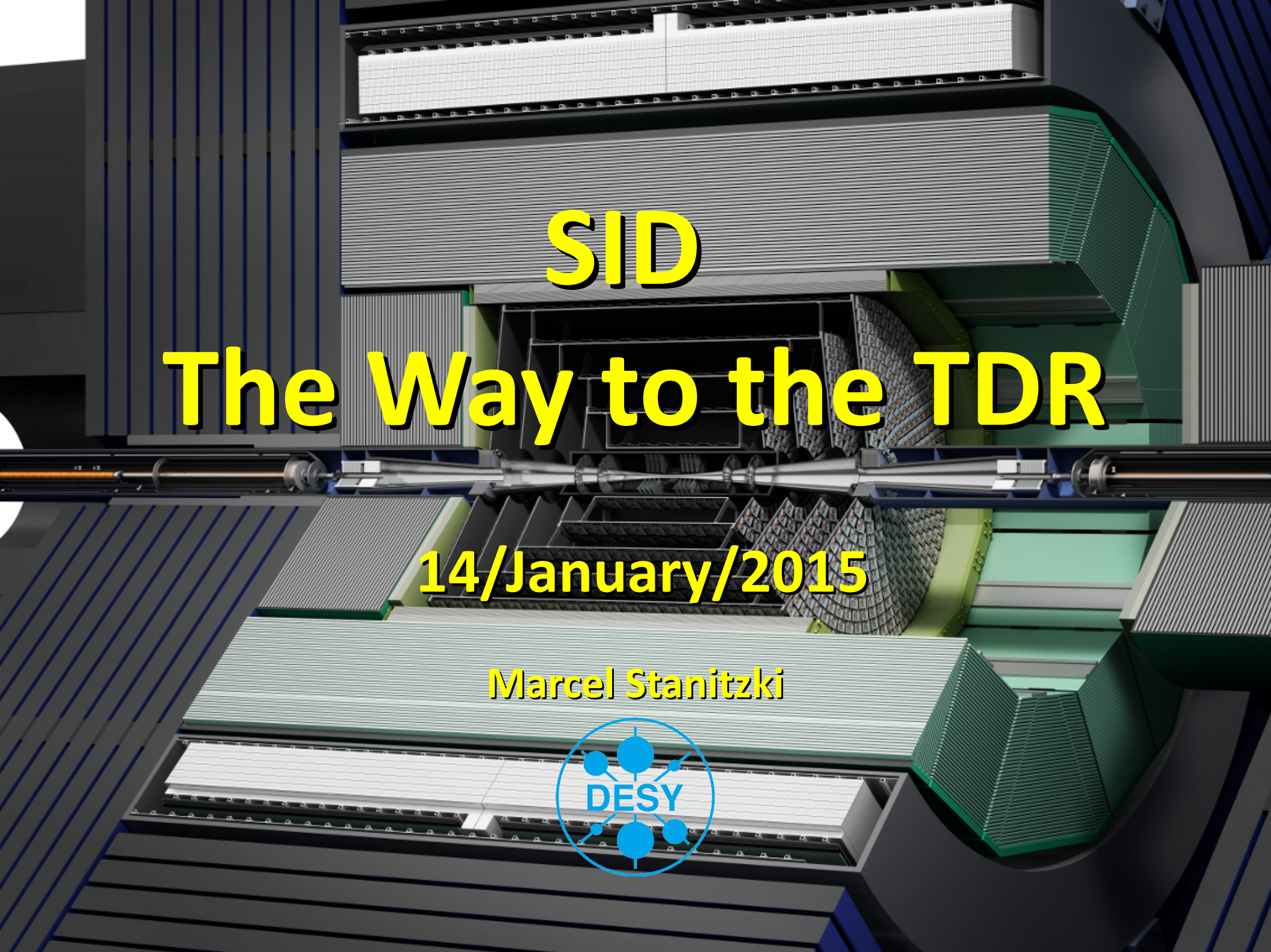


SID
The Way to the TDR

14/January/2015

Marcel Stanitzki

DESY

Where are we today

- The last milestone for SiD (and ILD): DBD
- The next milestone will be a Japanese ILC approval
  - This will not be before 2016
- Establishing the ILC Lab (Time X)
- ILC Lab calls for Experiments (Time Y)
- SiD delivers TDR (Time Y+2/3)
  - For Time scales see Marty's Slide
- We assume serious project funding earliest after project approval

What do we need to do

- At the time of starting to write the TDR
  - Have a well-established baseline design
  - Final parameter choices
  - Technology Prototypes (maybe not final ones)
  - Basic engineering done
- From that point on
  - 3 years of intense work to write an TDR (M. Breidenbach)

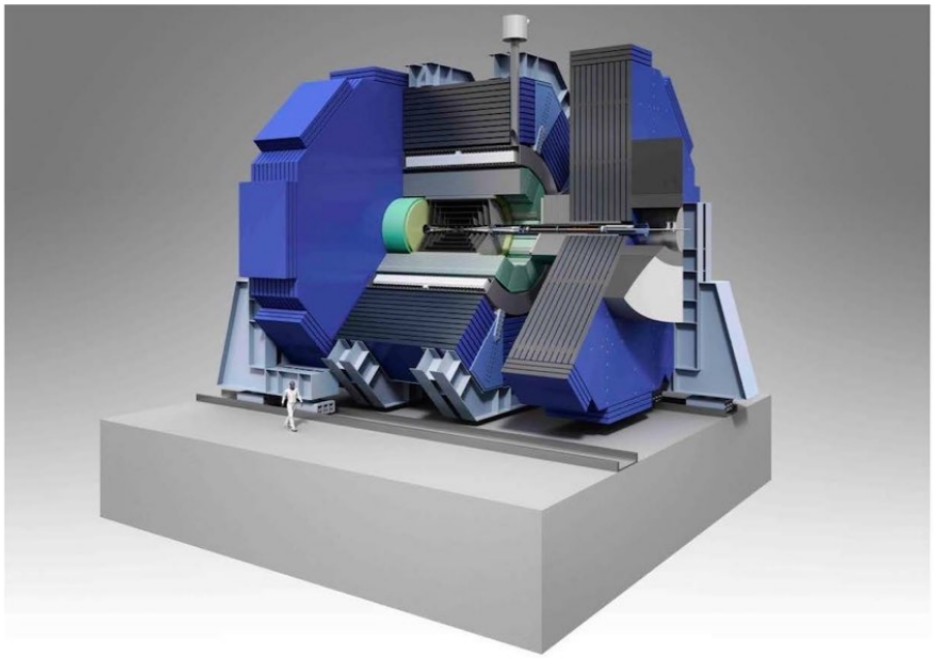
As SiD Consortium

- We have get going
- Get Funding, do R&D, make prototypes, do system tests
  - Obvious
  - Will not touch on this much
- We have to get to a stage we're are ready to take decisions
  - Changing parameters
  - Changing technology
- Accept the fact,
  - that this is “not for eternity”
  - We always have incomplete information
  - Up to now we have been very reluctant to touch the baseline

Inputs from our critic

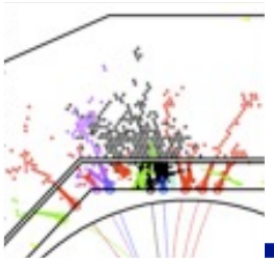
SiD detector design - a critic's view

Felix Sefkow
DESY

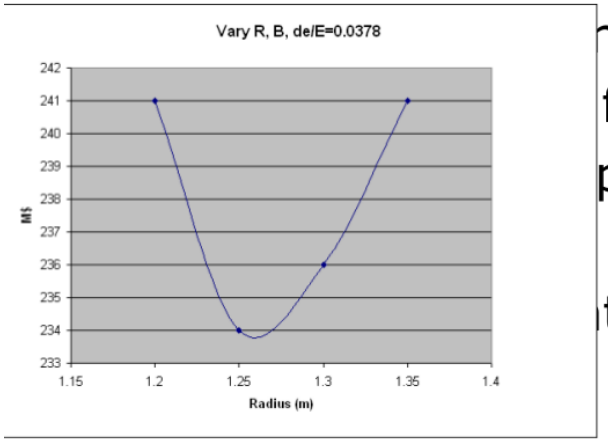


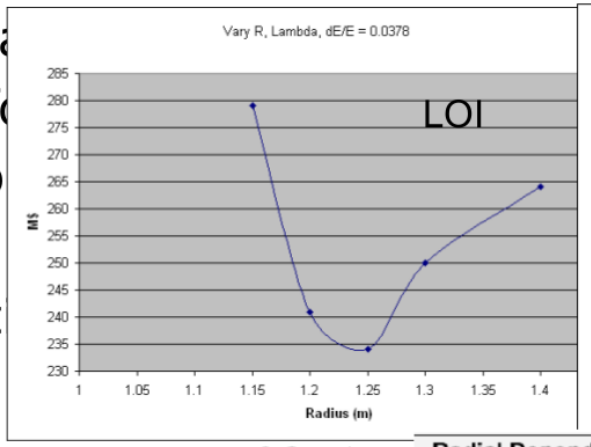
SiD workshop, SLAC, January 12-14, 2015

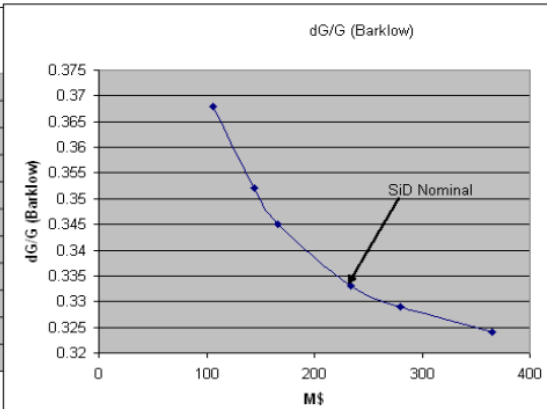
Glory from the past



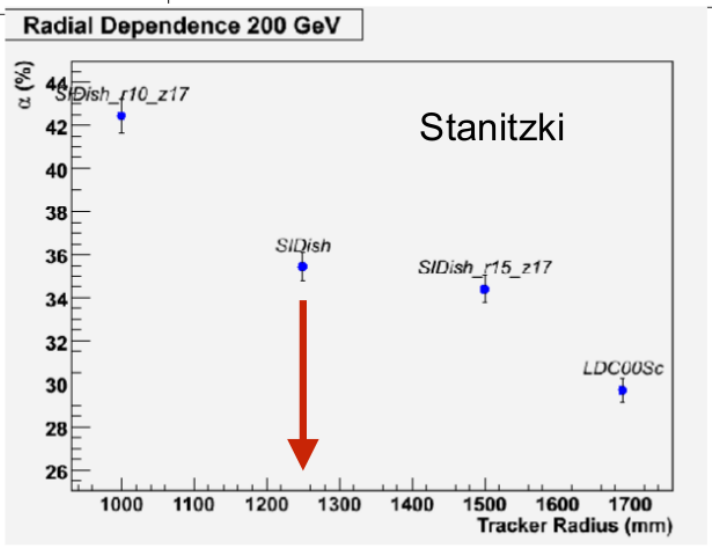
$iD optimisation







- Use the Pandora master formula $\sigma \sim B^{-0.3} R^{-1}$ and fold in cost
- Find minimal cost for fixed JER
- Minimal JER from physics (HHH)
- Partially supported by studies using ILD software and Pandora
- Studies done 2008 for the LOI
- **Excellent! - But needs to be revised with realistic SiD simulation**
  - and prototype-validated cost functions

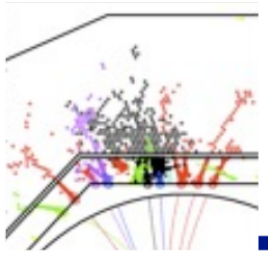


Marcel Stanitzki

But Never been followed up

- Lack of manpower
  - As always
- Lack of tools
  - We have many things in place, but..
- E.g., One key tool we always wanted
  - A “canned analysis”
  - A driver that can be run easily
  - Gives a performance number for each detector variant
  - Will give us physics performance benchmark

Important Input to



SiD concept

- The choice of silicon for the tracker gains in attractiveness and realism thanks to LHC experience and upgrade efforts
  - could be exploited more; e.g. study performance (efficiency and resolution) for LC events in present and future LHC detectors (a la TLEP)
- The early LOI studies with parameterisations or idealised detectors and reconstruction need to be replaced by realistic simulations (supports, services)
- Distance to "cliffs" must be known - existence of safety margins must be demonstrated
  - in terms of parameters like R and B
  - in terms of assumptions on, e.g, R_M, material budget or hit occupancy
- There must be prototypes!

What we need to do

- Felix' Criticism is well-placed
- For many design choices we don't have the plots to show e.g
  - why 1.25 m /5 T is a good choice
  - What happens if we have a worse tracking resolution
  - How close are we to the cliffs
- Some of these will require a lot of time
  - Some are “low-hanging” fruit

Inputs from optimization so far

- ECAL
  - 25 layers will do it seems
- HCAL
  - RPC Simulation is inadequate
  - PFA performance of DHCAL is way poorer than AHCAL
  - To study PFA performance we should use the AHCAL for the time being
- Tracking studies have started
  - 3 Double layers for the vertex detector does not show any improvements
- Studies are ongoing

Software

- Our software has been decaying for a while …
  - Loss of expertise is an real issue
- We have (too) many single point of failures
- Optimization meeting tries to help
  - Providing a forum to discuss also software problems
- But
  - We need to invest in our software infrastructure
  - We all need to get in the mode of documenting things and sharing code
  - We need to spread the expertise and grow new experts
  - The current threshold is too high → Documentation

Changing the Baseline

- Things that are on (my) list
  - Number of ECAL layers
  - HCAL technology
  - HCAL depth
  - Tracker layout
  - Tracker pitch
  - Tracker technology
- Some are less controversial than others
- How do we go about this ?

A possible model

- We can implement a change process along the lines of the machine
  - It's a bit formal
  - But allows input for everybody
  - Your views?
- For major decisions
  - Am in favor of summoning an expert committee to make recommendations ...

A possible HCAL proposal

- Q: What should be the SiD baseline HCAL technology
- Spokespeople assemble expert panel
- Panel
  - Reviews current status
  - May give technology proponents some homework
  - Final Review
  - Write report and give recommendation
  - Report is presented to Spokespeople and Exec board
- Spokespeople will take decision
  - Consultation with the Exec

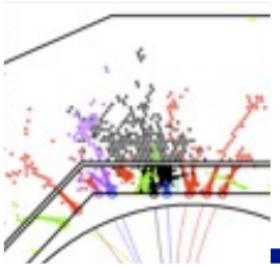
Proposal for today

- Switch the simulation model to scintillator
  - Allows to study other parameters
  - Gives RPC folks time to provide a better simulation
- Provide a series of questions and requirements for the technologies
  - Gives technology proponents some direction, which issues need addressing
- Documentation, Documentation, Documentation

Software Documentation

- Lots of documentation & code flying around
  - Not very efficient
- We need a place to collect all Documentation & Code
  - Git & Wiki-based
  - Best to start from scratch and build things up
  - Community-driven, everybody puts his stuff there
  - Documentation from Users for Users
- Need to decide on how and where to do this
  - Where to host the wiki
  - Where to host the repository
- Should be in place for the April Workshop

Stolen from Felix



Summary

- SiD has the right genes -
- let it mature and grow !

from Bruce Schumm's Belgrade talk