# McM : The Evolution of PREP. The CMS tool for Monte-Carlo Request Management.
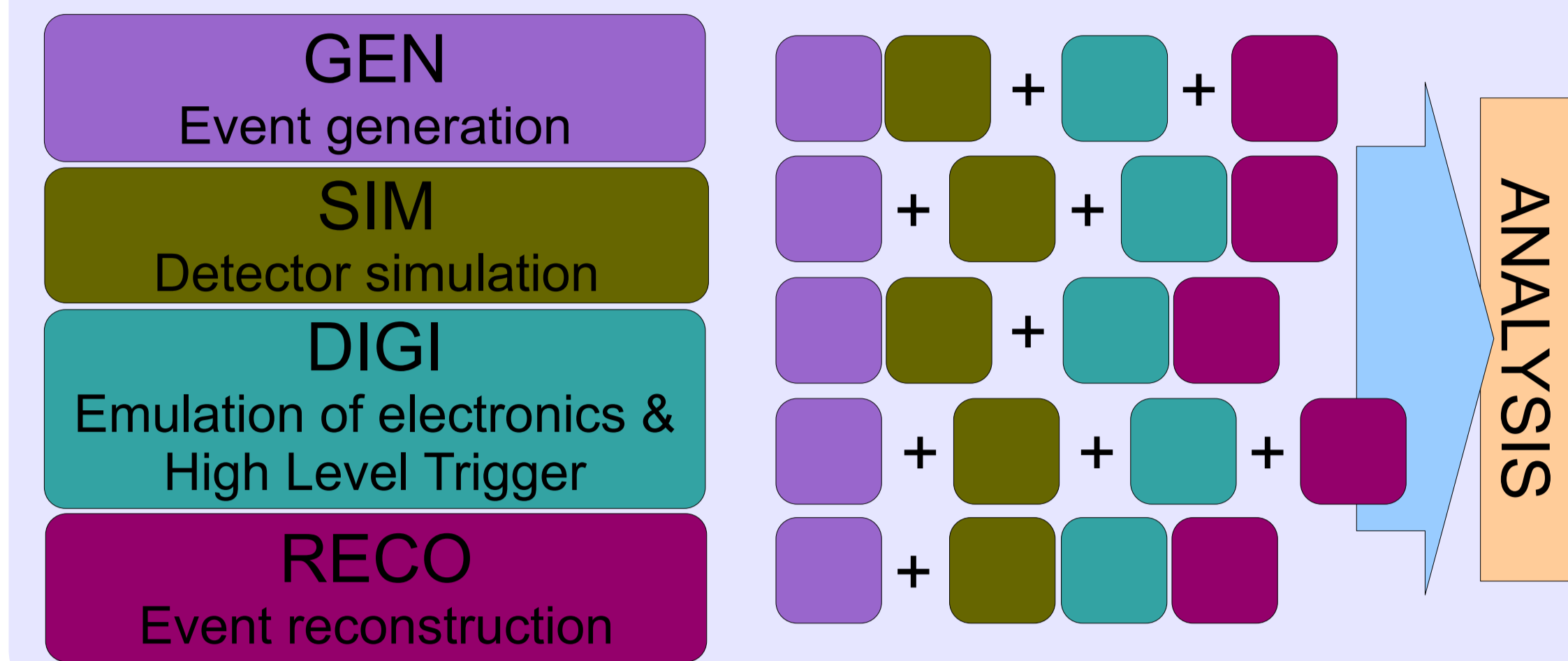
The analysis of the LHC data at the CMS experiment requires the production of a large number of simulated events. In 2012, CMS has produced over 4 Billion simulated events in about 100 thousands of datasets. Over the past years a tool (PREP) has been developed for managing such a production of thousands of samples. A lot of experience working with this tool has been gained, and conclusions on its limitations have been drawn. For better interfacing with the CMS production infrastructure and data book-keeping system, new database technology (couchDB) has been adopted. More recent server infrastructure technology (cherrypy + javascript) has been set as the new platform for an evolution of PREP. The operational limitations encountered over the years of usage have been solved in the new system. The aggregation of the production information of samples has been much improved for a better traceability and prioritization of work. This contribution will cover the description of the functionalities of this major evolution of the software for managing samples of simulated events for CMS.

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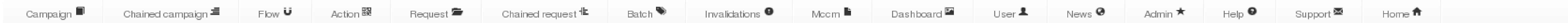
Steps in the Production of a Monte-Carlo Sample

The CMS software framework is organized such that the production of a dataset for analysis has to be done in successive steps, with I/O from disk. Arrangement of the steps is dictated by : software specifics, storage and software requirements, flexibility for further reprocessing, etc. In this document, a request is the logical container of the information required to perform one of such step. McM allows for the formation of any combination of steps.

- **GEN** — Event generation
- **SIM** — Detector simulation
- **DIGI** — Emulation of electronics & High Level Trigger
- **RECO** — Event reconstruction

ANALYSIS

Campaigns of Requests

Requests for all intermediate steps are gathered in campaign by type, energy, release software, etc. For book-keeping and clarity. Modification to the baseline request configuration are allowed for special requests, and within a certain flow of requests between campaigns.

Flow between Campaigns

Specific modifications to the baseline parameters of a campaign are allowed, once agreed and relevant for a relatively large number of sample production requests. The specification goes into the "flow" object, which links many campaigns to a single campaign.

Chains of Campaigns

Campaigns that are connected with "flows" form chains of campaigns. A "chained campaign" defines what are the necessary operations toward the finalization of the production of a sample for analysis.

Chains of Requests

User can visualize and follow the successive requests required for the completion of the production of a given Monte-Carlo sample.
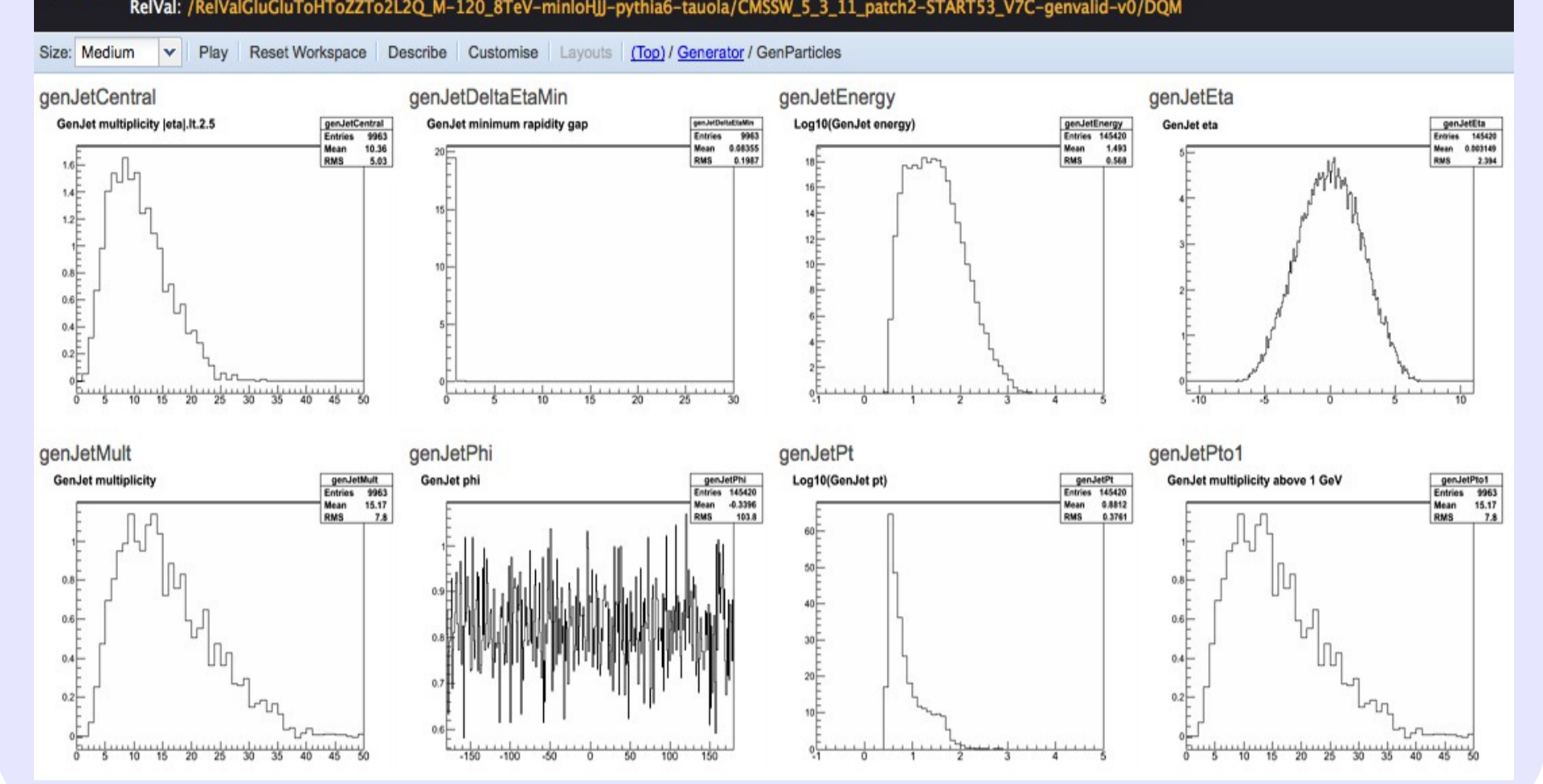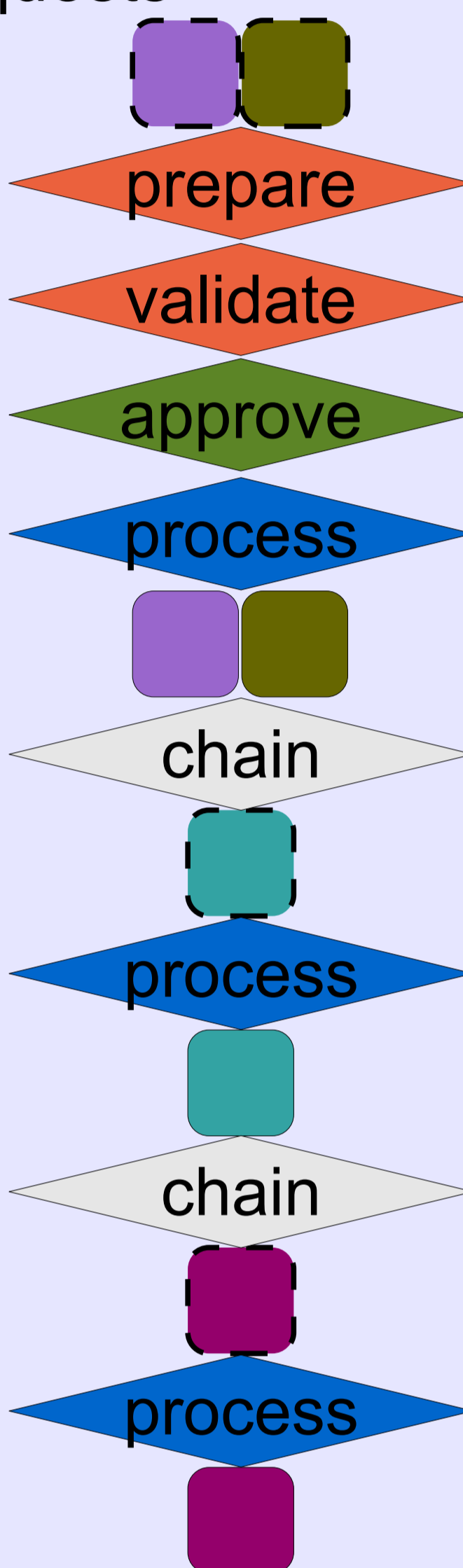
Building the Request Configuration

A request document holds a sequence of arguments to a configuration utility, bound to the software release used in production. It can be modified from the values defined in the campaign in specific cases.

Evolution in Between Requests

Requests are prepared by the contacts from various Physics groups. McM can produce validation histograms to check the physics content prior to full production. At each relevant stage the contact, then the generator convener has to sign-off on the content. The request is then processed through the desired chain of requests.

- prepare
- validate
- approve
- process
- chain
- process
- chain
- process

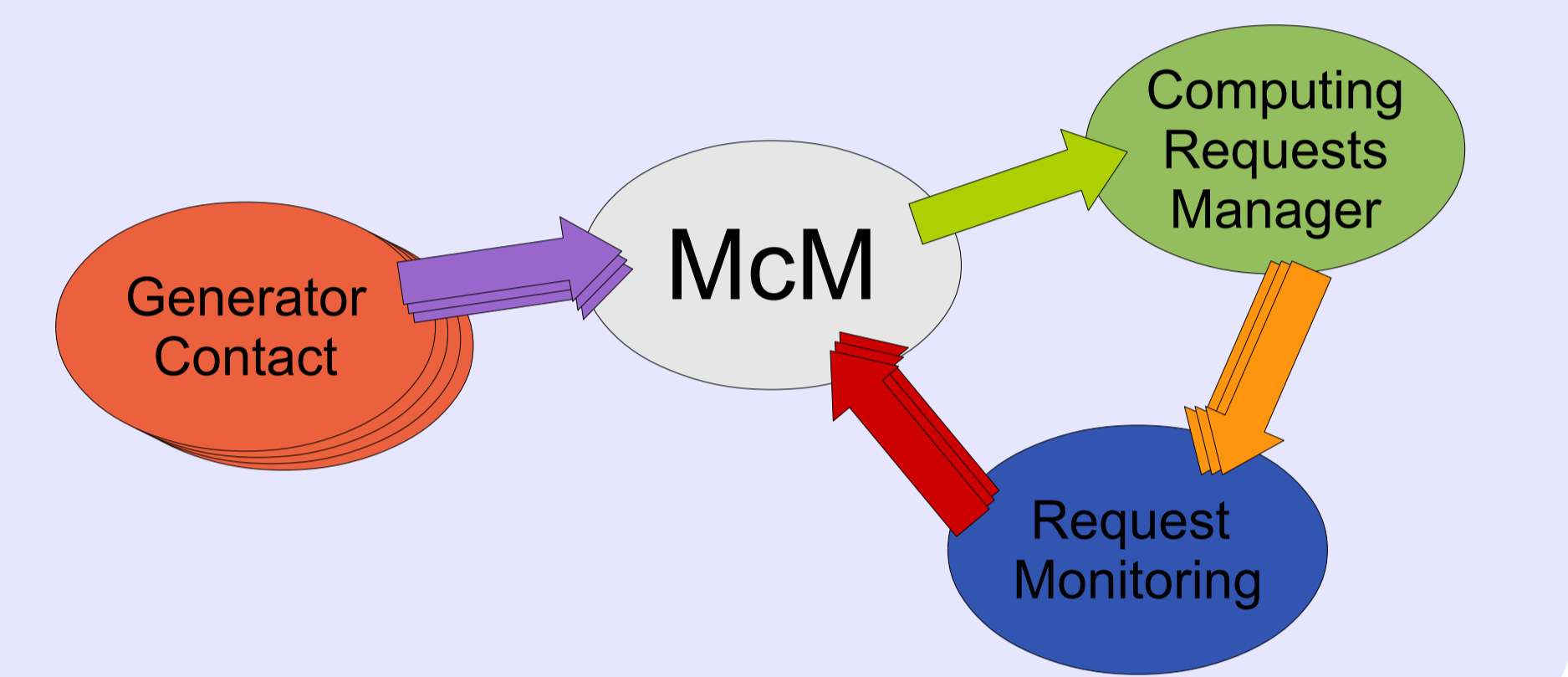**Production Contacts** — Prepare requests based on the needs of Physics groups

Generator Convener — Check the content of the requests

Production Operators — Handle the operation at production sites

McM — Handles automated operations on requests

Actions to be Taken on Samples

Production operators set the required action on the root requests before creating the chained requests. Specific priority block and partial processing can be specified.

Service Infrastructure and Technology

McM has a very simple and common infrastructure, with schema oriented documents stored in a database, object manipulations are done on the server side in a python application, visualization and operation in JavaScript on the client side.

- CouchDB™ [http://couchdb.apache.org]
- Python [http://python.org/]
- CherryPy [http://www.cherrypy.org/]
- JavaScript, Angularjs [http://angularjs.org/]

Validation of The Physics Content

The configuration of all varieties of event generator is complex. The full production of a samples can take a long time. In order to not waste resource ans delay delivery, a validation job on a selected number of events, is driven by McM and upload a set of plots to the Data Quality Monitoring (DQM) server.

Cycles of Production

Requests prepared in McM are sent for production to the computing system, monitored during processing, and the output is fed back to McM for completion of the production or preparation of the next request.

- Generator Contact
- McM
- Computing Requests Manager
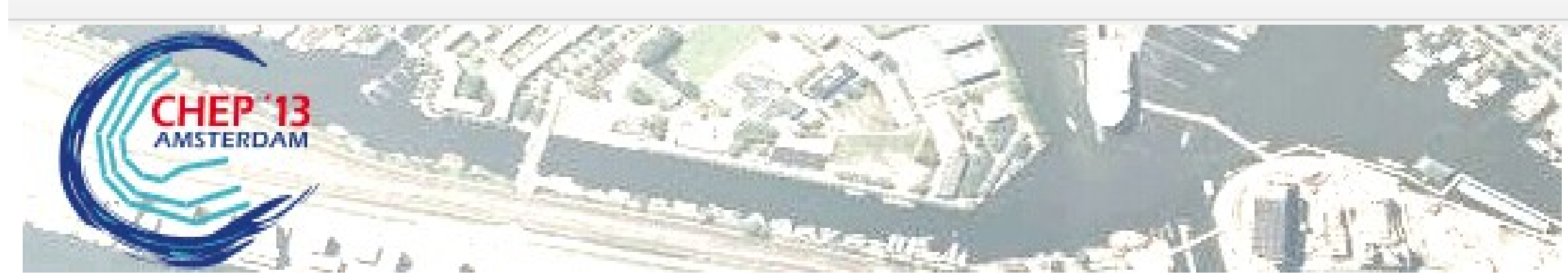- Request Monitoring

Documentation and Glossary

A set of documentation twiki [http://twiki.org/] is written with instructions and glossary for users, contacts and operators. The documentation is a collaborative effort.
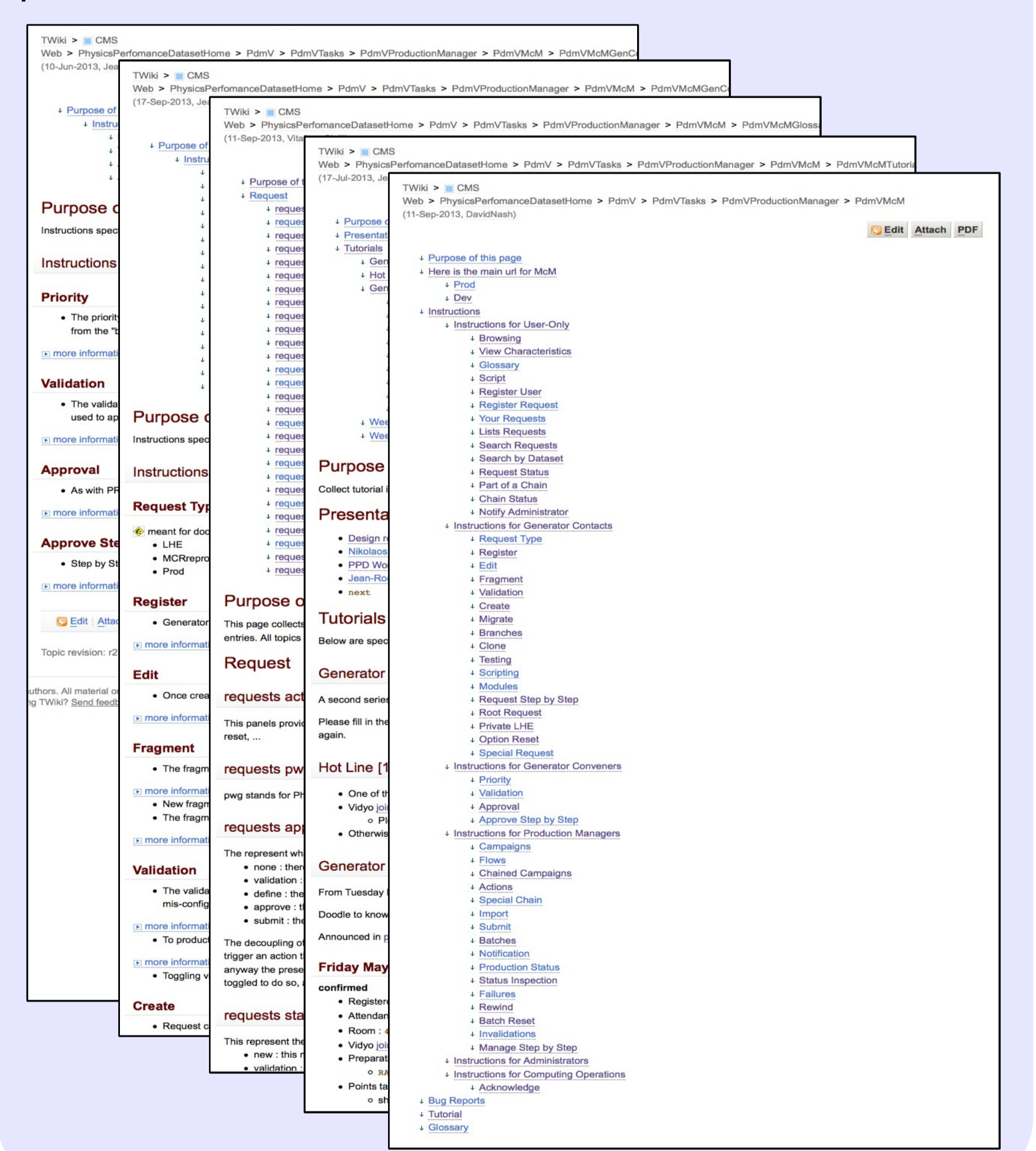
Overview and Outlooks

McM uses evolutive contemporary technology. It incorporates the experience gained from past years of operation of production tools at the interface of Analysis and Computing. Novel concepts (flow, chained requests, chained campaigns, actions) were introduced to simplify and automatize the production of a sample through the logical and technical steps of processing. McM enforces testing and validation of the single requests prior to production to improve manpower and computing efficiencies. Special and vanilla requests can be handled within targeted campaigns of production. McM serves as bookkeeping of sample production. It permits the aggregation of information on production from within or from other CMS services. Extensive documentation and tutorials are provided to the users and contacts. McM is the service for central production of samples for analysis in CMS.

Campaign | Chained campaign | Flow | Action | Request | Chained request | Batch | Invalidations | Mcm | Dashboard | User | News | Admin | Help | Support | Home

vlimant : administrator

McM Home page
Updated to use HTML5 links: exclude # from URL's
Welcome to the McM Monte-Carlo Request Management
Brought to you by PdmV

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Physics Performance and Dataset Project
Physics Data & MC Validation Group