

# Status of VXDTF-related modules

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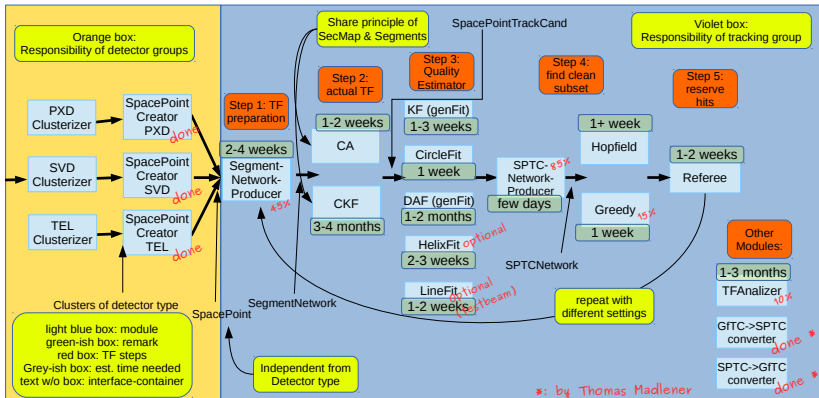
September 2, 2015

slide from last F2F meeting in Vienna April 2015  
 Next proposed steps - order of implementation:

- SPTCNetworkProducer *done, ready for field tests*
- TrackSetEvaluatorGreedy *done, ready for field tests*
- TrackSetEvaluatorHopfield *done, ready for field tests*
- if secMap not ready yet:
  - QualityEstimatorCircleFit *Eugenio*
  - SpacePointReferee
- FilterCalculator/SecMapTrainerBase *started (now using SPTCs as input), but new filters and TTree-output to do.*
- ExportSecMap/RawSecMapMerger
- SectorMapTuner
- SegmentNetworkProducer *mostly done, ready for field tests*
- TrackFinderVXD CelloMat *mostly done, ready for field tests*
- TrackFinderVXD ComboKalFit *Ian (he got the hard part only, I will simply use the interface to it)*
- QualityEstimatorKalmanFilter
- QualityEstimatorDAF
- TrackFinderVXDAnalyzer, after finishing TrackSetEvaluatorModules  
*mixed all in between mostly done, ready for field tests*



## Future state of the trackFinderVXD-approach (event-part)

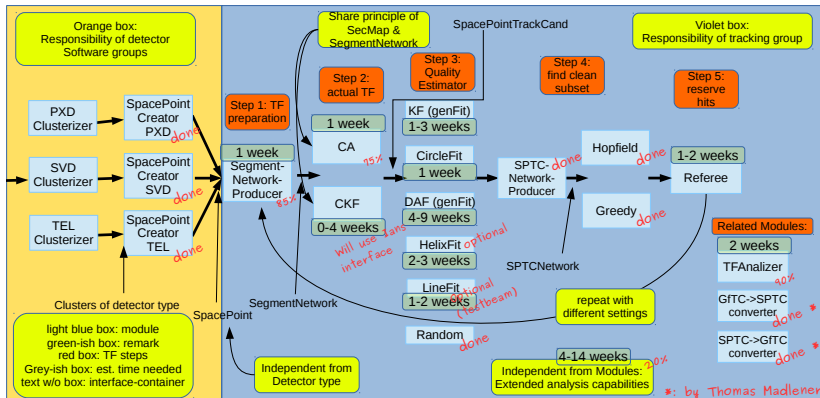


state of April 19th, 2015

- done, but not directly listed above: observers (2-hit), B3Vector3, Filters
- estimated time needed for essential stuff: 8-15 months, redesign only: 4-9 months



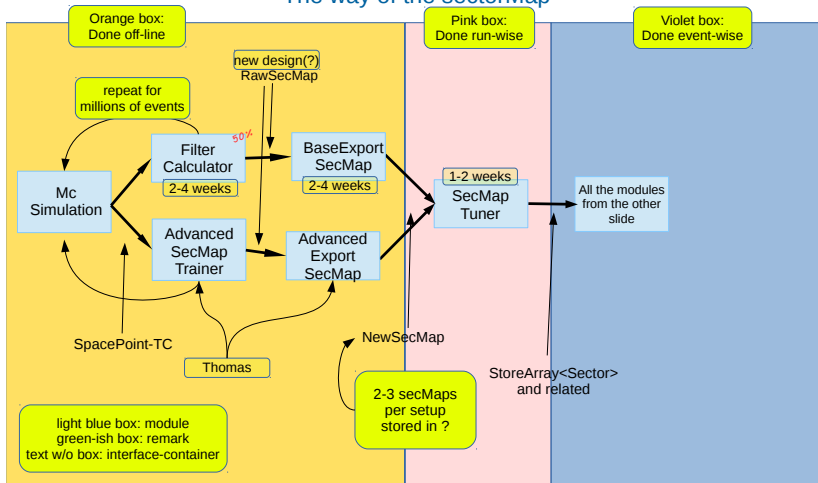
## Future state of the trackFinderVXD-approach (event-part)



state of August 31st, 2015

- done, but not directly listed above: 3-, 4-hit- and tracklet-filters, many nice containers like DirectedNodeNetwork and MinMaxCollector.
- not mentioned here: IntelligentSpacePointCreatorSVD → Andrzej Bozek (or someone delegated by him, current status unknown)
- estimated time needed for essential stuff: 6-9 months, redesign only: 2.5-3.5 months

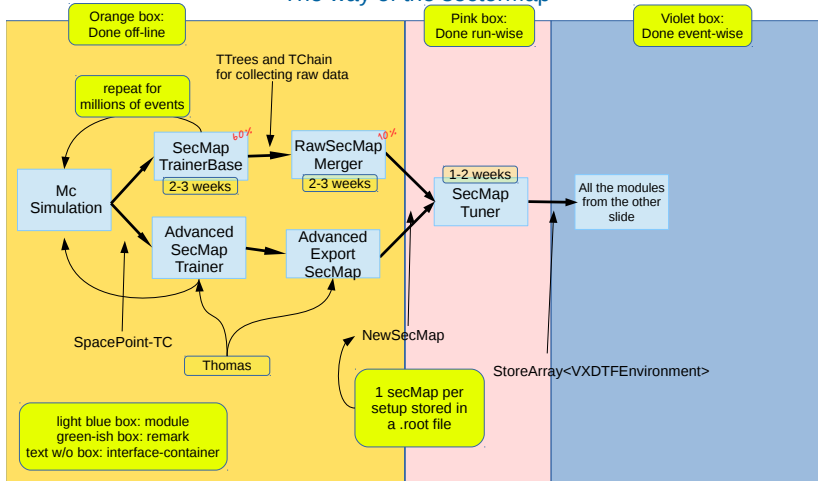
# The way of the sectorMap



state of April 19th, 2015



# The way of the sectorMap

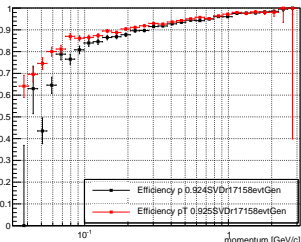


state of August 31st, 2015

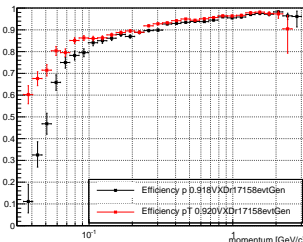
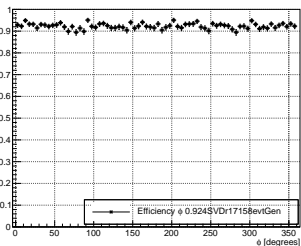
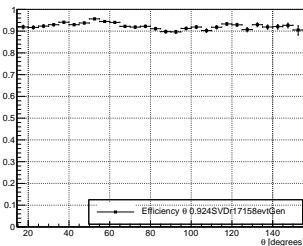


# Maintenance status of VXDTF (1.0)

Efficiency vs momentum



Efficiency vs momentum

Efficiency of  $\phi$ Efficiency of  $\theta$ 

- no changes in Efficiency since end of March 2015
- Last part to be changed: improved way to train sectorMaps (mostly compatible with v2.0)

## Next proposed steps:

- Checking state of VXDTF 1.0 regarding upcoming combined beam test
- Working on my thesis
- FilterCalculator/SecMapTrainerBase
- As soon as VXDTFEnvironment (including secMap-container) works:
  - ExportSecMap/RawSecMapMerger
  - Field tests for secMap-training
  - Field tests for event-part (bare SpacePoints → SPTCs in clean subsets)
- SpacePointReferee
- TrackFinderVXDComboKalFit
- QualityEstimatorKalmanFilter
- QualityEstimatorDAF
- EventDisplay-support for VXDTF 2.0
- Further field tests, polishing, thorough cross-check with VXDTF 1.0
- Studies efficiency, robustness against bkg & mis-alignment, time consumption,  $D^*$ -channel efficiency, general  $K_S$ -daughters-efficiency, other wishes?



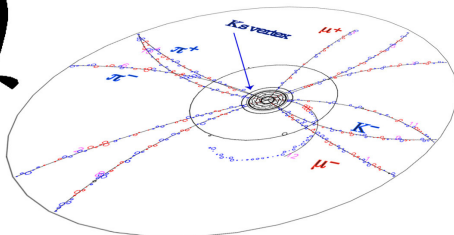


# One more thing

Many thanks to Eugenio for his help with the redesign so far. In view of the limited time until the end of my contract (March 14th, 2016) further support would be much appreciated.



that's all, folks!



Any suggestions, ideas or requests?

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### FilterCalculator - 60% done

- store measurements in TTrees
- VXDTF 2.0-fork only: use new filters
- estimation: 2-3 weeks

### ExportSecMap - 10% done

- merge TTrees using TChain instead of current approach
- VXDTF2.0-fork only: store as new secMap
- estimation: 2-3 weeks

### SectorMapTuner - runOnly 0% done

- load static secMap from root file
- apply tuning parameters
- make the map accessible on StoreArray → load into StoreObjPtr*i*VXDTFEnvironment*i*
- estimation: 1-2 weeks

## SpacePointCreatorSVD - 100% done

- SVDClusters (or combinations of it) → SpacePoints

## IntelligentSpacePointCreatorSVD - 0% done ?

- responsibility of Andrzej Bozek, Job: combine clusters intelligently
- estimation: 2-4 months

## SpacePointCreatorPXD - 100% done

- PXDClusters → SpacePoints

## SpacePointCreatorTEL - 100% done

- TelClusters → SpacePoints

## SegmentNetworkProducer - 85% done

- start to use new SectorMap
- optimize behavior (sorted internal structure in DirectedNodeNetwork?  
→ SubLayerID)
- bugfixing during field tests
- estimation: 1 week

### TrackFinderVXDCelloMat - 75% done

- add 4-hit- and tracklet-filters before output (?)
- speed optimization, bugfixing during field tests
- test printing capabilities in field test
- estimation: 1-2 weeks

### TrackFinderVXDComboKalFit - 0% done

- load segmentNetwork from storeArray
- for each allowed treeSeed, extrapolate to each sensor allowed by sectorCombi
- use lans interface as soon as it is ready-to-use
- estimation 1-4 weeks

### QualityEstimatorCircleFit - 0% done

- convert interface from VXDTFTrackCandidates to SpacePointTrackCands
- estimation: 1 week

## QualityEstimatorKalmanFilter - 0% done

- take TC and apply seed needed for fitting
- bad-ass-way: convert SpacePointTrackCands to genfit::TrackCand before, apply old interface
- estimation bad-ass: 1 week
- efficient-way: start with that module after finishing TrackFinderVXDComboKalFit, use as much as possible from that module
- estimation efficient: 1 week
- correct way: make genfit compatible (how?), new interface to be written
- estimation correct: 3+ weeks

## QualityEstimatorStraightLine - 0% done

- take TC and apply seed needed for fitting
- needed for runs without magnetic field and for testbeams
- low priority (any volunteers?)
- estimation: 1-2 weeks

### QualityEstimatorHelixFit - 0% done

- take TC and apply seed needed for fitting
- code partially already in FW, question whether should be completed
- lowPriority (any volunteers?)
- stimation: 2-3 weeks

### QualityEstimatorDAF - 0% done

- take tree of TCs and determine the best one using DAF
- mostly piping into genfit
- open question is how to do the interface (synergies with TrackFinderVXDComboKalFit and QualityEstimatorKalmanFilter apparent)
- estimation: 1-2 months

### SPTCNetworkProducer - 95% done

- field tests
- speed optimization (identification of overlaps: change back to VXDTF 1.0-approach if possible)

### TrackSetEvaluatorGreedy - 100% done

- field tests

### TrackSetEvaluatorHopfield - 100% done

- field tests

### SpacePointReferee - 0% done

- best x% (parameter) of TCs reserve the SP/Clusters (parameter) for further iterations
- not completely clear how to store relevant info (not thought about that yet in detail)
- estimation 1-2 weeks





## SPTC2GFTCConverter - 100% done

- Written and maintained by Thomas Madlener

## GFTC2SPTCConverter - 100% done

- Written and maintained by Thomas Madlener

## TFAnalyzer - 90% done

- field tests
- correct implementation:
  - heavily depending on observers, which have yet to be implemented
  - problem of correctly linking data in an oo-way for not to lose info too early
- estimation:  $\approx 6$  weeks



# The redesign task-force

## Who participates actively

- Eugenio Paoloni: the sectorMap-*Creator* (design for interfaces, off-line and on-line)
- Thomas Madlener: personal coach for the sectorMaps (intelligent filters with neural networks and boosted decision trees)
- Rudolf Frühwirth: father of the trackFinder (TF concept is his initial idea, now consulting task)
- Martin Heck: convener (mainly consulting tasks)
- Jakob Lettenbichler: midwife of the TF (responsible for the rest)

