



# IT Division report to FOCUS Year 2000

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## Outline

- Strategies
- Infrastructure computing
- Physics-specific computing
- Understanding and planning



## Strategies

- Wherever possible, move services to mainstream products which are widely used in the world.
- Minimize "CERN specials".
- Design new services to be handed over to outsourced operations.
- Exploit the Web as a worldwide pseudo-filesystem.
- Use Intel PCs everywhere possible.  
Solaris elsewhere.
- Reduce diversity of configurations. RISC reduction.
- Linux for physics, Windows for everything else.
- Write engineered, modular libraries using accepted software processes. Participate in GEANT4 collaboration.
- Attract users to a few high-quality, secure services.



## Infrastructure Computing

- Y2K transition – no problem
- New central Web servers
- Windows 2000 project
- Gigabit Ethernet Backbone
- Security



### ➤ This year:

- Based on Intel PCs running Windows.
- De-mystify Web Authoring, including creation and maintenance of access-controlled sites.
- Empower simple users to use the Web to share files.

### ➤ Future:

- Integrate with e-groups infrastructure.
- Explore ways in which outside institutions can participate in the e-groups scheme.
- Achieve a single login/password (CLASP project).



## Windows 2000 project

### ➤ This year:

- Prototype and Pilot projects.
- Active Directory architecture appropriate to CERN's needs.
- Migrate out of Netware – makes possible coexistence of NICE 95 and NICE 2000. Biggest problem: Mac files !!!
- Windows 2000 Migration Task Force focused on identifying application stacks to be supported for various communities.
- Automated maintenance and application deployment based completely on commercial standards.

### ➤ Future:

- Migration will start in January 2001 and last 12-18 months.
- Progressively outsource operations.
- Look at backups and wide-area inter-institutional aspects.



### ➤ This year:

- CDR purely on GbE. Eliminated all HIPPI.
- Eliminated FDDI from CORE network.
- Start replacing FDDI campus backbone by GbE.
- Add redundancy everywhere.
- Phones and accelerator networking entrusted to IT Division.
- LHC-era Communications Infrastructure Project defined.
- IP-only policy. IPX gone with Netware. No more Appletalk or Netport printers through backbone. Appletalk over IP ?

### ➤ Future:

- GbE over copper for farms with 10GbE uplinks on fiber.
- Continue backbone plan. Eliminate last bits of coax.
- Convergence of data, video and audio: all on IP network.
- Design and prototype communications for LHC-era.



## Security

### ➤ This year:

- New Computer Security Rules (Oper. Circ. 5).
- Increasing number of improperly configured "orphan" machines. Many setup by physics groups.
- Number of serious security incidents at least doubled.
- Vast number of small incidents.
- First examples of security problems from inside the site.
- Trends are extremely disturbing...

### ➤ Future:

- Web server scan: identify and then register or close.
- Increase staff and purchased resources in security.
- Study the idea of a "certificate to offer services on CERN LAN" or "Driver's license to get on the CERN backbone".



## Physics-specific Computing

- Mass Storage
- LXPLUS/LXBATCH
- Towards an LHC Computing Testbed
  
- GEANT4
- ANAPHE and applications
- XML to describe detector geometry and data ?



## Mass Storage

## ➤ This year:

- *hsm* command in full production.
- AFS instabilities mostly due to old hardware and unbounded expansion, including inappropriate use of AFS for scratch.
- Massive investment in AFS hardware refresh.
- Disturbing commercial announcements about AFS.
- Production experience with Objectivity service building up.
- CASTOR rolled into production – quite successful.
- HPSS stable but expensive to operate.
- Changing economics of tape: "Managed Storage" proposal.

## ➤ Future:

- Educate users to fully exploit possibilities of *hsm* command.
- Understand file sharing reqts. and seek alternatives to AFS.
- Deploy "Managed Storage" concept using CASTOR.



## LXPLUS/LXBATCH

### ➤ This year:

- A quantum leap in power for all users, even LEP.
- Main problems, in order of importance:
  - AFS needed in every node, causes instabilities
  - Compiler quality, particularly Fortran
  - Linux itself, particularly SMP kernel and security holes
- Hardware is remarkably stable.
- LSF delivers a lot of functionality, allows to partition as needed a large "Computing Fabric".

### ➤ Future:

- Look at eliminating "CERN specials":  
Re-engineer SUE and ASIS using products from the Linux world.
- Collaborate with users to develop AFS-safe methodologies.
- Merge all Linux services into a large partitionable fabric.
- Develop a fully integrated LXDESK desktop environment.



### ➤ This year:

- Data challenges for ALICE and CMS.
- COMPASS CDR is also a "data challenge".
- Each one of these tests is very expensive.  
So far, ad-hoc coordination and budgeting is OK, but this will have to change in the future.

### ➤ Future:

- Evolve from CDR to CDFR:  
Central Data Filtering and Recording (use NA48 experience)
- Build a common LHC Computing Testbed.  
Problem: Cost estimates vastly exceed what was budgeted.
- Do progressively more "intelligent" operations in a data challenge, particularly analysis-like operations and WAN.



## GEANT4

### ➤ This year:

- Achieve smooth development cycle, timely releases.
- Start shifting focus towards physics models and comparisons with data.
- Software engineering effort showing big payoffs, GEANT4 is like a "sponge" for new physics models.
- Development of training kits and user tutorials.

### ➤ Future:

- Encourage emerging activities, particularly at the conceptual design and letter of intent level, to use GEANT4.
- Continue training and tutorials. Improve software process and documentation.
- Laboratory-specific deployment and maintenance strategies.
- Strong push to compare with as much data as possible.



## ANAPHE and applications

- LHC++ was launched to demonstrate a feasibility of a model using both commercial and homemade components. There was mixed success:
  - Positive: Modular persistency interface, use of ODBMS.
  - Negative: User rejection of IRIS Explorer.
- Meantime, components of LHC++ such as CLHEP, have become widely used (GEANT4, frameworks, event generators).
- Lots of progress in experiment frameworks.
- Time to consolidate, productize and build from there
  - New name selected by contest: ANAPHE
- Same philosophy as CERNLIB:
  - You build your application using your own as well as ANAPHE modules
  - IT provides a few "out of the box" applications you use as an appliance
- First examples of this:
  - Histogramming plugged into GEANT4 during G4 Workshop (few hours)
  - Preview release of LIZARD, geared towards PAW replacement.



## XML to describe det. geom. and data ?

### ➤ This year:

- XML is taking the world by a storm.
- XML is *the choice* for data modeling and description.
- Preliminary recommendations of LHC Computing Review is to look at a general way to describe detector geometry using XML.
  - Already some activities in some detectors
  - Read same geometry from G4, reconstruction, analysis
  - Define configurations and control them
  - Similar activity in LHC machine component description in the context of EDMS project (one IT staff member leading this).

### ➤ Next year:

- The community should invest in understanding XML.
- Explore XML to describe event and histogram data.

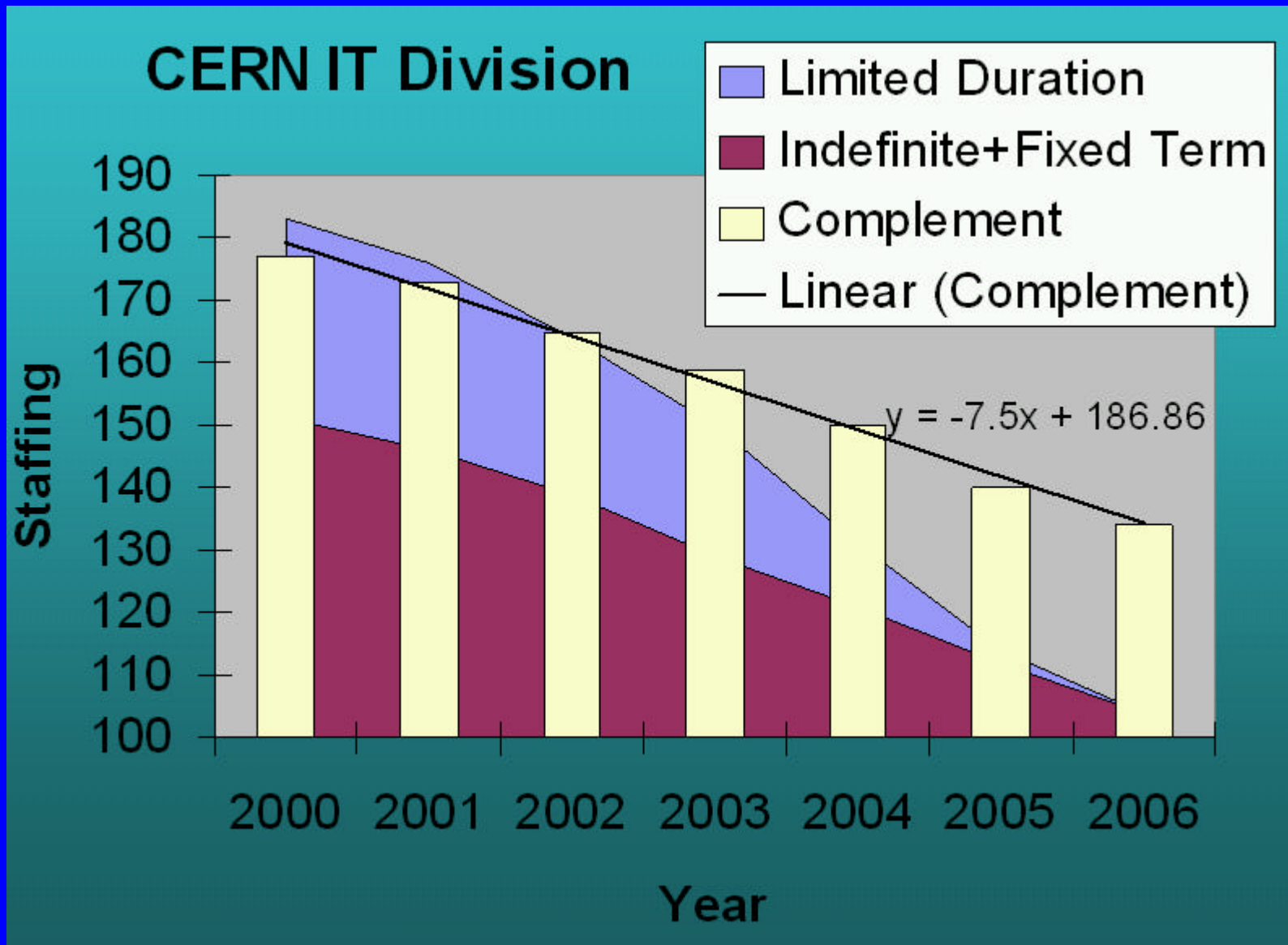


- Matching services to the reduced personnel
- Matching user expectations to what we can offer
- Consolidation and reduction of services



# Understanding and Planning

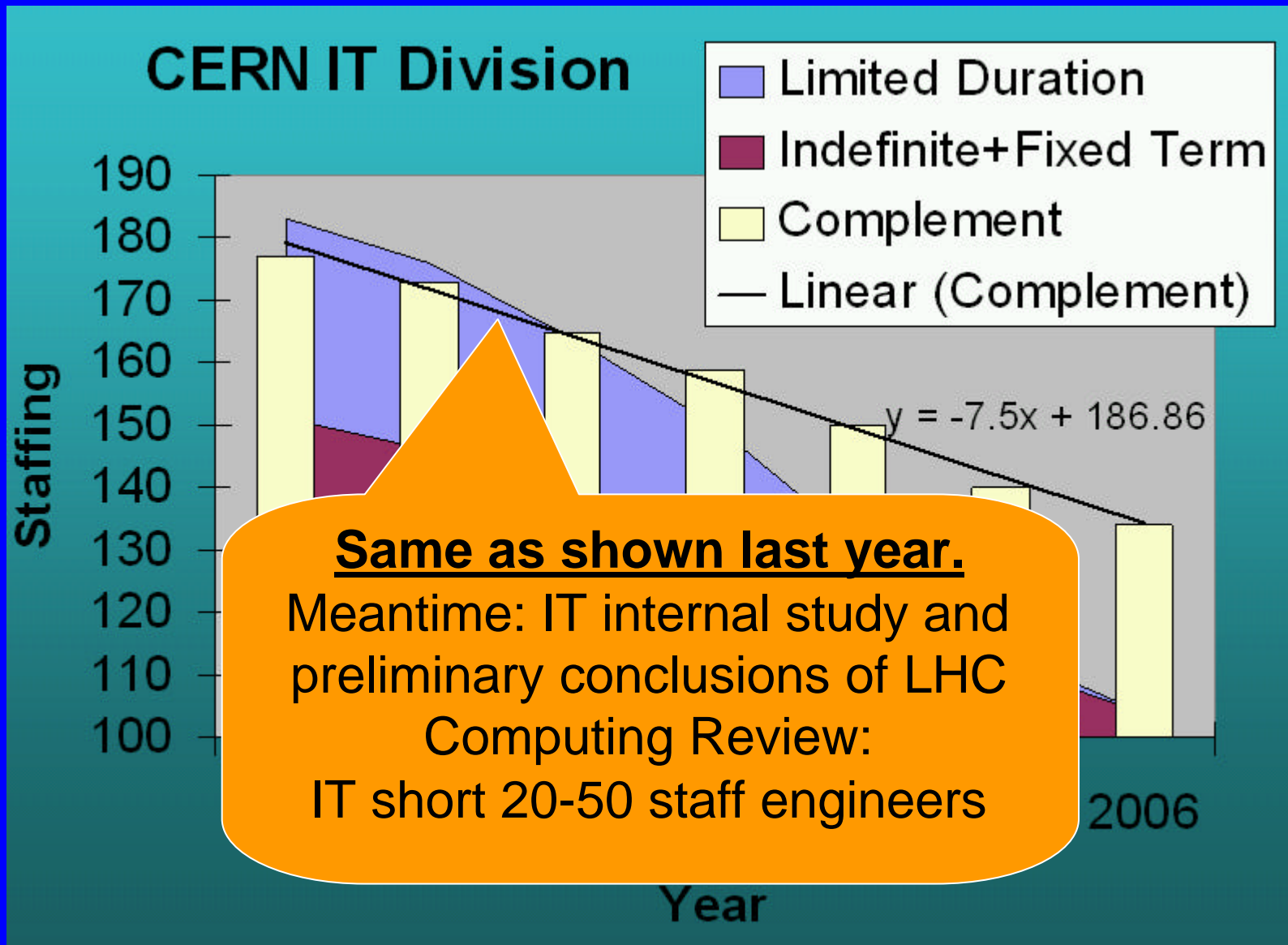
## Matching services to the reduced personnel





# Understanding and Planning

## Matching services to the reduced personnel





- During 1999 and 2000, the division has made large investments to prepare for this severe reduction:
  - Formally defining activities and services
  - Assigning a cost to each one, including personnel
  - Categorizing them and defining dependencies:
    - General-Purpose Computing Services
    - Physics and Engineering-Computing Services
    - Consolidation and Standardization of Computing Activities
- Two major management meetings have revealed a lot of good things and a few disturbing ones:
  - Staff overloaded and in "fire fighting" mode.
  - Continuous user requests for new things and refusal to turn off existing things.
- One inescapable solution: We must reduce.



- Increased frequency of episodes of *user rage* (not only for IT services but those of other divisions).
- Correlated with either of:
  - Replacement of "local, personal" support by "centralized, generic" support
  - Introduction of outsourcing
- It is absolutely essential to outsource many services. This is not only because of reduction of staff, but it is part of the directives of the "new CERN".
- There is a huge historical tide to swim against.
- Experimental communities sometimes rapidly and strongly focus resources on something, then lose interest, leaving CERN (IT) to pick up the pieces. This is undesirable from a planning view and impossible with the current resources.



- The deadly "user perception" matrix (sometimes also the "director perception" matrix).

<i>These communities feel that</i>	<i>We are putting too many resources in</i>
Engineering	Physics General
Physics	General Engineering
General	Physics Engineering
Accelerator, Technical and Administrative sectors	Research Sector
Other Research Divisions	IT Division



### ➤ This year:

- Agreement on RISC reduction by FOCUS
- Accelerator and Technical sectors going along with this

### ➤ Year 2001:

- A key year to consolidate some services and reduce others
- Evaluation of complete ("vertical") outsourcing for:
  - Legacy products that must be kept operating
  - Commonplace services which are also used in other organizations
  - Specialized services which are also used in other organizations
- Analysis of user feedback to refine already outsourced serv
- Define IT's "core business" in agreement with management and the users and concentrate staff on that.

➤ We need your help and involvement in this process !!!