:00-12:30)

Closed session, parallel, WGs on Supplementary Topics - WG-7 in Room I/ WG-8 in Room II/ WG-9 in Room III/ WG-10 in Room IV/ WG-11 in Room V. (09:00-12:30)

Buffé lunch in the foyer (12:30-13:30)

Closed session, co-chairs - Room 3 (13:30-16:00)

Closed session, parallel, WGs on Supplementary Topics - WG-7 in Room I/ WG-8 in Room II/ WG-9 in Room III/ WG-10 in Room IV/ WG-11 in Room V. (13:30-16:00)

Closed session: Distribution of the DSD - Foyer (16:00-16:15)

Bus to Seehotel (16:15-16:30)

Dinner at Seehotel/ room Zeuthen,Hennigsdorf (18:00-19:30)

Saturday 06 May 2006

Boat from Seehotel to DESY/Zeuthen (08:15-08:30)

Coffee in the foyer (08:30-09:00)

Closed session, plenary - Room I+II (09:00-13:00)

time	[id] title	presenter
09:00	[42] Presentation of DSD overall structure (00h30')	
09:30	[43] Discussion of the overall structure (00h45')	
10:15	[44] Approval of the overall structure (00h15')	
11:00	[45] Discussion and approval of individual statements (02h00')	

Buffe lunch in foyer (13:00-14:00)

Closed session, plenary - Room I+II (14:00-17:15)

time	[id] title	presenter
14:00	[46] Considerations and proposal from wg 7 (00h15')	
14:15	[47] Discussion and decision (00h20')	
14:35	[48] Considerations and proposal from wg 8 (00h15')	
14:50	[49] Discussion and decision (00h20')	
15:10	[50] Considerations and proposal from wg 9 (00h15')	
15:25	[51] Discussion and decision (00h20')	
16:05	[52] Considerations and proposal from wg 10 (00h15')	
16:20	[53] Discussion and decision (00h20')	
16:40	[54] Considerations and proposal from wg 11 (00h15')	
16:55	[55] Discussion and decision (00h20')	

Bus to Seehotel (17:15-17:30)

Dinner at Seehotel/ room Meißen Döllensee (19:00-20:30)

Working Groups

Wednesday

1. Frontier questions of EPP

- Completing the Standard Model;
- Origins of mass;
- Force unification;
- Matter-antimatter imbalance and lepto-genesis;
- Hierarchy problem;
- Origin of families;
- New symmetries/forces/dimensions;
- Other issues

2. Improve the understanding of the EPP we know; what do deviations tell us of the beyond?

- Vector boson interactions;
- Rare decays;
- Branching ratios, particle masses and mixing;
- Precision measurements of particle properties at accelerators;
- Strong interaction measurements;
- FCNC;
- Other issues

3. Non-accelerator physics and the interface to cosmos

- Implications of the ApPEC roadmap;
- Stability of matter;
- Precision measurements of particle properties;
- Strong CP problem and axions;
- Particle properties, interactions and particles from particle astrophysics initiatives;
- Laboratory measurements of relevance for particle astrophysics (dark matter; dark energy understanding; highest energy processes, composition and interactions);
- Particle physics and the early Universe;
- Other issues

4. Strong interaction, the nuclear interface, the impact on EPP

- QCD as a tool to explore the nature of fundamental interactions within, and beyond, the Standard Model;
- Relativistic heavy ion collisions;
- Hadronization;
- Hadron spectroscopy and QCD on the lattice;
- The nucleon structure;
- Hadronic spin physics;
- Diffraction
    - Impact on QCD;
    - Source of new and cleaner signals;
- Implications of the NuPECC roadmap;
- Other issues

5. Universities, national laboratories and CERN

- European political representation in global initiatives;
    - In Europe
    - Elsewhere
- European participation in global initiatives;
    - In-kind
    - Funding
- Accelerator and detector R&D in Europe, networks and the role of CERN;
    - For identified EPP initiatives
    - Generic
    - Accelerators and detectors for non-EPP
- National EPP-funding;
- European EPP interactions with EU. Do we have the needed structures?
    - Commission

    - Parliament
    - The future ERC
    - Which body is watching EU in the interest of European EPP?
- Technical training and recruitment for EPP;
- CERN as a broad activity laboratory. CERN during the LHC loan-repayment period;
- A need for a general global forum/framework?

6. Inter-regional collaboration (morning only)

- Europe as a collaborator in national/regional programmes outside Europe;
- To collaborate in European programmes;
    - National
    - Regional
    - CERN-based
- What is needed from Europe?
- What is needed in the observer state to enable collaboration with Europe?
- A need for a global forum/framework?

Friday (groups 7 and 8 merge by noon)

7. EPP initiatives and industry

- Industrial technology-forums;
- Best practices;
    - Experiences from previous initiatives
    - Guidelines for the future

8. Technology and knowledge transfer

- Known initiatives and the role of EPP laboratories;
    - Application of accelerators
    - Bioimaging
    - Computing
- Mobility related;
    - Relevant early training of EPP researchers
    - Industrial collaboration for technology transfer
- Incubator related;
    - Contacts with technology parks
    - Risk capital
- EU technology support;
    - Joint EPP-industry/SME initiatives
- Knowledge integration communities;
    - National initiatives
    - Laboratory initiatives
    - At the European level

9. Theoretical physics

- Prescription for success and world excellence;
    - Conclusions from citation analysis
    - Centres
    - Visitor programs
- Interactions with experiments;
- The role of CERN
- Lattice calculations;
- Supporting theory that is essential for experiment (higher-order corrections, event generators, etc.);
- Magnitude of activities in Europe compared with elsewhere;
- Infrastructure;
- Open a dialogue with the Commission if an initiative is needed?
- Other issues.

10. Public information

- Resources;
- Role of projects/initiatives respectively laboratories and CERN;
- General public;
- Decision makers;

11. School-related activities

- Existing activities compared with required scope for impact;
- Critical age groups;
- Resources;

Working Group Membership

This paper gives the attribution of the members of the Strategy group and official observers to the working groups on Wednesday 3rd May and Friday 5th May.

Torsten Åkesson and Ken Peach

Geneva, 4th April 2006.

1.1 Wednesday 3rd May

WG	Title	Chair	Members
1	Frontier Questions of EPP	Bertolucci	Barriera, Blondel, Cerny, Engelen, Heuer, *(Staffin),* Stapnes**,** Thomas, Zinn-Justin
2	Improved the Understanding of the EPP we know…	Rondio	Calvetti, *(Danilov),* de Jong, Rubbia, Nanopoulos, Webber, Wormser, *(Japan)*
3	Non accelerator physics and the interface to the cosmos	Cavalli	Coccia, *(Demir),* Linde, Majerotto, Tuominiemi, *(Turner)*, Vesztergombi, Wade
4	Strong Interaction, the nuclear interface, the impact on EPP	Mangano	Boggild, Chyla, Cifarelli, Feltesse, Fulton, *(Rabinovici),* Nassalski
5	Universities, national laboratories and CERN	Aleksan	Aguilar, Asman, Aymar, *(Eichler),* Gastmans, Herten, Petronzio, Wagner, Womersley
6*	Inter-regional Collaboration	Eichler	Danilov, Demir, Kondo, Rabinovici, Staffin, Turner, *(India)*

* **Morning only** Names in *(bracket italics)* = afternoon only; Countries in *Italics* = no name yet

1.2 Friday 5th May

WG	Title	Chair	Members
7#	EPP initiatives and Industry	Bertolucci	Aleksan, Aymar, Cavalli, Cerny, Cifarelli, Stapnes, Wagner, Womersley, *Japan*, *India*
8#	Technology and knowledge Transfer	Linde	Barriera, Coccia, Herten, Rabinovici, Tuominiemi, Vesztergombi, Wade
9	Theoretical Physics	Webber	Engelen, Gastmans, Mangano, Majerotto, Nanopoulos, Petronzio, Rubbia, Turner, Zinn-Justin
10	Public Information	Heuer	Aguilar, Asman, Bertolucci, de Jong, Eichler, Fulton, Nassalski, Staffin, Wormser
11	Schools-related activities	Blondel	Boggild, Calvetti, Chyla, Danilov, Demir, Feltesse, Rondio, Thomas

These two working groups merge after lunch with Linde as chairperson

Countries in *Italics* = no name yet

Explanatory notes for the vocabulary about the research projects/infrastructure

Content

The vocabulary specifies the projects/infrastructure in five different ways:

1. Scientific importance
2. Required effort
3. Collaborative status
4. Time-scale
5. Technical status

Working groups 1-4 goes through the inventory of projects/infrastructure with a special focus on their physics-area.

1. Scientific importance of the infrastructure

Fundamental

Project/infrastructure that is absolutely necessary for advancement. It is hoped to deliver a suite of results that will form our broad understanding of elementary particle physics. There is, or could be, a danger of stagnation without this project/infrastructure.

Very important

Project/infrastructure that is absolutely necessary for the advancement of some major aspect. It is hoped to deliver some breakthroughs that will fundamentally form our understanding of this area. This aspect of the theme will most likely remain unexplored without this project/installation.

Important

Project/infrastructure that is needed to address at least one major question that is a basic issue in elementary particle physics. It is unlikely that some other project with another purpose could provide the answer in a direct or indirect manner.

Project/infrastructure that would increase the precision of some fundamental physics parameter(s), with at least an order of magnitude, and from which issues relevant for this theme could be inferred.

Interesting

Project/infrastructure that would significantly progress our knowledge in an area of this theme much beyond what is known today, significantly improve our knowledge inventory in that area, that could lead to large model-improvements.

Of limited relevance

Project/infrastructure to produce relevant information but only with a limited improvement compared with what is achievable today, or which is not expected to become internationally competitive.

Unknown

Project/infrastructure for which results are needed to determine its scientific relevance.

2. Required effort

Global

Of such a magnitude that global collaboration is necessary. It probably requires an agreement at an inter-governmental level.

Regional

Of such a magnitude that at least regional effort is necessary. Can be hosted by an existing major laboratory and a collaboration be formed on an inter-agency level.

National

Of such a magnitude that it will require a substantial part of the resources of a major European country, or will adversely reduce the diversity of research activities in a smaller European country if it chooses to do it (to a big part) alone. Collaboration between several countries is desirable, but could be done with only one major country responsible, or as a dominating actor. It is too large to be duplicated in Europe.

Laboratory or institute

It is of such a scope, that it is reasonable to do it with only one country responsible (or as a dominating actor). It could well be duplicated in Europe if independent results are important.

3. Collaborative status

Established

Collaborations have been formed appropriate to the scope of the projects.

In formation

Several collaborations are in the process of being formed, it is not yet clear if there is a good balance between diversity and collaboration-strengths. More collaborators are sought to reach critical masses.

Embryonic

Groups are working together on R&D, but experiment collaborations are not yet under formation.

4. Time-scale

Long

Design, construction and commissioning, takes a decade or more. It will operate during a decade or more.

Medium

Design, construction and operation, take in the order of a decade in total.

Short

Design, construction and operation, take a few years in total.

5. Technical status

Construction

Under construction or getting the construction organization at place.

Mature

Ready to start working out a Technical Design Report as a basis for construction approval. Ready to make pre-production full scale prototypes.

Technical R&D status

Principles of the technology understood, and the problem scope is well worked out; ready to start with technical R&D and to formulate the conceptual design.

Conceptual

Need to work out the general conceptual issues. Some generic development may still be needed.

Generic

Research is needed to establish the basic technical features; R&D of generic nature.

Strategy for European Elementary Particle Physics

<Optional: General statement about the purpose of the Strategy Statement, followed by a series of “ordered and concise statements”>

1. <Statement #1>;<Consequences>
2. <Statement #2>;<Consequences>
3. …

n. <Statement #n>;<Consequences>

<Optional: General summary statement”>

Initiatives for European Elementary Particle Physics

<Optional: General statement about the purpose of the Initiatives and their relationship to the concise statements>

1. <Short title of "initiative #1">

<Description of the issue>

<Analysis of the implications for European Particle Physics for Members States, National Laboratories, Institutes and CERN, and where appropriate the relationship to particle physics globally, using the *standardised vocabulary* to describe the **Scientific Importance**, the **Effort Required**, the **Timescale** and the **Technical Status** (suitably interpreted for the non-scientific topics such as knowledge transfer, outreach etc)>

<Optional: Comments>

<Strategic Consequences>

2. <Short title of "initiative #2">

…

3. <Short title of "initiative #3">

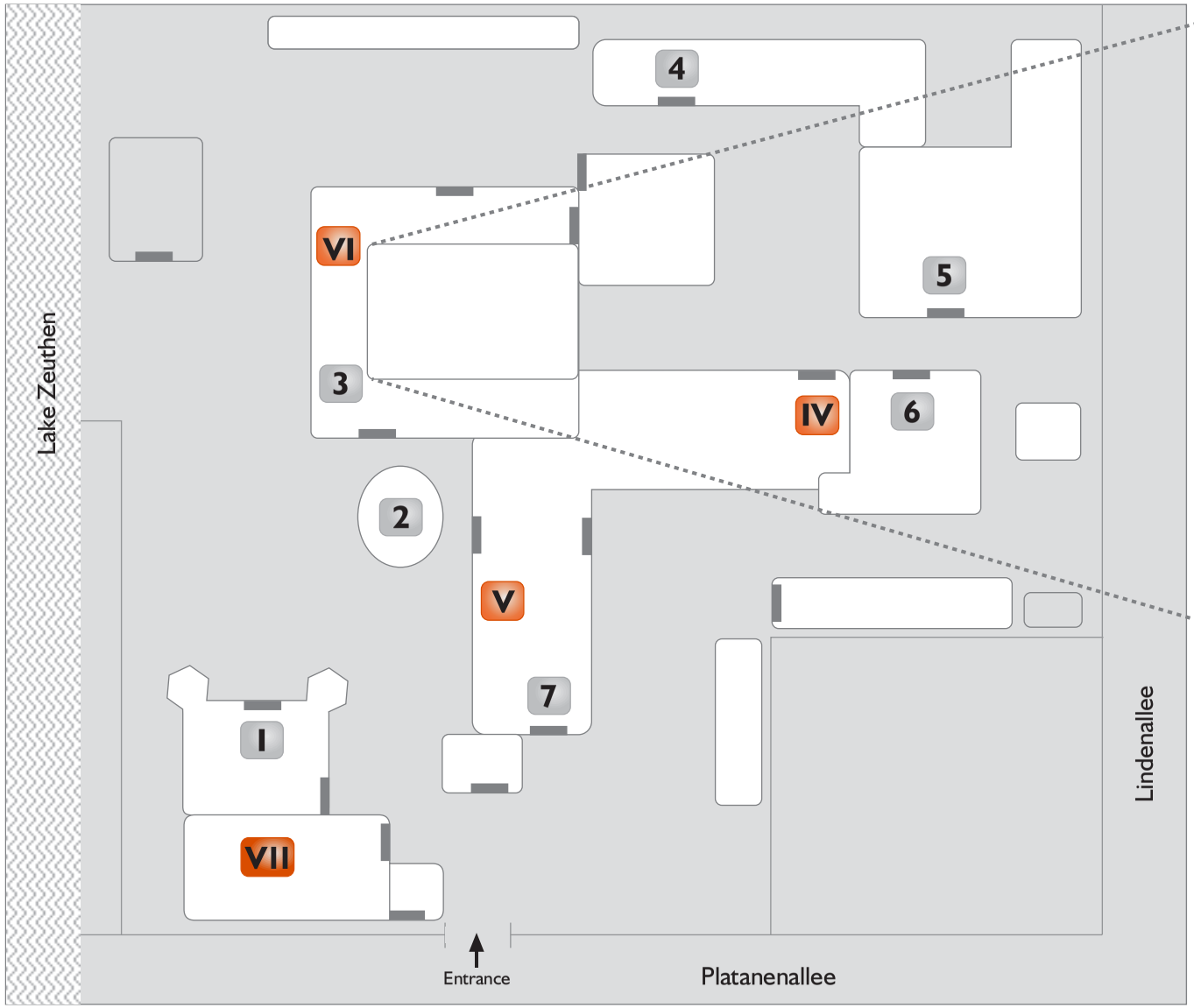
…

n. <Short title of "initiative #n">

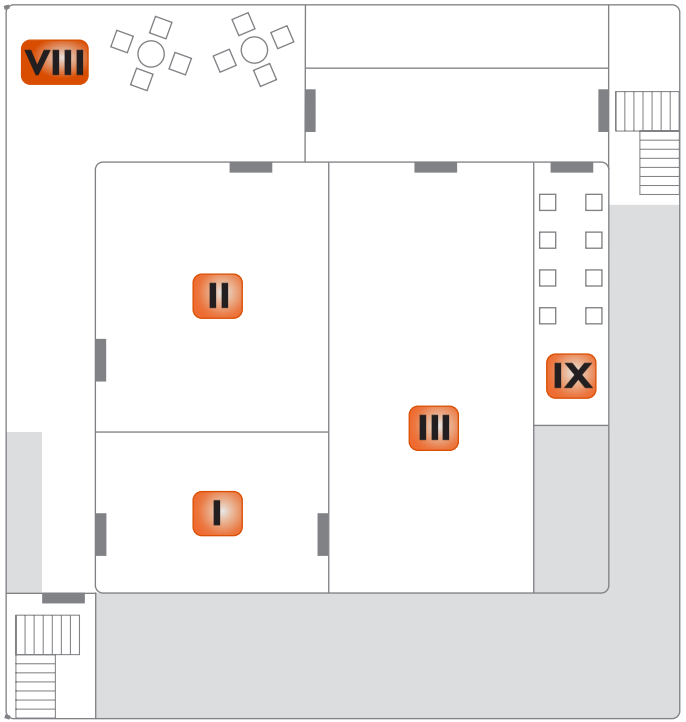
Summary (optional)

<Optional: Summary>

Ground Plan



Conference Center, 3rd Floor



		Location	Capacity
I	Seminar Room I	3H01, 3rd Floor	30
II	Seminar Room II	3H02, 3rd Floor	70
III	Seminar Room III	3H03, 3rd Floor	120
IV	Seminar Room IV	4L03, 4th Floor	20
V	Seminar Room V	2L46, 2nd Floor	10
VI	Seminar Room VI	1HU02, 1st Floor	15
VII	Seminar Room VII	2P05, 2nd Floor	7
VIII	Conference Office	3rd Floor	
IX	Terminal Room	3H04, 3rd Floor	

1 Cafeteria
2 Max Planck Statue
3 Experimental Hall
4 IceCube Lab
5 Computer Center
6 Photoinjector PITZ
7 Lab Building