



Offline & Computing

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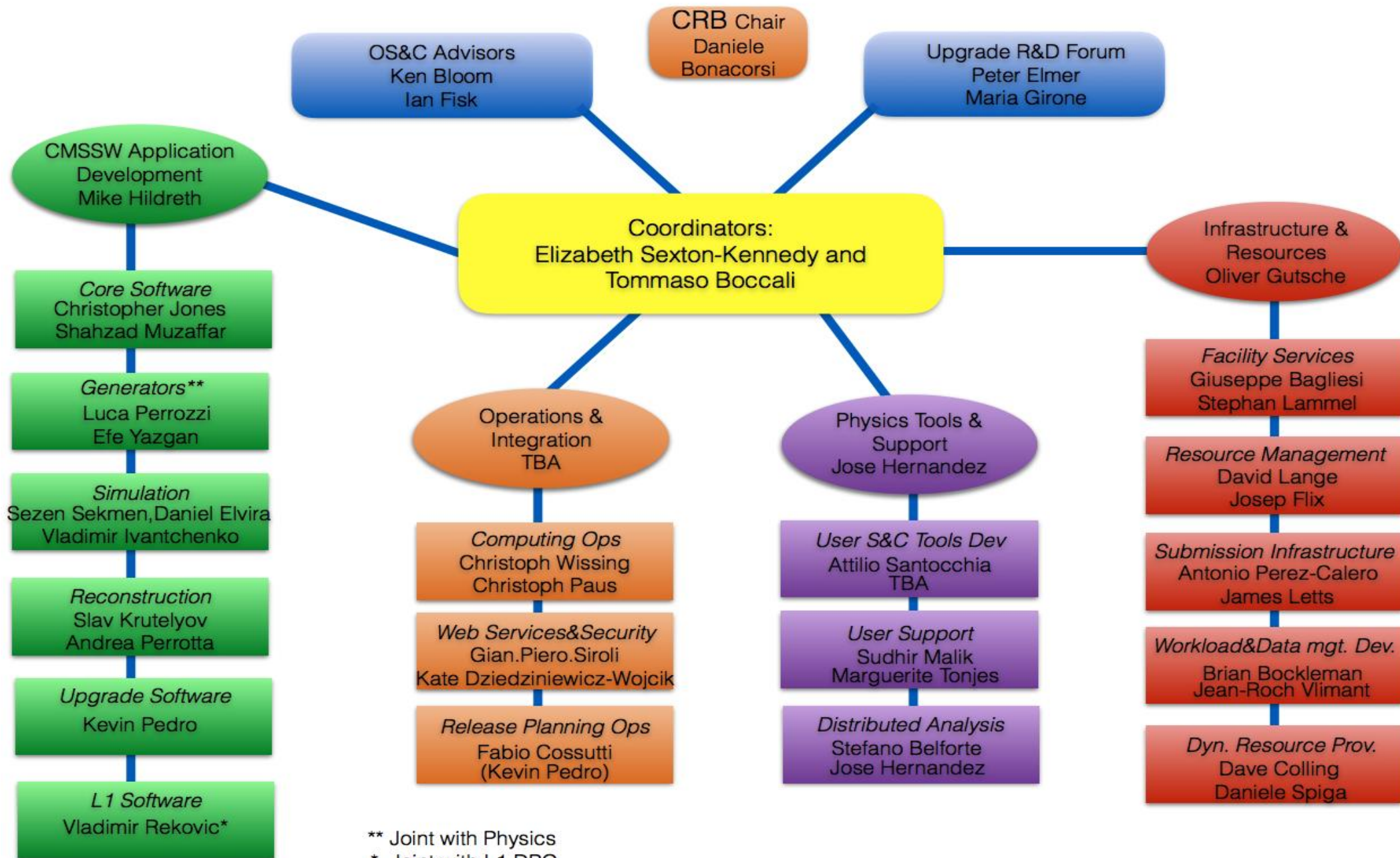


Outline

- The Offline & Computing Organization
- The role within CMS
- Tasks, Sites, Infrastructure, Operations
- Opportunities



2018 Offline Software and Computing



** Joint with Physics

* Joint with L1 DPG



Role within CMS (a sparse macro list...)

1. Ensure that CMS Offline software (from Tier-0 to analysis) is developed and maintained up to CMS needs; including
 - Prompt Operations at the Tier-0
 - Data processing and reprocessing
 - Monte Carlo simulation from Generators onwards
 - Analysis environment for end users
 - (most of the software anyhow shared with HLT – so de facto also looking there)
2. Ensure a smooth running of the CMS Distributed Computing System (within WLCG)
 - 1 Tier-0, 7 Tier-1, O(50) Tier-2 centers, private institution centers, opportunistic computing at standard / HPC centers, Commercial clouds , ...
3. Plan resource needs for the close and far future
4. Plan and follow O&C R&D for the various LHC/CMS upgrades
5. ...



Efforts in O&C

- We have a long activity list, with various tasks associated to each activity
- Generally, we specify the (human) effort needed per activity/task, and search for CMS collaborators willing to contribute
- EPR crediting mechanism recognizes the contributions
- Via the mechanism, O&C can keep track of missing efforts, and Institutes / CMS members can see opportunities for contributions



Your current involvement with CMS Computing

- (Apologies, something will be surely forgotten)
- Distribute Computing: a long standing [Tier2 @ Tallin](#)
- From EPR 2017 only Estonia contributed to O+C
 - T2 handling + TAU POG reco maintenance
- Not in the EPR, but your countries have historically been a source of (very good) students for operator positions in Computing
 - Tier-0, Distributed computing, ...

| Task Name | Needed Work | Fraction Done | % of work at CERN | Type of task | Comment | edit Task | User |
|---|-------------|---------------|-------------------|------------------|--|-----------|---------------------------------|
| Distributed Tier-2 site operations (task) | 480 | 0.91 | 5 | Perennial (CORE) | Ops/support skills, knowledge of CMS workflows | | Kadastik, Mario (TALLINN) |
| Distributed Tier-2 site operations (task) | 480 | 0.91 | 5 | Perennial (CORE) | Ops/support skills, knowledge of CMS workflows | | Raidal, Martti (TALLINN) |
| Distributed Tier-2 site operations (task) | 480 | 0.91 | 5 | Perennial (CORE) | Ops/support skills, knowledge of CMS workflows | | Dewanjee, Ram Krishna (TALLINN) |
| Distributed Tier-2 site operations (task) | 480 | 0.91 | 5 | Perennial (CORE) | Ops/support skills, knowledge of CMS workflows | | Veelken, Christian (TALLINN) |
| TAU POG reco maintenance (task) | 10 | 1.00 | 5 | Perennial (CORE) | Knowledge of CMSSW, python, and c++ | | Veelken, Christian (TALLINN) |
| Distributed Tier-2 site operations (task) | 480 | 0.91 | 5 | Perennial (CORE) | Ops/support skills, knowledge of CMS workflows | | Ehataht, Karl (TALLINN) |
| Tau POG maintenance (task) | 4 | 1.00 | 5 | Perennial (CORE) | Knowledge of CMSSW, python, or c++ | | Veelken, Christian (TALLINN) |



Opportunities in O+C

- In general, the O+C coordination area is not manpower rich
 - The same can be eventually said for most of CMS activities ...
- We have clear deficits in some of them, all providing EPRs
 - Monitoring
 - Operators for submissions to special resources (CMS@Home, HPC, ...)
 - Release management
 - In general SW development, testing, debugging, ...
- We always welcome new Computing Centers to join as CMS Tier-2s
- Plus ...



R&D

- From your presentation, it is clear an interest on BigData and Software Engineering
- We have a specific forum in O&C which aims to launch R&D initiatives on next generation computing infrastructures:
 - Partnership with Industrial Partners and CERN OpenLab
 - Architectures, tools, utilization of heterogeneous solutions
 - Introduction of new HW and SW technologies for mid/long term CMS Computing evolution
 - Data reduction facilities, analysis oriented centers •
 - Data Analytics / Mining applied to O&C
 - Log analysis
 - Transfer optimization
 - Automatic data placement / removal mechanisms
 - Feature extraction
 - Anomaly detections
 - Resource Accounting and resource optimizations
 - ...



O+C as a service activity to CMS

- Many Activities (not enough space to list tasks!)

- **Simulation** - O&C simulation development area
- **Operations** - O&C computing operations area
- **Physics Support** - O&C physics support area
- **Data and Workflow Management** - O&C DM/WM area
- **Submission infrastructure** - Submission infrastructure development and operation
- **Facilities services** - Facilities services
- **Dynamic resource provisioning** - Dynamic resource provisioning
- **Upgrade SW Phase1** - Upgrade SW Phase1
- **Upgrade Phase 2** - Upgrade Phase 2
- **Dynamic Resource Provisioning** - Dynamic Resource Provisioning
- **Security Office** - O&C security area
- **Open Access** - Open Access
- **Coordination** - O&C management tasks
- **Analysis Tools** - O&C analysis tools area
- **Core Software** - O&C core software area
- **Generators** - O&C generators area
- **Reconstruction** - O&C reconstruction software area
- **Site Contributions** - O&C site contributions area

| Activity | Work Needed | Work Accepted |
|-------------------------------|-------------|---------------|
| Software developments | 0.00 | 0.00 |
| Simulation | 93.00 | 56.00 |
| Operations | 134.00 | 77.50 |
| Physics Support | 36.00 | 25.00 |
| Data and Workflow Management | 68.00 | 68.00 |
| Facilities services | 41.00 | 37.10 |
| Dynamic resource provisioning | 24.00 | 20.00 |
| Security Office | 3.00 | 3.00 |
| Coordination | 88.00 | 71.50 |
| Analysis Tools | 48.00 | 46.00 |
| Core Software | 34.00 | 25.50 |
| Generators | 59.00 | 60.00 |
| Reconstruction | 152.00 | 133.00 |
| Site Contributions | 690.00 | 635.65 |
| Submission infrastructure | 36.00 | 29.00 |
| Upgrade | 0.00 | 0.00 |

2017 view



2017 – least covered tasks

| Activity | TaskName | Fraction Accepted |
|-------------------------------|---|-------------------|
| Coordination | Web services and security L2 convener (task) | 0.00 |
| Core Software | Performance measurement and monitoring (task) | 0.00 |
| Simulation | FullSim - Maintenance of Core infrastructure, particle interactions, pileup and integration (task) | 0.32 |
| Operations | Integration activities (task) | 0.35 |
| Reconstruction | Core integration and performance monitoring (task) | 0.42 |
| Operations | Data transfers operations (task) | 0.43 |
| Simulation | FastSim - Tracking infrastructure (task) | 0.44 |
| Simulation | FullSim - Test beam applications (task) | 0.47 |
| Coordination | CMSSW Release planning and operations L2 Convener (task) | 0.50 |
| Coordination | User tools development L2 convener (task) | 0.50 |
| Coordination | Distributed analysis operations L2 convener (task) | 0.50 |
| Coordination | Simulation L2 convener (task) | 0.50 |
| Analysis Tools | JetMet POG maintenance (task) | 0.50 |
| Dynamic resource provisioning | Operation of the HLT farm for offline use (task) | 0.50 |

Cutting at < 50%