

The approach

(Chosen) Domains of applicability in Geant4:

- Q/A & Optimization activity

apply Q/A to the software product in either global and component domain related context

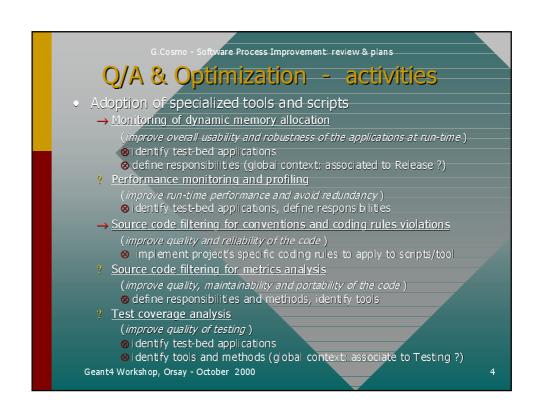
- Analysis & Design software cycle

identify the well established OOP procedure for development and maintenance

- Testing

assure constant improvement and continuity to system testing

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Q/A & Optimization - actions

- Creation of Q/A specialized team (2 people, ≥30%)
 - "global context" activity deployed to the team.
 - activity possibly independent from development
 - activity in coordination with the System Testing & Release Teams
 - activity based on mutual trust with developers and Coordinators
 - Team's responsibilities:

 - select *testbed* applications and care for maintenance/upgrade in collaboration with STT and Category Coordinators
 - perform a complete analysis every 1-2 months and delegate to Category Coordinators fixes to the code
 - identify coding rules and implement them through scripts/tool
- Identify resources (tools/people) from external groups in the Collaboration
- Improve automation: integrate with tools for testing

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Analysis & Design cycle

Goal: guarantee that the code quality will not degrade with time. Assure a coherent development where coupling will not increase with the complexity of the software

- **General Actions:**
 - Periodically review the global category diagram

 - check for violations/changes and additions
 inform TSB of any architectural change for new developments
 - Actions to be performed by Category Coordinators
 - periodically review URD, possibly starting from "use cases"
 - review/identify areas where A&D software cycle need to be applied
 - review consistency of code with design
 - supervise Category activity and organize training
 - → Collect architectural/detailed design and URD documents and define a clear procedure for maintenance and update
 - → Currently in place: tree <u>documents</u> in /afs/cern.ch/sw/geant4/cvs
 - → Notify SW-Management Coordinator for new diagrams/docs on Web

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Analysis & Design cycle - actions

- Improve traceability or requirements with design and test-cases
- Promote internal training (books, monitoring, ...)
 - requirements ↔ design ↔ implementation cycle
 design methodology and CASE tools
- Provide/adopt tools for work-flow management, size & effort estimation
 - training for effective usage of the tools
- Define standards for design documents to be provided and published AND maintain them!
 - CVS repository for design documents (architectural/detailed sources, URD, specifications, ...)
- Adopt change management for design. faults/updates during development/maintenance

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System Testing - tests

- Improvement of system and validation tests
 - →establish clear responsibility for maintenance and integration of tests in the normal development process
 - → formalized in release&testing procedures document
 - keep updated list with descriptions
 - review and properly document tests; check correspondence with URD and use-cases
 - identify most common use-cases
 - create map for testing coverage and keep it updated
 - involve category coordinators
 - adopt/improve regression and statistical tests
 - · establish methods and tools
 - provide a clear time-table for deliverables

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System Testing - automation

- → adoption of *Bonsai* to automate testing activity and CVS tags submission through Web
 - → system already in production (see our *tag-database*)
- → adoption of <u>LXR</u> for online browsing of code through Web → first prototype implemented and available (KEK, TRIUMPH) → add links from central Geant4 web
- → adoption of *Tinderbox* to allow developers and testers to monitor progress of system tests and allow distributed control
 - → first working prototype already available from TRIUMPH
- integrate Q/A automation to provide developers a way to perform basic Q/A checks on code before submitting to test
 - implementation of scripts for automating CW code filtering in progress (E. Medernach)

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Conclusions

- Apply SPI actions to three different domains:
 - Q/A and Optimization, Analysis & Design cycle, Testing
- Monitor progress of SPI program
 - iterate new assessments in 2001
 - extend assessment to uncovered (or partially covered) domains (testing, documentation, Software Management)
 - try improving Capability levels (try to reach Capability Level 3 assessment)
- Establish clear commitments and deadlines for the implementation of proposed SPI actions
 - Discussion here at the Category Coordinators meeting Geant4 Workshop, Orsay - October 2000

Conclusions - 2

Traceability
- requirements <> design <> test-cases
- estimation of time scale for each Category required

Documents CVS repository
- insert existing design documents and gradually update them
- retrieve source of URD and store in repository
• plan update of URD (global/detailed)

Category diagram
- identify and report current violations by October 31st

Updating of diagrams in public documentation

Q/A team manpower issue