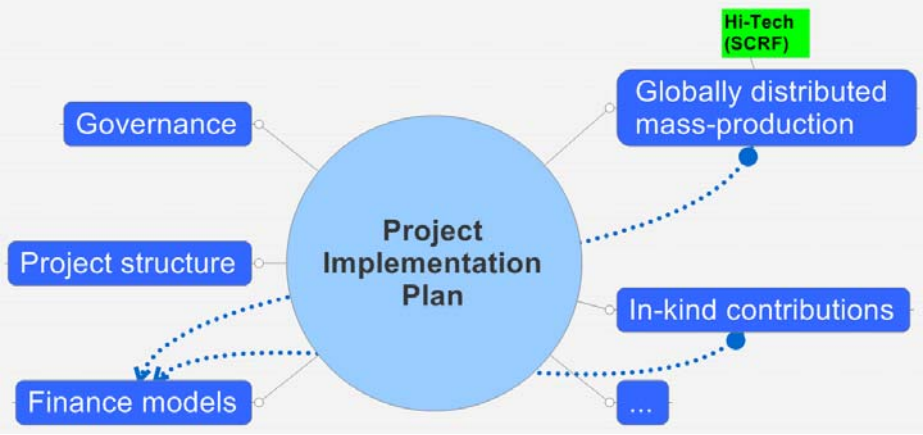
Update on Project Implementation Plan

Brian Foster (Oxford & GDE)

PAC Meeting
Vancouver 9-10/5/09

Project Implementation Plan (PIP)



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Introduction

- Only report on selected aspects of PIP where most progress has been made:
  - plug compatibility and governance;
  - some other aspects – such as common tools – covered elsewhere (PG)
- Governance:
  - summarise what we have learnt by studying "cognate projects" – ITER, ALMA, SKA, XFEL (FAIR)
  - from these studies, draw some general inferences for the ILC project governance
  - give timetable we expect to follow to produce interim report on Governance at end of TDP1 in summer 2009

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Plug compatibility for PIP (Kerby, AAP 4/09)

- Very extensive studies carried out for the R&D Phase. Evident benefits include:
  - Encourage creative work and innovation for performance improvement from a common baseline
  - Global transfer of information
  - Sharing of components to continue progress world-wide despite outside uncertainties
  - Development of the RDR design for system tests and in preparation for construction phase
- Production/Construction Phase
  - Keep competitive condition with free market/multiple-suppliers, and effort for cost-reduction
  - Keep flexibility to accept industrial effort, with features and constraints, to reduce the cost
  - Maintain intellectual regional expertise base

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Plug compatibility for PIP

General agreement that plug compatibility very useful for R&D phase. Differences of opinion remain for the procurement phase.

Some of the issues we will need to study in deciding this are:

1) Costs – enforcing common designs may result in price differences in different regions, and a general price increase since the best and cheapest manufacturing technique may not be available in a standardised design. This will need to be estimated for the recosting in 2012;

2) Installation & commissioning – plug compatibility guarantees compatible interfaces, but there will be technical differences in other parts of the system that will have implications for the commissioning, assembly and operation of the ILC. To what extent is it desirable, and if desirable, practical, to impose uniform designs across the regions;

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Plug compatibility for PIP

3) Spares – to what extent will we need to keep different sets of spares for each regional design and what are the cost implications;

4) Operations – do we need to confine the separate regional components to separate areas of the machine, or can they be mixed together and if so to what extent? How do we cope if the performance of the components of one manufacturer is markedly different to the others? Do we have to have operators trained in how to optimise the performance of each of the variants;

5) Does existence of different plug-compatible design variants introduce unacceptable operations and maintenance complications and the possibility of increasing number of design problems that have to be diagnosed and solved;

6) How do we deal with the IP implications of different companies working on a common design with their own commercially sensitive processes?

We will study the implications of these questions in drawing up a PIP which proposes the best balance between uniform and regional variations in design.

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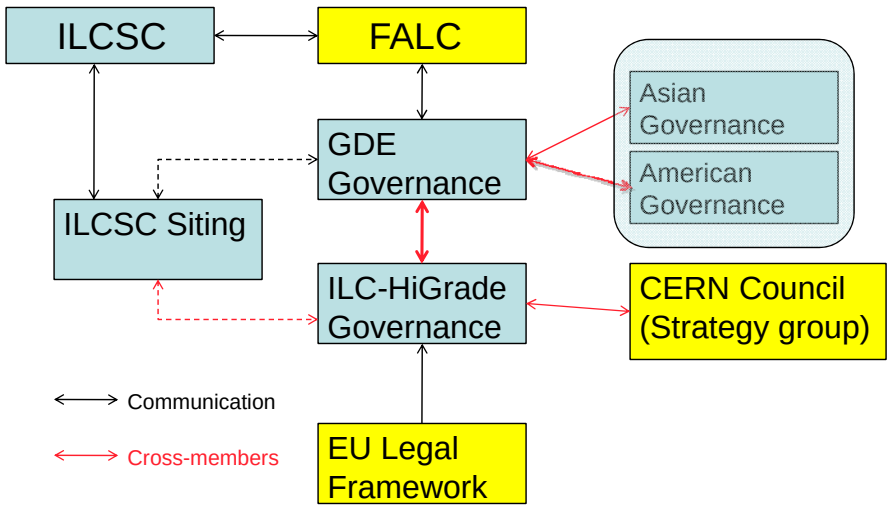
Governance



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The ITER Project

ITER agreement includes 29 articles + annexes, quite detailed
Agreement for 35 years, members can leave after 10 years.
Host (EU) + 6 member states (US, Ind, Rus, Kor, Jap, Chi)
In-kind contributions + small (12%) common fund in cash
Host ~ 45% contribution + ~ 9% each member state. Costs in IUA's.
Project reports to the ITER Council which meets twice per year
Issues

- All disagreements end up at the Council for resolution, insufficient Project authority: very inefficient
- In-kind contributions do not always follow rational technical interfaces, thus project integration is more complicated than necessary
- Normal construction project design changes are difficult to implement due to agreements on in-kind contributions of components which are difficult to change
- Relative cost changes in the different systems effectively change member contributions
- Value engineering & associated cost control difficult with IUA's & in-kind
- No accepted project-wide management tools yet

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The ALMA Project

Complex agreement – ALMA is not a legal entity. Overall budget ~450 Meuro.

Host (Chile – special position) + regional membership (Americas (=US/Canada), Europe (=ESO), Asia (=Japan – with link with Taiwan). No clear leading region; Japan joined late, leading to "de-descoping".

Each region carried out separate procurement for WBS items for which it took responsibility; there is ~ no common fund (which has caused enormous problems)

Host provides site only; present in Board but does not vote on many things. EU +Americas 50:50 before Asia. Asia now 1/4 of enlarged project, US&EU 3/8.

Project reports to ALMA Board which meets 3 times per year with extra telecons.

Issues

- ALMA's lack of legal standing is problem; staff employed by two different bodies;
- Procurement led to 3 different designs of antennae – although there are positive aspects of this (risk reduction) it is a problem;
- Partners joining (and leaving) not properly catered for;
- Management control weak – multiple paths of reporting to regional funding agencies;
- Council subordinate to regional interests and did not become robust;
- Ownership of assets, pensions fund etc. needed earlier clarification.

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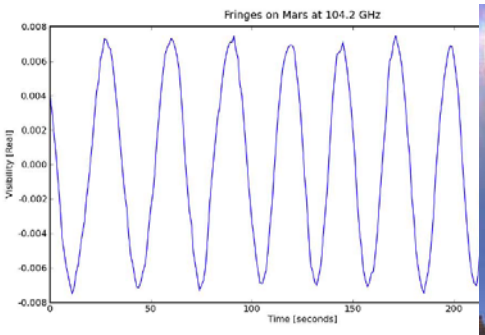
The ALMA Project – 1st results on May 4th



DV01 and PM03 pointing at Mars, 30 April 2009

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The Square Kilometer Array (SKA)

Proposed project – Similar maturity to ILC

MOU: MOU to Establish the International Square Kilometre Array Steering Committee (ISSC) -- eleven countries (Australia, Canada, China, Germany, India, Italy, the Netherlands, Poland, Sweden, the United Kingdom, and the United States) (analogous to ILCSC)

No parent organizations like ICFA, FALC or CERN, instead OECD Working group on Radio Astronomy

Design: PreSKA: now to 2012 define the project; earliest construction start 2012

Site selection: Two potential sites have been chosen: Australia and South Africa

Issues

- Design specification not yet agreed; mechanism to decide?
- Cost €300 M (2007 Value) for Phase 1 and €1,200 M (2007 Value) for Phase 2, i.e. €1,500 M (2007 Value) for array frequencies ~70 MHz to 10 GHz. [goals, not design parameters or cost estimates]. Advantage that excellent physics possible from small subsection of project.
- Phase 3 extension to at least 25 GHz, is not yet defined (like 1 TeV for ILC)
- 5 site proposals Argentina, Australia, China, South Africa, and the USA. USA withdrew and ISSC picked Australia & South Africa finalists. Decision ???
- New Science & Eng Committee of 22 members: US Consortium (7), European Consortium (7) and the Rest of the World Consortium (8), provides scientific and technical guidance but no fiscal authority
- New SKA Program Development Office (SPDO) Common Fund / finances
- No project governance model at this time -- after site selection?

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The XFEL Project

The XFEL Company, a Limited Liability Company or GmbH under German Law, and DESY will collaborate on the construction, commissioning and operation of the XFEL on the basis of a long term agreement. The convention, agreed upon in September 2008, and expected to be formally signed in 2009, has 17 articles + 6 annexes.

The construction cost in Annex 1 is to not exceed 1082 M euros in 2005 prices. This is to be reviewed annually by the Council (see below) who acting unanimously may approve a modification of the construction costs including commissioning.

The organs of the Company shall be the "Shareholders Assembly", referred to as the "Council", and the Management Board. A change in the total cost (see above) appears to be the sole action requiring unanimous approval.

The shareholders represent 14 countries with the host, and majority shareholder, Germany contributing 55%, Russia 24% and for the remaining 12 the contributions range from 1% to 4%.. This applies in cash or in kind to construction, commissioning and future operating costs, through an initial period ending in December 2026.

The timeline to date has

-XFEL TDR 7/2006

-- Foundation of XFEL GmbH sometime in early 2009

(Also monitoring FAIR but issues ~ identical and somewhat behind XFEL)

Issues

- The formation of the "Company" has taken longer than expected and has caused some delay in the project start. The German Government has minimized this delay by authorizing the beginning of civil construction in 2008.
- This delay appears to be because the "Articles of Incorporation" or " Convention" establishing the Company have tried to address, in detail, many lessons learned from past and ongoing multinational large science projects regarding project management and cost control throughout construction. commissioning and operation.

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The European XFEL GmbH exclusively and directly pursues not-for-profit objectives in the field of science and research.
The European XFEL GmbH will in particular be in charge of
the coordination and monitoring of the construction activities,
the scientific policy and strategy,
the construction of five beamlines with ten experiment stations and the associated infrastructure,
the operation of the beamlines and the implementation of a user programme,
the further development of the facility based on a vigorous research and development programme,
and, related to the aforementioned tasks: the management, supervision and controlling of all financial and other resources made available by the shareholders or through collaboration contracts.
The European XFEL GmbH will be supported by various advisory committees (Science, Machine, Administration and Finance).

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Inferences from these studies

1) Achieving a consensus and implementing a method of governance is a long-drawn-out and complex process. It needs strong involvement and buy-in from funding authorities and governments at all stages. The statement of the OECD science ministers in 2004: ".. They agreed that the planning and implementation of such a large, multi-year project should be carried out on a global basis, and should involve consultations among not just scientists, but also representatives of science funding agencies from interested countries. Accordingly, Ministers endorsed the statement prepared by the OECD Global Science Forum Consultative Group on High-Energy Physics…" is important in this regard. (See later for more on OECD)

2) All schemes explored by monitored projects seem viable, including negotiation of an international treaty (ITER) and foundation of a company with limited liability (XFEL, FAIR). There does not seem to be much difference in the complexity of time taken between the various options : n.b. DoE has signed the ITER treaty.

3) The ILC laboratory has to have its own legal standing as a legal entity and the ability to hire staff directly. Questions such as pension rights, tax status need to be solved well in advance of setting up the organisation.

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Inferences from these studies

4) Strong management structure essential, with clear responsibles and delegation down to appropriate level for decision making. Clear reporting paths to single bodies.

5) In-kind contributions will have important role in project. Essential to have large enough common fund to be able to react to overruns and have enough management flexibility to be able to optimise resources. Need agreement on how to deal with cost overruns on particular items.

6) Need common project management tools and well defined procedure to make changes in projects specification if necessary as development progresses.

7) Need early agreement on site selection procedure and call for site proposals with an agreed timetable.

8) Do not under-estimate the length of time taken e.g. to agree on official translations of documents to by signed by partners across the world!

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OECD GSF Developments

NB – OECD GSF has very recently authorised study on options for establishing large international research infrastructures. Led by S. Michalowski who will do most of work with oversight from experts nominated by member states.

He and I are in contact and will meet probably next month.

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Timescales leading to interim Governance report

1) GDE EC meeting – June 11/12 @ CERN – agree presentation for FALC

2) Albuquerque Sep 29 – Oct 3 – tentative conclusion on funding model – fractions per partner, size of common fund etc.

3) EC face-to-face: Jan. 6-8 Oxford – conclusion on funding model, preliminary conclusion on governance model options

4) Beijing March/April 2010? – conclusion on governance model options

5) Write preliminary governance report and iterate May – June 2010

6) Present to and get comments from ICFA, ILCSC, PAC & FALC – June-July 2010?

7) Present at Paris ICHEP July 2010 – N.B. this is not a final report and no funding authority/government will be expected to sign off on it. Comments etc however would be very welcome.