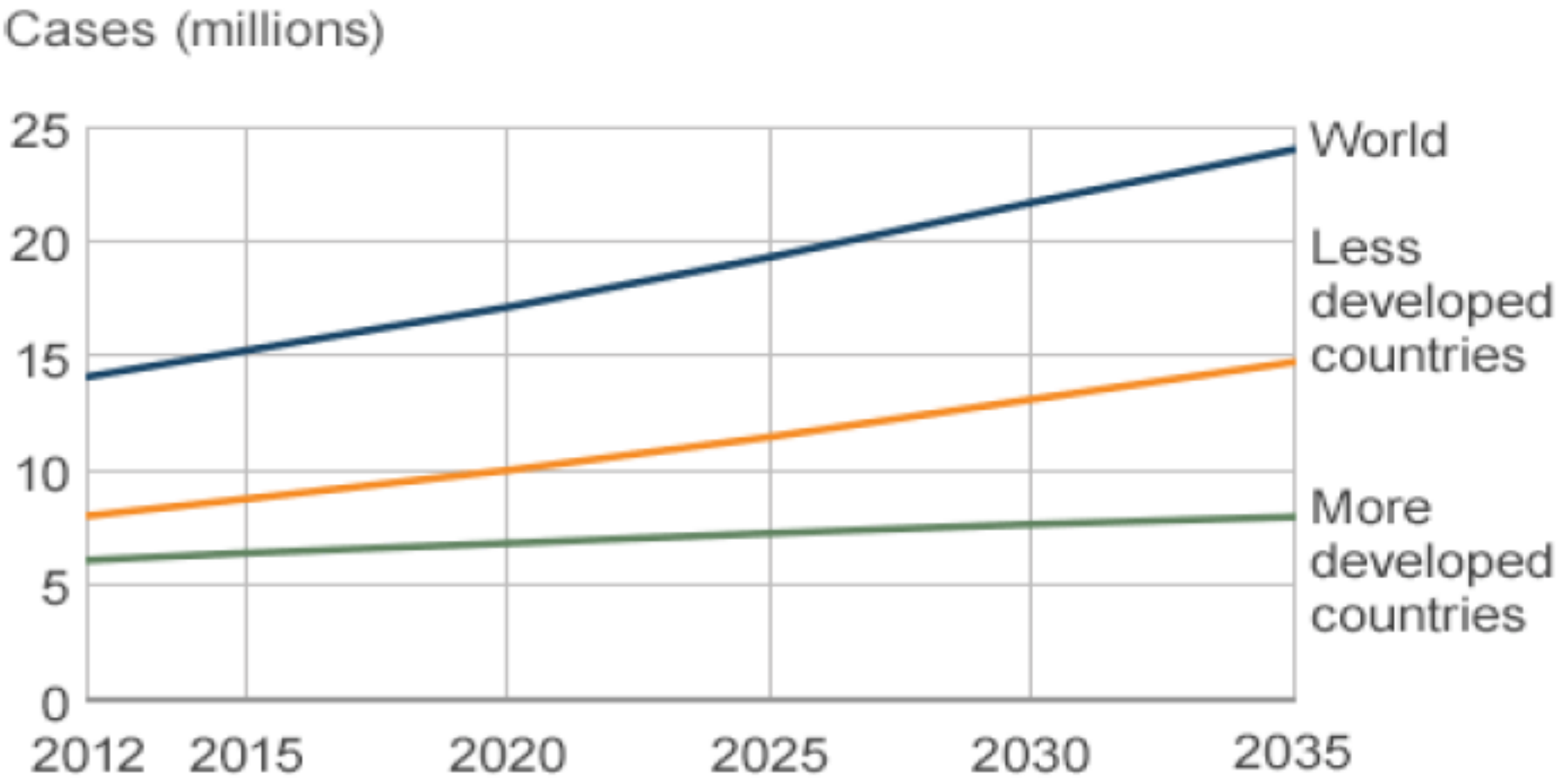
Innovative, Robust and Affordable medical linac technologies for challenging environments

Manjit Dosanjh, CERN

Predicted Global Cancer Cases



Source: WHO GloboCan

Cancer is a growing challenge

Globally 15 million (2015) to 25 million in (2035)

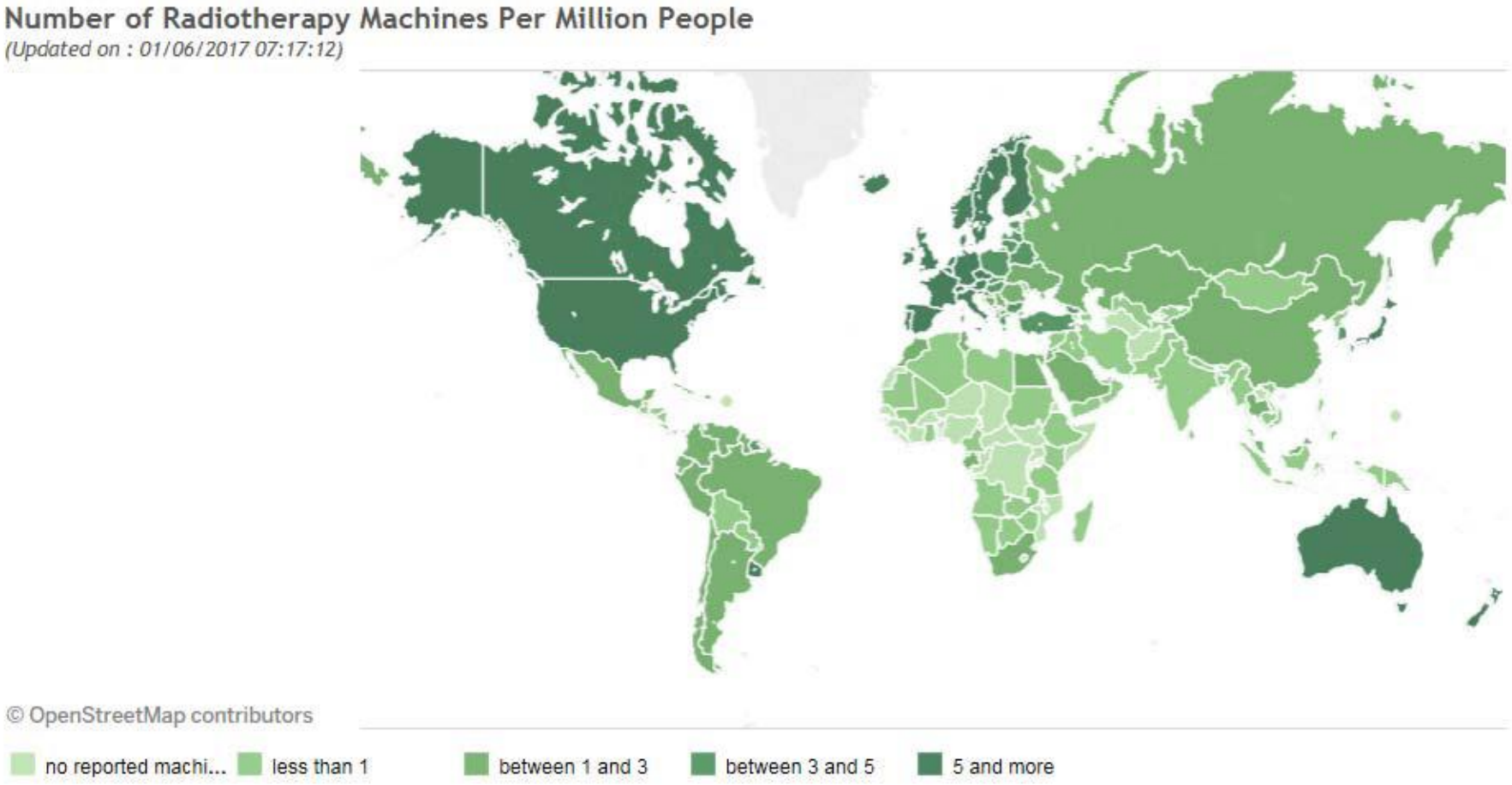
Effective cancer care uses radiation therapy for about 50% of the patients

1 million inhabitants recommendation is 5 or more linacs

Challenge: how to go from no or limited radiotherapy to high quality radiotherapy globally

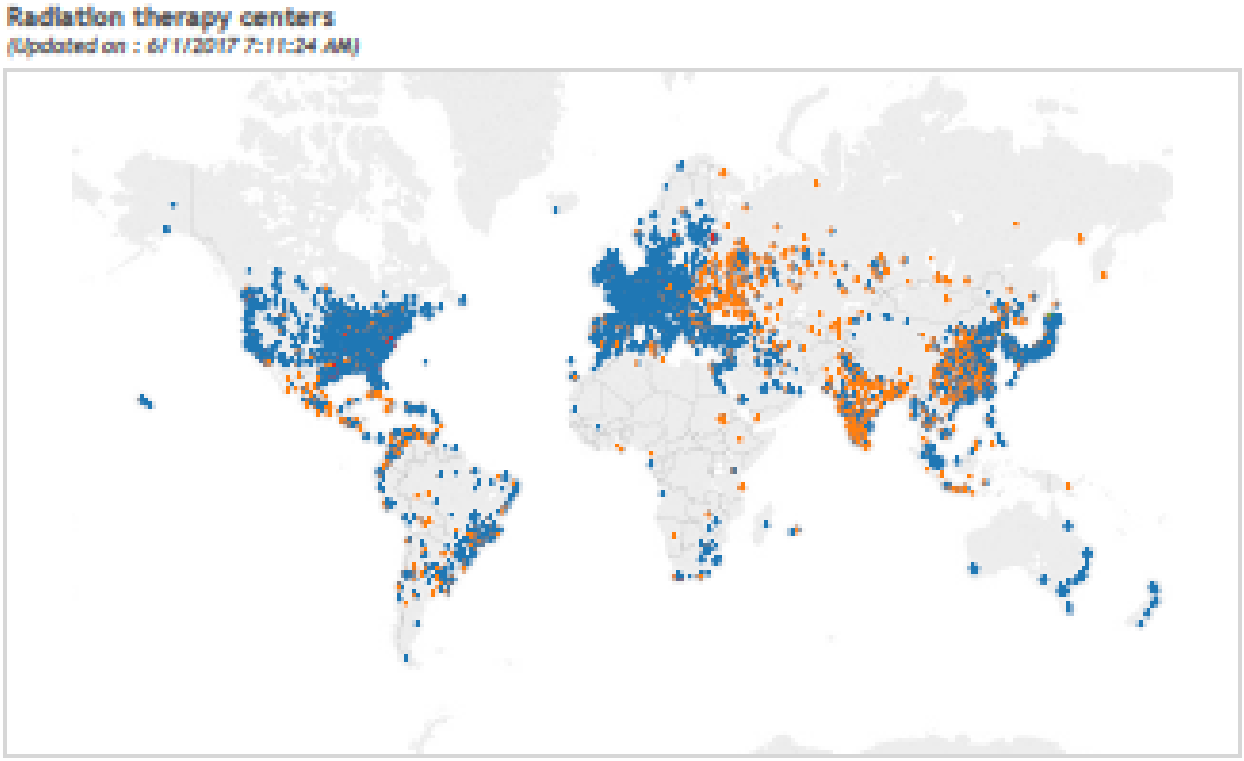
RT is an essential part of the cancer treatment

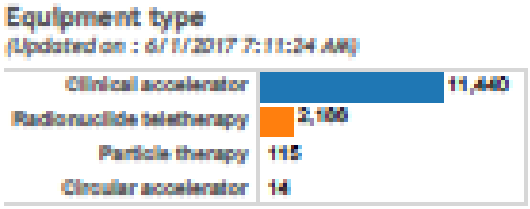
Globally: no of machines per 1 million inhabitants

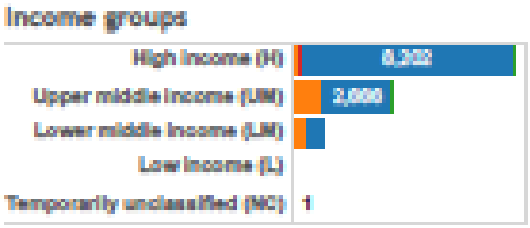


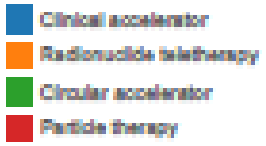
Slides from IAEA, Dirac

World wide radiotherapy coverage









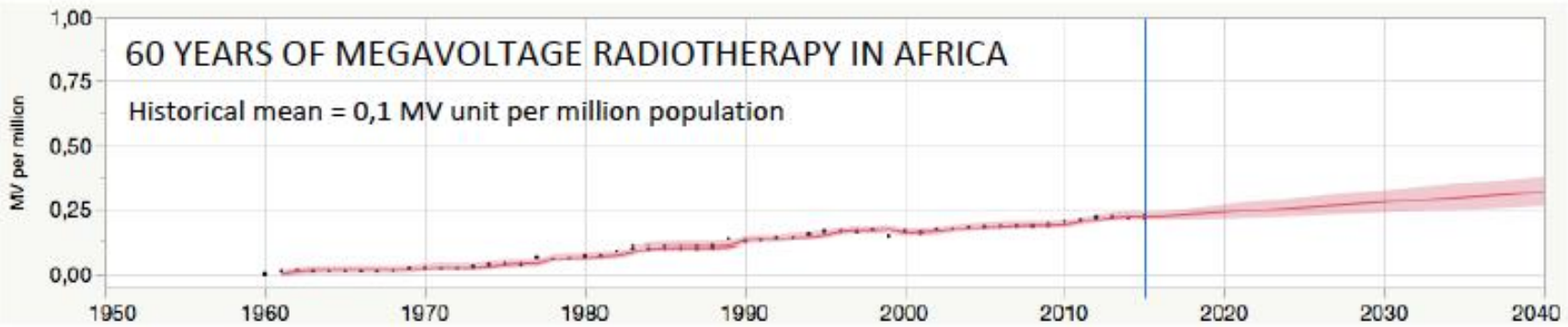
Countries	RT centers	Equipment	Linac	Radionuclide Therapy	Circular Accelerator	Particle Therapy
139	7041	13755	11440	2186	14	115

Slides from IAEA, Dirac

RADIOTHERAPY IN AFRICA

21 countries with RT in 1995

23 countries with RT in 2017



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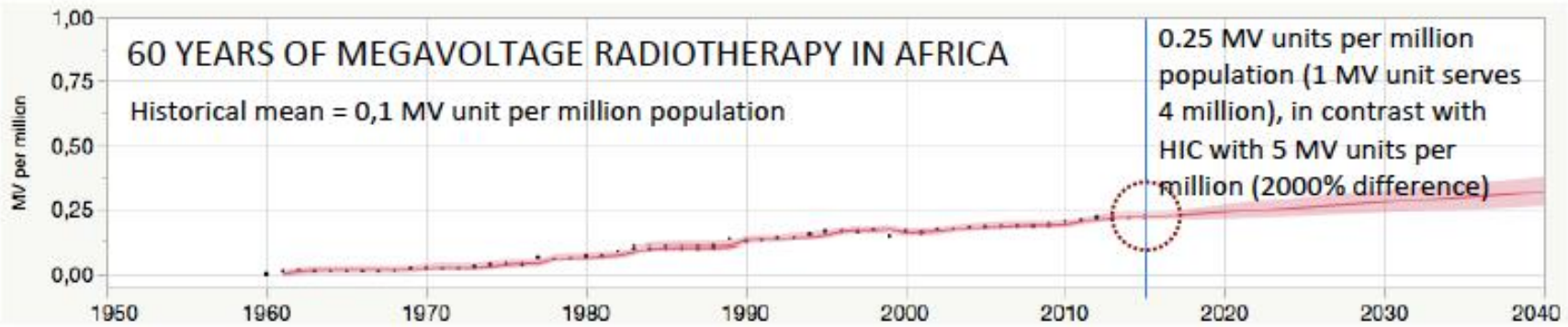

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Needs by 2035 in LMIC

Globally 15 million (2015) to 25 million in (2035):

- 12,600 megavolt-class treatment machines
- 30,000 radiation oncologists
- 22,000 medical physicists
- 80,000 radiation technologists

Standard staffing ratios

CERN hosted workshop on: "Design Characteristics of a Novel Linear Accelerator for Challenging Environments"

Norman Coleman, David Pistenmaa (ICEC) Manjit Dosanjh (CERN)

International Cancer Expert Corps &CERN

European Organization for Nuclear Research (CERN)
International Atomic Energy Agency (IAEA)
James Martin Center for Nonproliferation Studies (CNS)
National Aeronautics and Space Administration (NASA)
National Nuclear Security Administration (NNSA)

Introduction

Convened By:

Hosted By:

The Workshop addressed:

1) the role of radiotherapy in treating cancer in challenging environments such as in many low- and middle-income countries (LMICs) and the related security concerns of medical radiological materials,

2) the design requirements of linear accelerators and related technologies for use in challenging environments,

3) the education, training and mentoring of the sustainable workforce needed to utilize novel radiation treatment systems 4) the costs of and financing for the implementation of the recommendations from the workshop.

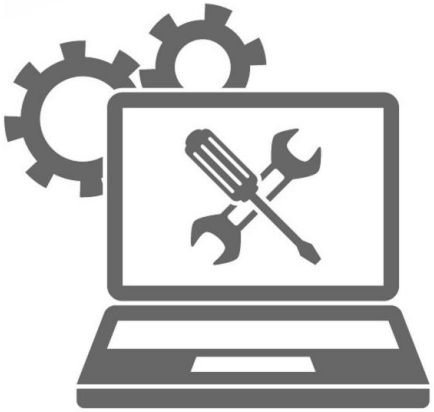
Slides provided by David Jaffray

Task Forces

- **TF1: Technology (Bury the Complexity)**
  a) near term b) long term
- **TF2: Education, Training and Mentoring**
- **TF3: Global Connectivity and Development**

https://indico.cern.ch/event/560969/

Recommendations & Actions



Technology (“Bury the Complexity)

Develop optimal design requirements for a novel high-quality, lower-cost treatment solution that leverages existing linac technologies and incorporates intelligent software designed for robust operation in a range of challenging environments

Education, Training, and Mentoring

Identify 1) the education and training requirements for current as well as future radiotherapy equipment and treatment systems worldwide, 2) the current extent of education and training program resources and 3) the education and training needed to fill the gaps.

Global Connectivity and Development

Develop and implement a strategy for securing financial support in client countries as well as from governmental, academic and philanthropic organizations and individuals to insure success of the effort to make excellent near-term and long-term RT systems.

Slides provided by David Jaffray

This workshop is focussing on Task Force 1