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PROPOSAL OF TRAINING REQUIREMENTS

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1 INTRODUCTION

1.1 Purpose of this document

This document proposes the Requirements for a Geant4 Training Kit, to be developed as part of Geant4 Milestones for year 2000.

1.2 General description

The set of training requirements listed in this document derive from:

- direct requirements elicitation in the Geant4 user communities,
- collection and analysis of data on Geant4 training across the last 15 months.

Please note that all the direct interviews indicated the **improvement of the User Documentation as the top priority** of a training plan.

1.3 General capabilities

The Training Requirements of this document take into account the needs of the following kinds of user communities:

- large scale HEP experiments
- small scale HEP and nuclear physics experiments
- astrophysics experiments
- space missions
- medical applications in academic environments
- medical applications in hospitals

1.4 Definitions

In the following chapters the party requesting to host a Geant4 Training Programme is generically defined as the "Organisation".

2 REQUIREMENTS

2.1 Scope and general features of the training plan

1. Geant4 Training shall deal with the Geant4 Toolkit.
2. The Geant4 Training Kit shall consist of a set of reusable training modules.
3. It should be possible to assemble a variety of Training Programmes from the material of the Geant4 Training Kit.
4. The educational objective of the Geant4 Collaboration should be matched with the objectives of the organisation requesting Geant4 training.
5. There should be a documented planning process for identifying training needs.
6. There should be a documented process for the development of the Geant4 Training Kit.
7. The development of the material in the training kit should be staged, according to a set of agreed and documented priorities.
8. There should be a continuous improvement of the Geant4 Training Kit.
9. The language for the written material in the Training Kit should be English (and also the default language for delivering the courses); training courses delivered in other languages, but still based on the same written material in the Training Kit, should be subject to the agreement between the Geant4 Collaboration and the Organisation.

2.2 Training objectives

1. In all the Training Programmes, the student shall learn the main features and functionalities of Geant4, with depth of learning appropriate to the duration of the Training Programme.

2. In the "hands-on" general Training Programmes, the student shall acquire the basic capabilities to develop and run a simple Geant4-based application, at the level of the Novice Examples.
3. In the advanced Training Programmes, the student shall acquire the capabilities to develop advanced Geant4-based applications on specialised topics, at the level of Advanced Examples.

2.3 Audience of the Training Programmes

1. A Geant4 Training Programme shall be available, suitable to people with no previous C++ nor OOP experience, but with some simulation experience.
2. A Geant4 Training Programme shall be available, suitable to people with a modest knowledge of C++ and with some simulation experience.
3. A Geant4 Training Programme shall be available, suitable to people with a modest knowledge of C++, but with no simulation experience.
4. A Geant4 Training Programme shall be available, suitable to people experienced both in C++/OOP and in simulation techniques.
5. A Geant4 Training Programme shall be available, suitable for organizations with homogeneous characteristics (eg. an experiment).
6. A Geant4 Training Programme shall be available, suitable for organizations with no homogeneous characteristics (e.g. a national organization).
7. A Geant4 Training Programme shall be available, suitable for inclusion in a post-graduate Physics School programme.

2.4 Type of Training Programmes

The following types of Training Programmes are required, in order of priority:

1. Geant4 demo, 1/2 day
2. Short hands-on introduction to Geant4, 1 day
3. Long hands-on course on Geant4, 4 days
4. Academic-style series of lectures, suitable to a School in Physics Technologies, 3-5 1-hour lectures
5. Series of lectures + hands-on sessions, suitable to a Computing School, 3-5 1-hour lectures
6. Specialized advanced courses on specific topics, 1/2 day each:
    1. Geometry and CAD interface
    2. Physics (could be also split into Electromagnetic Physics, Hadronic Physics etc.)
    3. Visualisation and UI/GUI
    4. Features and functionalities for medical physics applications
    5. Modules for space applications

2.5 Content of the Training Programmes

1. All the Training Programmes, irrespective of their type, shall be preceded by an introductory overview of Geant4, of the type of a seminar.
2. The introductory session shall provide an overview of software engineering and OO technology in Geant4, Geant4 functionalities in general, Geant4 physics content and transparency and Geant4 applications and results.
3. The general Training Programmes shall provide an overview of Geant4 installation and updating procedures, how to build a simple Geant4-based application, the use of the main functionalities in the various categories (including Geant4 physics).
4. The extension and depth of the presentation of the functionalities of each category should depend on the length of the Training Programme offered.
5. The Advanced Training Programmes shall provide an in-depth coverage of a specific topic.

2.6 Training evaluation and tracking

1. The effectiveness of Training Programmes shall be assessed.
2. The evaluation of the effectiveness of the Training Programmes shall be performed according to documented procedures.
3. The evaluation of the effectiveness of training should be performed according to various levels of assessment (such as, for instance, the Kirkpatrick[1] Model Guidance).
4. Data from the evaluation of the training effectiveness shall be collected, to be used for the continuous improvement of the Geant4 Training Kit.

2.7 Training schedule and prerequisites

The Geant4 Collaboration shall specify:

1. An outline of the Training Programmes available
2. A description of the intended audience for each Training Programme
3. A description of the learning objectives of each Training Programme
4. Recommended sequencing of the Training Programmes
5. Duration of the Training Programmes and their delivery medium
6. Designation of mandatory and recommended prerequisites
7. Planned frequency of Training Programme offerings or Training Programme schedule
8. Copy of the notes
9. Instructor credentials

[1] D.L. Kirkpatrick, J. ASTD, 1959 and 1960.

2.8 Student selection and enrollment procedures

1. There shall be documented procedures for the students selection.
2. The Geant4 Collaboration should provide documentation about the prerequisites of Training Programmes.
3. The procedures for student selection shall be agreed by both the Geant4 Collaboration and the Organisation.

2.9 Trainers

1. The trainers of Geant4 Training Programmes shall be appointed by the Geant4 Collaboration, in consultation with the Organisation.
2. Local contributions to the staff of Geant4 Training Programmes shall be subject to the agreement of the Geant4 Collaboration.
3. The trainers shall be identified according to documented procedures.
4. An internal training programme shall be available to adequately prepare Geant4 trainers.
5. The trainers shall be knowledgeable in Geant4; in the case of advanced courses, they shall also be expert on the specific topic.
6. The trainers shall possess excellent ability to speak in public and to make professional presentations.

2.10 Requirements on the Organisation

1. The Organisation shall follow a written policy concerning its training needs.
2. A person responsible for the training needs of the organisation shall exist.
3. The Organisation should provide the results of its training needs analysis.
4. A description of the audience shall be provided.
5. Adequate resources and funding shall be provided for implementing the Training Programme.
6. A preview of the facilities should be provided.
7. All the necessary components shall be installed locally, as required by each Training Programme.
8. Local members of the training group shall have the necessary skills and knowledge to perform the training activities.