

# Scoring: Some URs from Space Applications

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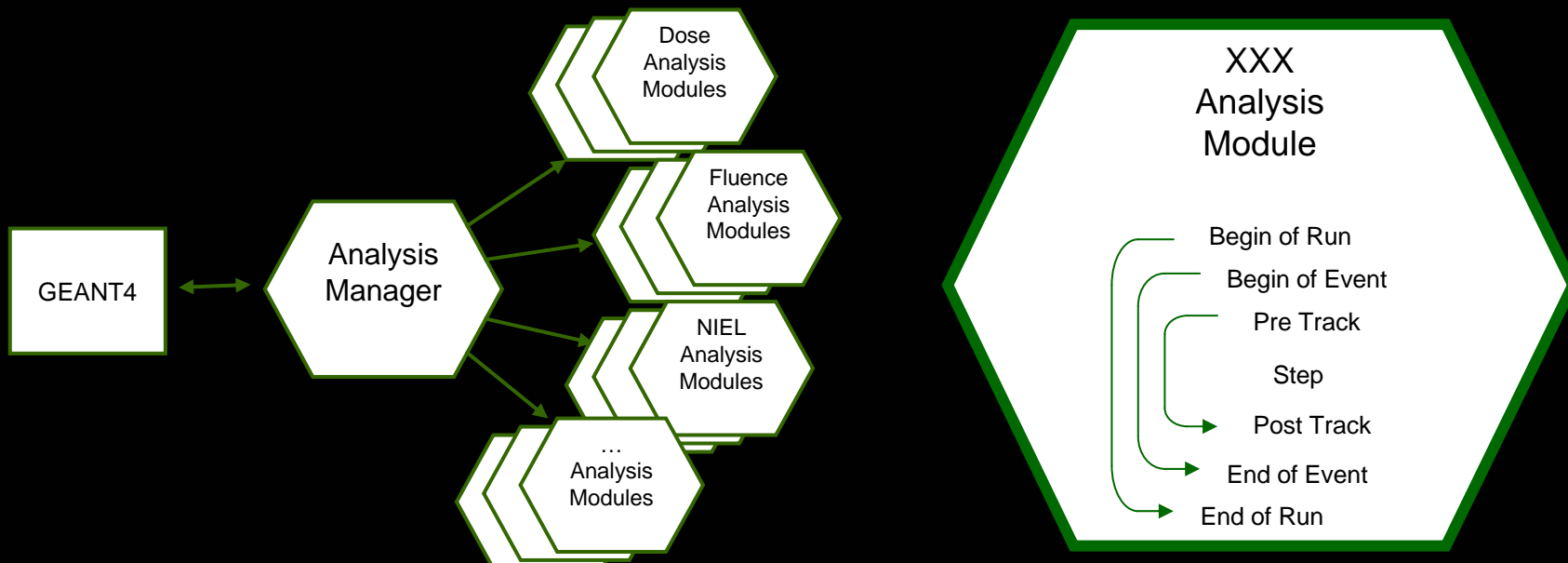


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# Introduction

- The following slides derive from several years of experience in dedicated tool development for space applications
- Lots of this experience has been used now in the development of the GRAS tool
  - Our dream is to see GRAS becoming useless...
  - First common discussion with Geant4 coll. (Makoto,...) in Catania (2004)
  - Standard scoring in GEANT4 is welcome
  - We are willing to contribute to a generalization of GRAS in Geant4



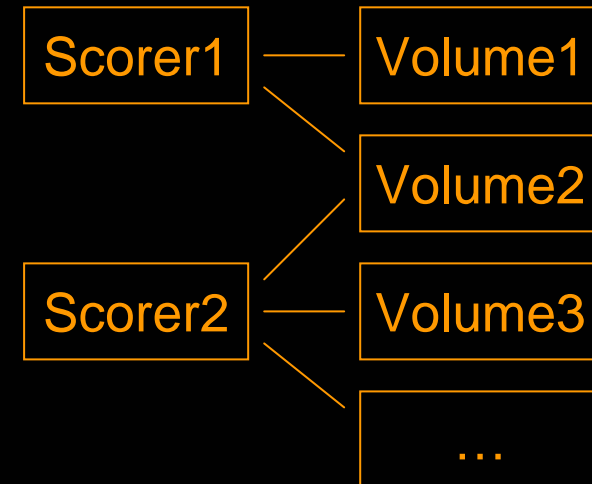
# Scoring types (This exists in GRAS now)

- Dose
    - Total Ionizing Dose (TID)
    - Dose Equivalent
    - Equivalent Dose
    - Effective Dose
  - NIEL
    - Microscopic
    - Macroscopic
  - Fluence
    - On surface
    - “Volumic”
- 
- Charging
  - Path length
  - Source monitoring
  - SEE / MBU ←
  - ...

# UR's on "Scoring features"

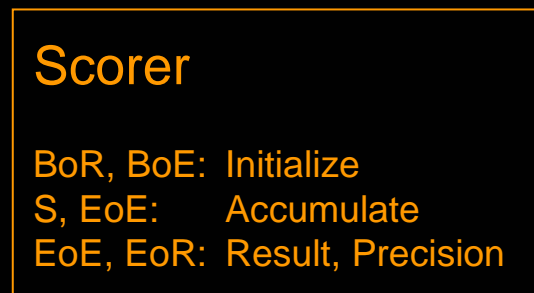
## Influences on design

- Common scoring in many volumes
  - E.g. Total dose in (volume1+volume2+...)
- Detect interface between specific volumes
  - E.g. fluence from volume1 to volume2
- Independent from geometry
  - From geometry type
  - From geometry itself: e.g. source scoring
- Connection to primary particles
  - E.g. dose in volume VS primary energy
- Self compute precision of estimate
  - Need to accumulate relevant quantity & compute "error"
  - E.g. ongoing work on "StatDouble" in GRAS, but also T.Koi experience from MCNP
  - Interested in collaborating
  - AIDA?
  - See also next slide on design

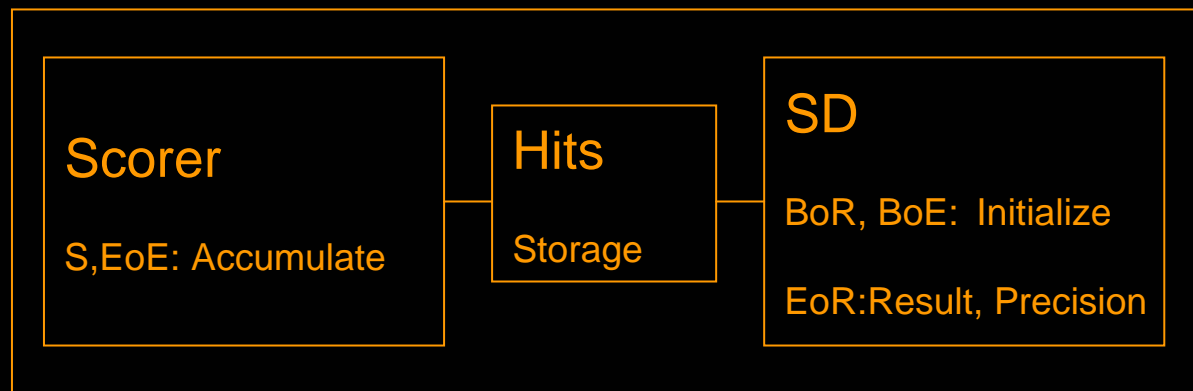


# Design issues: Self contained?

- In GRAS: Self contained scorers
  - Capable of collecting but also “summarizing” (and self estimating precision)



Self contained  
(Choice in GRAS)



Through Hit Collection  
(present choice in G4 Scorers)

# Other design issues

(from experience in GRAS)

- UI to introduce instances of scoring objects will (probably) remain in user application
- Parallel geometries for Mass, Tallying, Biasing, ...
  - Scoring design independent from geometry “type” (mass/biasing/tallying/...)
- One hit per event: issues with fluence, charging,...
- Interaction with particle history
  - Forward propagation of properties (crossing of surfaces, ...) or
  - Backward search of history
  - Important for
    - “Equivalent dose” ←
    - In general for “Dose by particle”
- Filtering: generic
  - E.g. GRAS: IsAnalysisRequired() method

# Optimization issues

- All scorers normally need access to common information from run / event / track / step / primary
- Get & store the information in an easily accessible location
  - E.g. GRASInfo class in GRAS

# Conclusions

Glad to

- see things moving
- collaborate
- if compatible, adapt GRAS to the new schemes