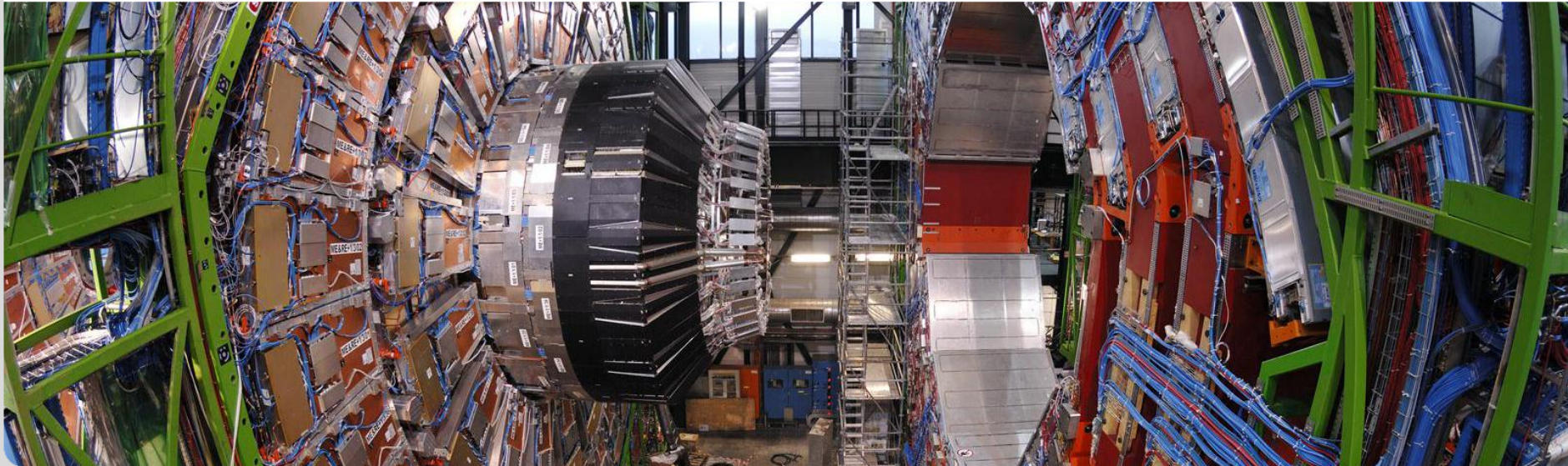# Site Meta-Monitoring – The HappyFace Project

A. Scheurer on behalf of the HappyFace Developers

4th Annual Workshop of the Helmholtz Alliance "Physics at the Terascale"

Dresden, 01. – 03. December 2010

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HappyFace (HF) Basics
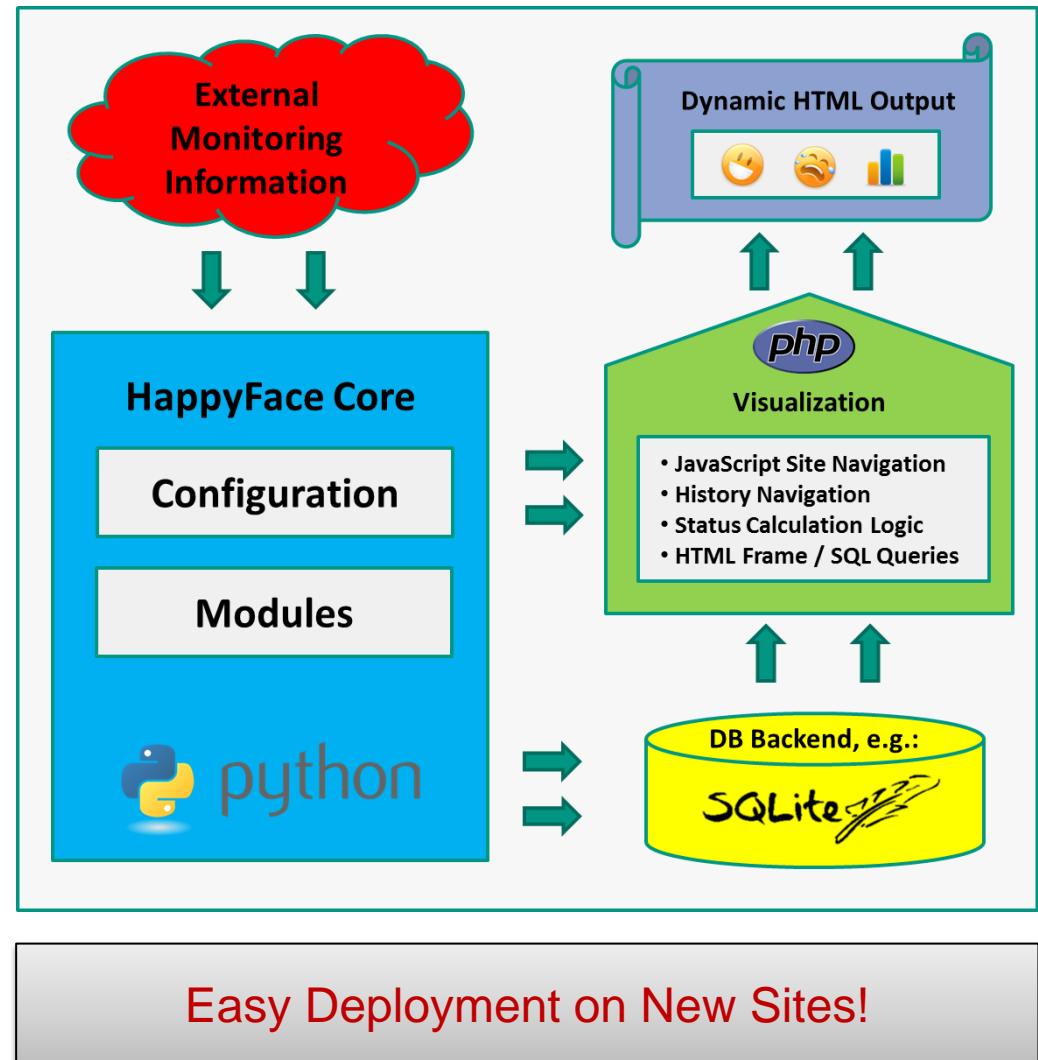
- **HF - What it is:**
  - Allows real-time site monitoring
  - Acquires information automatically, not on demand!
  - Can be used as sophisticated and modular shift tool
  - Provides as well detailed information for admins (if required)
  - Auto-refresh system, no user intervention necessary
  - Provides rating system (Keyword: non-expert shift crews)
  - Allows to correlate information
  - Can trigger automatic alarms/notifications
  - Highly configurable and adjustable

  → **Meta-monitoring Suite**

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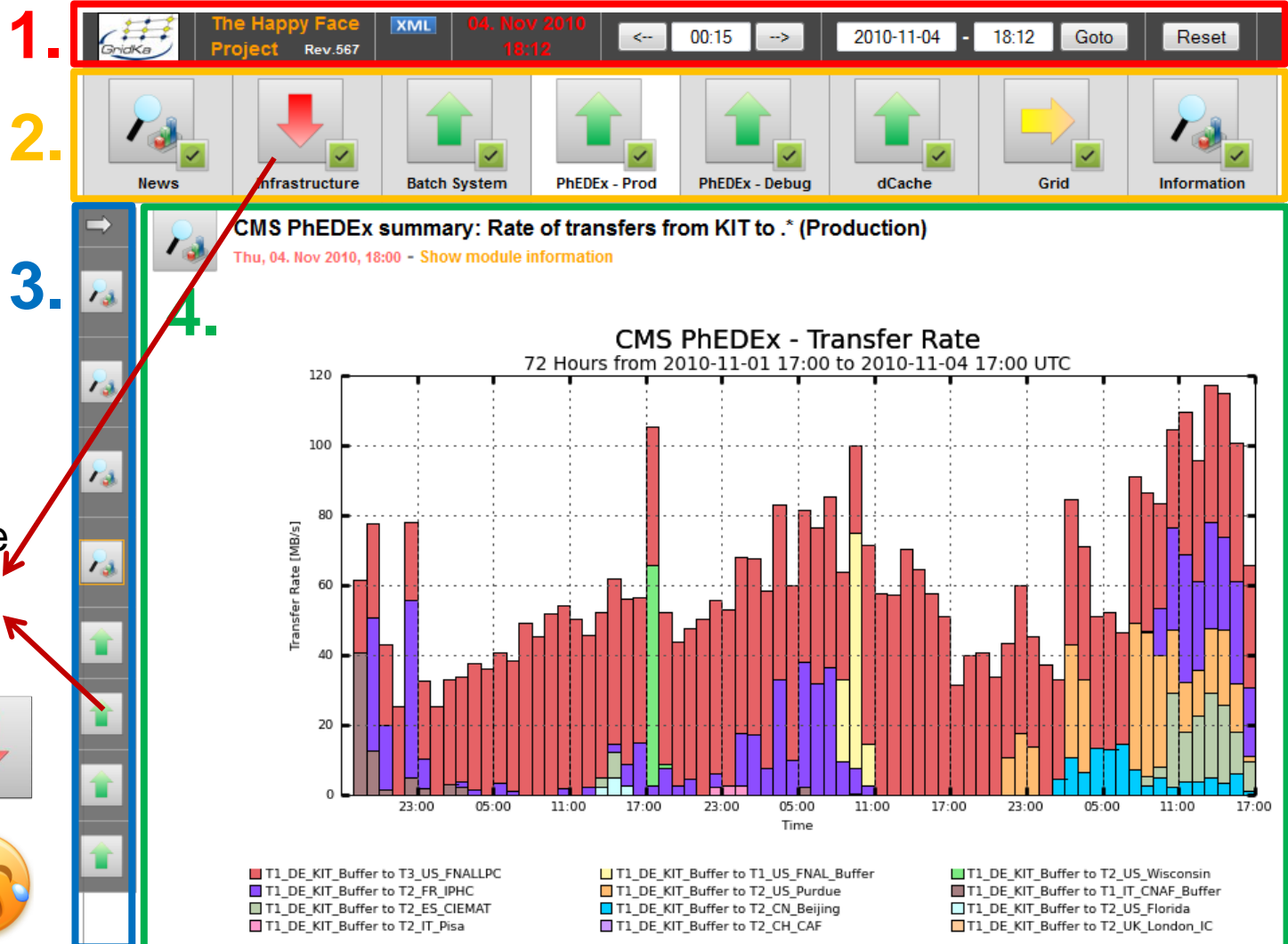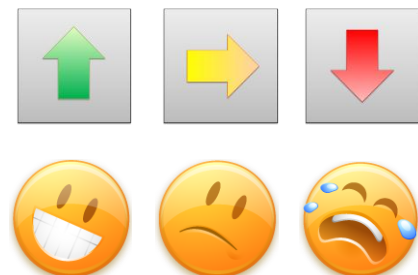Institut für Experimentelle Kernphysik

Technical Background

- HF is:
  - Written in Python
  - Highly modular
    - Similar modules inherit functionality
    - Configuration possible on each inheritance level, e.g. 5 modules which provide CMS Dashboard information for T1_DE_KIT can be changed to monitor the site T2_DE_DESY by just altering one line in the parent config file.
  - DB assisted
    - Intrinsic history functionality
  - Lightweight, fast and reliable
    - In production use since more than 2 years now

Easy Deployment on New Sites!

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The Interface & Rating System

- 1. History Navigation
- 2. Category Navigation
- 3. Module Navigation
- 4. Module Content

- Simple module and category rating system

1.

| | The Happy Face Project Rev.567 | XML | 04. Nov 2010 18:12 | <-- | 00:15 | --> | 2010-11-04 | - | 18:12 | Goto | Reset |

2.

News · Infrastructure · Batch System · PhEDEx - Prod · PhEDEx - Debug · dCache · Grid · Information

3.

4.

CMS PhEDEx summary: Rate of transfers from KIT to .* (Production)
Thu, 04. Nov 2010, 18:00 - Show module information

CMS PhEDEx - Transfer Rate
72 Hours from 2010-11-01 17:00 to 2010-11-04 17:00 UTC

Legend:
- T1_DE_KIT_Buffer to T3_US_FNALLPC
- T1_DE_KIT_Buffer to T2_FR_IPHC
- T1_DE_KIT_Buffer to T2_ES_CIEMAT
- T1_DE_KIT_Buffer to T2_IT_Pisa
- T1_DE_KIT_Buffer to T1_US_FNAL_Buffer
- T1_DE_KIT_Buffer to T2_US_Purdue
- T1_DE_KIT_Buffer to T2_CN_Beijing
- T1_DE_KIT_Buffer to T2_CH_CAF
- T1_DE_KIT_Buffer to T2_US_Wisconsin
- T1_DE_KIT_Buffer to T1_IT_CNAF_Buffer
- T1_DE_KIT_Buffer to T2_US_Florida
- T1_DE_KIT_Buffer to T2_UK_London_IC

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HF – CMS and ATLAS partners

- HF core and module development:
  - KIT Karlsruhe
- Module development/usage
  - University of Hamburg
  - DESY Hamburg
  - RWTH Aachen
  - University of Göttingen

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Some Selected Modules – Batch System Karlsruhe

- ## Real-time batch system monitoring
  - Use batch system xml provider (CMS has providers for e.g. PBS, LSF, Condor)
  - See currently running batch jobs
  - Calculate current job efficiency
  - Define warning/ error thresholds

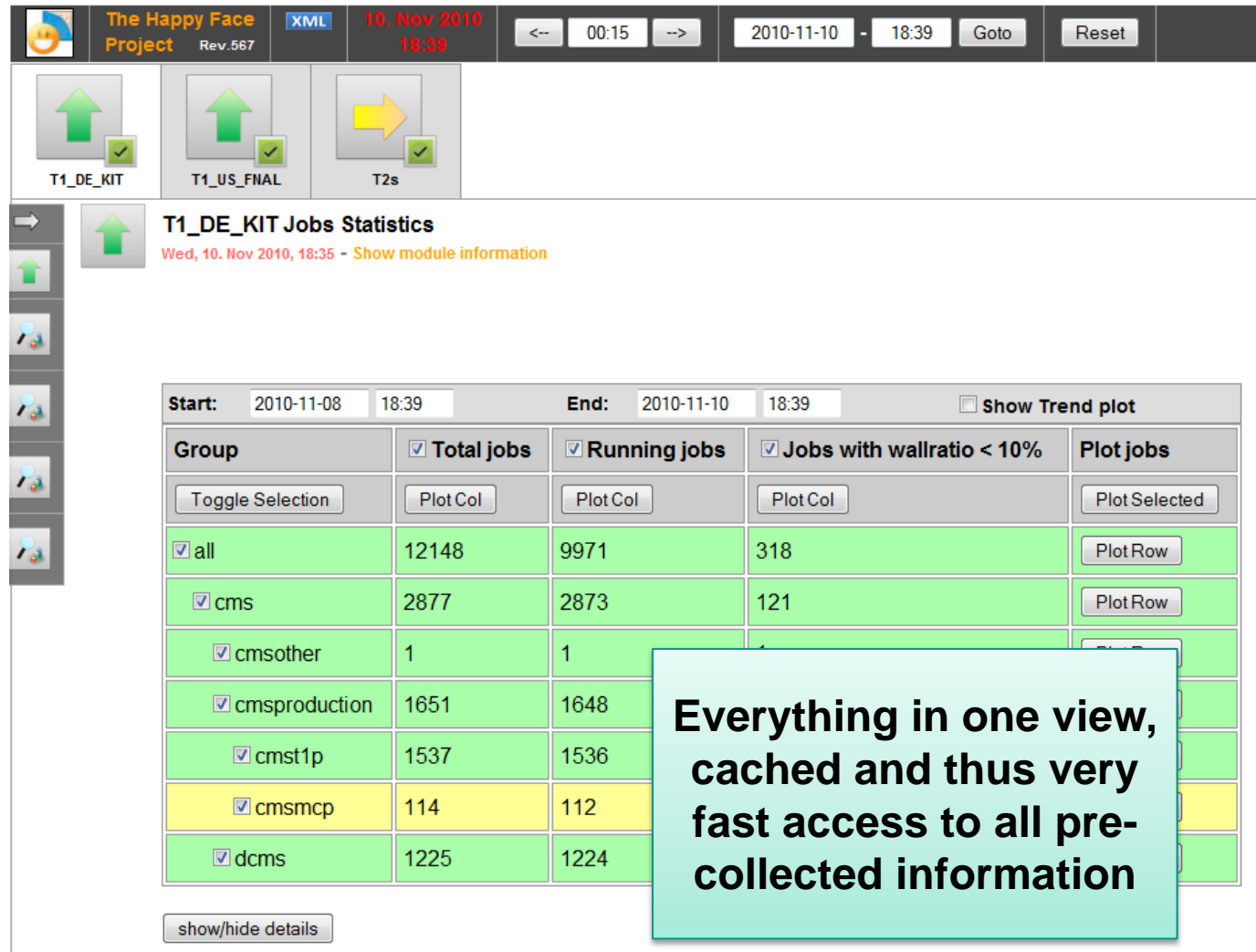| Start: 2010-11-05 09:18		End: 2010-11-07 09:18		☐ Show Trend plot
Group	☑ **Total jobs**	☑ **Running jobs**	☑ **Jobs with wallratio < 10%**	**Plot jobs**
Toggle Selection	Plot Col	Plot Col	Plot Col	Plot Selected
☑ all	12287	6606	1424	Plot Row
☑ cms	990	973	403	Plot Row
☑ cmsother	16	0	0	Plot Row
☑ cmsproduction	965	965	398	Plot Row
☑ cmst1p	751	751	351	Plot Row
☑ cmsmcp	214	214	47	Plot Row
☑ dcms	9	8	5	Plot Row

show/hide details

Note: This table shows users of the group **cms** only

User	Total	Running	Waiting	Queued	Eff. > 80%	80% > Eff. > 30%	30% > Eff. > 10%	10% > Eff.
cmsmcp33	192	192	0	0	156	8	3	25
dcms118	2	2	0	0	1	1	0	0
dcms013	1	1	0	0	0	0	0	1
cmssgm	16	0	0	16	0	0	0	0
cmst1p31	5	5	0	0	1	0	1	3
cmst1p23	746	746	0	0	397	0	1	348
cmsmcp41	22	22	0	0	0	0	0	22
dcms131	3	3	0	0	0	1	0	2

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Prototype: CMS Tier1 Batch System Monitoring

- Individual categories for each Tier1, e.g.
  - KIT
  - FNAL
  - etc.
- Combined or individual categories for Tier2s
- Easily extendable to integrate e.g. storage system monitoring, etc.

Everything in one view, cached and thus very fast access to all pre-collected information

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Some Selected Modules – Storage System Karlsruhe

dCache: Status of CMS Disk Only Pools
Mon, 15. Nov 2010, 16:00 - Show module information

- HF provides modules to monitor dCache systems
  - Use standard dCache xml provider
    - Can be used by any dCache site
  - Monitor overall dCache status, down to the point of individual pools
  - Monitor current I/O throughput and status of active/queued transfers
  - "Free space"
  - And many more features …

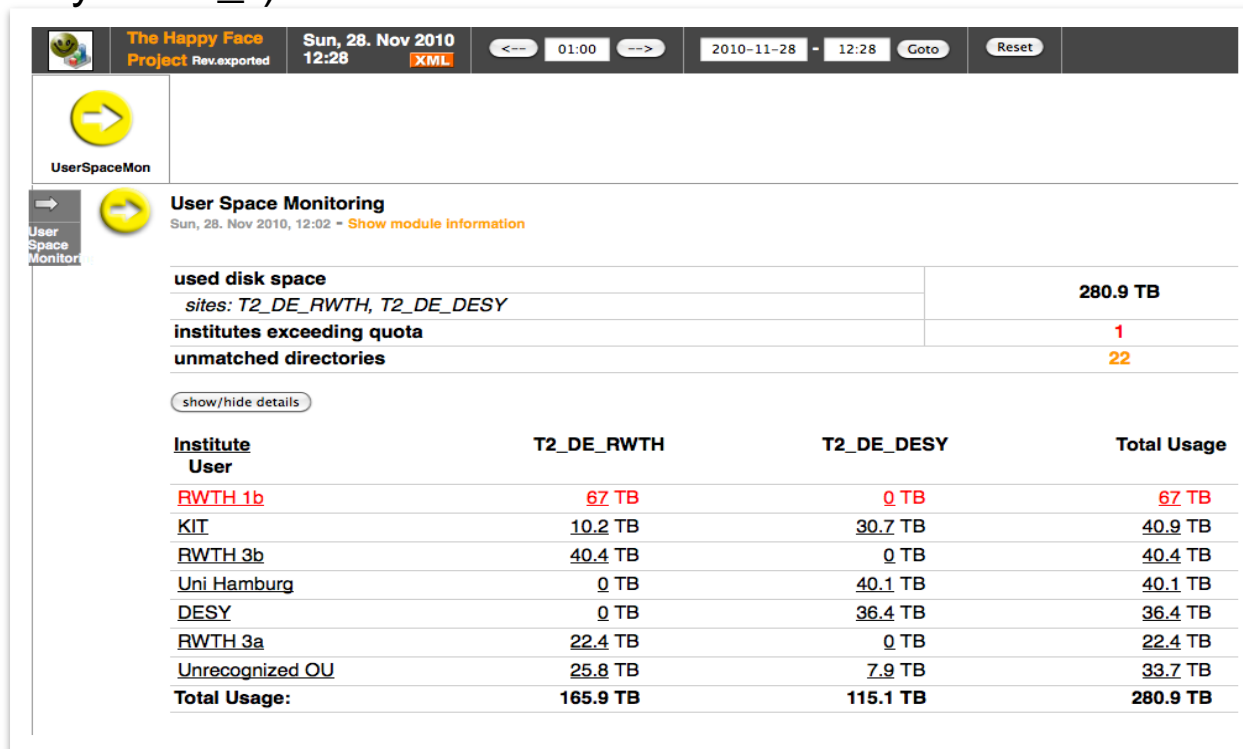|	
Pools	6
Pools with status warning [%]	0
Pools with status critical [%]	0
Total Space [TiB]	174.02
Free Space [TiB]	137.07
Used Space [TiB]	36.95
Precious Space [TiB]	0
Removable Space [TiB]	0
Free Space/Total Space [%]	78.8
Pools with status critical [%]	0
Pools with status warning [%]	0

show/hide results

Start: 2010-11-13 16:05   End: 2010-11-15 16:05   ☐ Show different variables in the same plot

Poolname	Total Space [TiB]	Free Space [TiB]	Used Space [TiB]	Precious Space [TiB]	Removable Space [TiB]	Free Space/Total Space [%]	Pool Plot
Toggle Selection	Plot Col	Plot Col	Plot Col	Plot Col	Plot Col	Plot Col	Plot Selected
☑ f01-070-134-e_1D_cms	29	24.11	4.89	0	0	83.1	Plot Row
☑ f01-070-120-e_1D_cms	29	21.7	7.3	0	0	74.8	Plot Row

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User Storage Consumption - I
Slide by Aachen HappyFace Team

- Contributions (from all three Aachen institutes) financed by BMBF FSP-CMS
- In CMS model a user gets a few TB „Grid home storage space" at national T-2s
- dCache does not (yet) offer a usable quota system, so we use HappyFace to monitor the consumption at T2_DE_DESY and T2_DE_RWTH (can be extended easily to T3_*)
- Summary

Institute User	T2_DE_RWTH	T2_DE_DESY	Total Usage
RWTH 1b	67 TB	0 TB	67 TB
KIT	10.2 TB	30.7 TB	40.9 TB
RWTH 3b	40.4 TB	0 TB	40.4 TB
Uni Hamburg	0 TB	40.1 TB	40.1 TB
DESY	0 TB	36.4 TB	36.4 TB
RWTH 3a	22.4 TB	0 TB	22.4 TB
Unrecognized OU	25.8 TB	7.9 TB	33.7 TB
Total Usage:	**165.9 TB**	**115.1 TB**	**280.9 TB**

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User Storage Consumption - II
Slide by Aachen HappyFace Team

- **User's view** (authentication by cert.p12 in browser)

Thomas Kress	940.3 GB	–	940.3 GB

Directory Name: kress
DN: /O=GermanGrid/OU=RWTH/CN=Thomas Kress
email: Thomas.Kress@cern.ch
VOMS Group: /cms/dcms
Storage Path: 940.3 GB @ [T2_DE_RWTH] grid-srm.physik.rwth-aachen.de:/pnfs/physik.rwth-aachen.de/cms/store/user/kress
Storage Path: 0.0 GB @ [T2_DE_DESY] dcache-se-cms.desy.de:/pnfs/desy.de/cms/tier2/store/user/kress
Status: Use 2.3 %

- User can use both German CMS Tier-2s to place data

- Includes user's job „output" data and official CMS „input" data sets transferred (by PhEDEx) to our Tier-2s on behalf of the user

- Admins can see the details of all users, grouped by institutes/labs

- We can find (most) users not associated to German CMS groups and will start soon to automatically inform and ask them to delete data (if above a threshold)

- History view available

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Physics Group Space Usage (CMS)
Slide by Hamburg HappyFace Team

- In CMS, each dataset skim is allocated to a specific "physics group"
- Each of these groups has dedicated T2 sites for storage purposes
- The DESY T2 hosts 4 groups: Top Physics, Jets + Missing E_T, Forward Physics, and QCD

- Module shows warnings for missing files in the group space
- Module shows errors for exceeding space budged

details

Group	resident data [TiB]	subscribed data [TiB]	resident files	subscribed files
top	32.28	32.29	19259	19260
jets-met_hcal	44.42	44.42	22823	22823
forward	62.95	62.95	25862	25862
AnalysisOps	45.33	45.33	12305	12305
local	174.4	174.4	66159	66159
DataOps	6.1	6.1	3289	3289
FacOps	0.51	0.51	510	510
qcd	38.83	38.83	28308	28308
undefined	9.24	9.24	4878	4878

Storage Usage of the Physics Groups
Mon, 29. Nov 2010, 11:00 - Show module information

Group	resident data [TiB]	percent of subscribed data
top	32.28	100
jets-met_hcal	44.42	100
forward	62.95	100
AnalysisOps	45.33	100
local	174.4	100
DataOps	6.1	100
FacOps	0.51	100
qcd	38.83	100
undefined	9.24	100

- Details are listing the number of subcribed files and datasize
- Also used frequently: dCache storage monitoring

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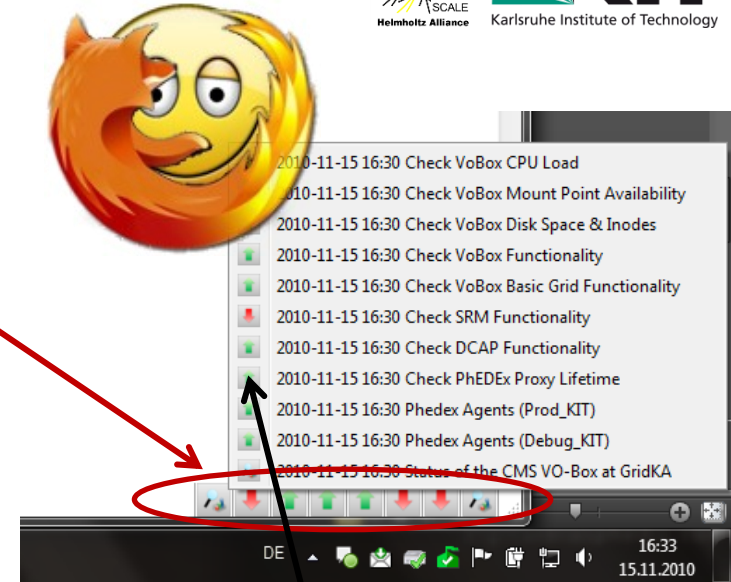Institut für Experimentelle Kernphysik

Some Modules Developed in Göttingen

- Developed modules in Göttingen
  - Interface to Nagios
  - Panda monitoring (e.g. queue status)
  - Hardware monitoring (e.g. ILO, network)
  - ATLAS GridKa-Cloud monitoring module

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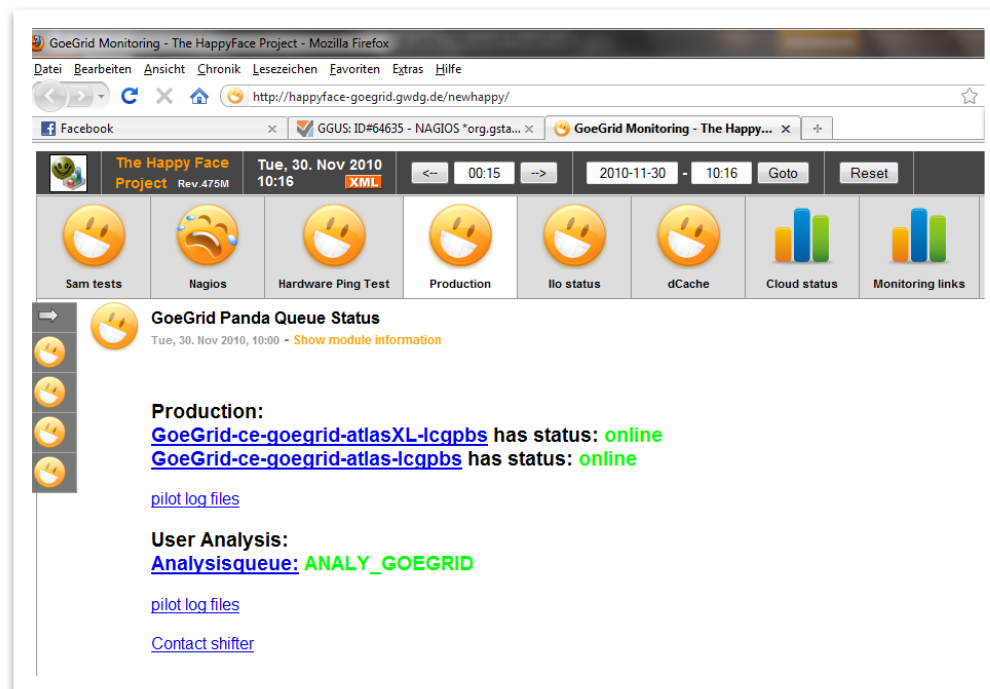
Extended Functionality

- **HF publishes its current status via xml**
  - Used as input for a plugin available for the Firefox web browser statusbar
  - Used as input for smartphone apps (e.g. iPhone, Android)
  - Used for Meta² - Monitoring, ideal for central shifts – the HF matrix

By clicking on the individual arrows, directly jump to the proper HF instance and module

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Summary

- HF – What it is:
    - Modular and easily configurable tool for shifters and admins
    - All information is pre-collected (time interval: ~10 min)
        - No waiting time, "live feeling"
    - Stores information from external sources (plots, xml/html, text files…)
    - Stores configuration parameters with the data to allow a consistent history view even after threshold changes, etc.
    - Identify problems: possibility to "get exact state of my site on Sunday night"
    - Provides rating system, allows to define complex correlations
    - Hides unnecessary information but provides access to all details if required
    - Possibility to automatically trigger alarms/notifications
    - Exports it's status via xml for further usage/harvesting (e.g. iPhone app, Firefox plugin, Meta²-Monitoring
    - Used by German CMS and Atlas Sites for more than 2 years now
        - Stable, reliable, tested
    - Many modules available – designed for collaboration via central repository

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The HappyFace Project

More Information & Documentation:

`https://ekptrac.physik.uni-karlsruhe.de/trac/HappyFace`

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