

# **CERN-hosted Workshop on Design Characteristics of a Novel Linear Accelerator for Challenging Environments - Improving global access to radiation therapy**



## **Report of Contributions**

Contribution ID: 2

Type: **not specified**

# I. Welcome to CERN: Frederick Bordry

*Monday 7 November 2016 08:30 (5 minutes)*

**Presenter:** BORDRY, Frederick (CERN)

Contribution ID: 3

Type: **not specified**

## **II. Welcome and Goals of the Workshop: Norman Coleman, Manjit Dosanjh and David Pistenmaa**

*Monday 7 November 2016 08:35 (10 minutes)*

**Presenters:** COLEMAN, C. Norman (National Cancer Institute); PISTENMAA, David; DOSANJH, Manjit

Contribution ID: 4

Type: **not specified**

## **III. A. Summary of findings of the Global Task Force for Radiation Control Cancer (GTFRCC)**

*Monday 7 November 2016 08:50 (15 minutes)*

**Presenter:** GOSPODAROWICZ, Mary

**Session Classification:** III. Unique Partnerships to Improve Radiation Oncology in Low- and Middle-Income Countries: Moderator: Manjit Dosanjh

Contribution ID: 8

Type: **not specified**

## IV. B. Open Discussion

*Monday 7 November 2016 10:45 (10 minutes)*

**Session Classification:** IV. Lessons from Past and Current Radiation Therapy Initiatives: What Works or Does not Work in Low- and Middle-Income Countries, and Why: Moderator: Yakov Pipman

Contribution ID: 17

Type: **not specified**

## **XII. Concluding Remarks by Workshop Co-organizers**

*Tuesday 8 November 2016 15:00 (5 minutes)*

**Presenters:** COLEMAN, C. Norman (National Cancer Institute); PISTENMAA, David (ICEC); DOSANJH, Manjit (CERN)

Contribution ID: 18

Type: **not specified**

## **III. B. Balancing Equity and Advancement in Radiotherapy: How Economics Can Help Solve Global Health Challenges**

*Monday 7 November 2016 09:05 (15 minutes)*

**Presenter:** RODIN, Danielle

**Session Classification:** III. Unique Partnerships to Improve Radiation Oncology in Low- and Middle-Income Countries: Moderator: Manjit Dosanjh

Contribution ID: 19

Type: **not specified**

## **III. D. Treatment not Terror: Improving Cancer Treatment while Reducing Security Risks**

*Monday 7 November 2016 09:35 (15 minutes)*

**Presenter:** POMPER, Miles

**Session Classification:** III. Unique Partnerships to Improve Radiation Oncology in Low- and Middle-Income Countries: Moderator: Manjit Dosanjh



Contribution ID: 20

Type: **not specified**

## IV. A. IAEA's perspective

*Monday 7 November 2016 10:25 (20 minutes)*

**Presenter:** ZUBIZARRETA, Zubi

**Session Classification:** IV. Lessons from Past and Current Radiation Therapy Initiatives: What Works or Does not Work in Low- and Middle-Income Countries, and Why: Moderator: Yakov Pipman

Contribution ID: 21

Type: **not specified**

## IV. C. Industry's experience

**Presenter:** FEHERVARY, Andras

**Session Classification:** IV. Lessons from Past and Current Radiation Therapy Initiatives: What Works or Does not Work in Low- and Middle-Income Countries, and Why: Moderator: Yakov Pipman

Contribution ID: 22

Type: **not specified**

## **V. A. Radiation Oncology in Africa; Current State and Future Goals**

*Monday 7 November 2016 11:00 (15 minutes)*

**Presenter:** GROVER, Surbhi

**Session Classification:** V. Design Considerations for a Linear Accelerator for Challenging Environments - Moderator: Richard Lanza

Contribution ID: 23

Type: **not specified**

## **V. B. Machine Parameters and Machine Operational Features to Satisfy Requirements**

*Monday 7 November 2016 11:15 (20 minutes)*

**Presenter:** MEGHZIFENE, Ahmed

**Session Classification:** V. Design Considerations for a Linear Accelerator for Challenging Environments - Moderator: Richard Lanza

Contribution ID: 24

Type: **not specified**

## **V. C. “Dreamliner” Novel Linear Accelerator Features for Challenging Environments**

*Monday 7 November 2016 11:35 (5 minutes)*

**Presenter:** PISTENMAA, David (ICEC)

**Session Classification:** V. Design Considerations for a Linear Accelerator for Challenging Environments - Moderator: Richard Lanza

Contribution ID: 25

Type: **not specified**

## **VI. NASA's Experience in the Modular Design of Complex Systems**

*Monday 7 November 2016 11:40 (20 minutes)*

**Presenter:** COBBS, Ron

Contribution ID: 27

Type: **not specified**

## VII. B. Considerations at TERA

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 28

Type: **not specified**

## VII. C. Considerations from other organizations

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.



Contribution ID: 29

Type: **not specified**

## VII. D. Open Discussion

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 30

Type: **not specified**

## **IX. A. How do we translate design characteristics into a working machine (From machine shop to the clinic)?**

*Tuesday 8 November 2016 10:25 (15 minutes)*

**Presenter:** BERNIER, Jacques (GSMN)

**Session Classification:** IX. What Will it Take to Make it Happen?: Moderator: Bruce Curran

Contribution ID: 31

Type: **not specified**

## **IX. B. Challenges in introducing new technology in the developing world**

*Tuesday 8 November 2016 10:40 (15 minutes)*

**Presenter:** FEHERVARY, Andras

**Session Classification:** IX. What Will it Take to Make it Happen?: Moderator: Bruce Curran

Contribution ID: 32

Type: **not specified**

## **IX. D. Determining the cost of new technologies such as the linear accelerator under consideration**

*Tuesday 8 November 2016 11:10 (15 minutes)*

**Presenter:** LIEVENS, Yolande

**Session Classification:** IX. What Will it Take to Make it Happen?: Moderator: Bruce Curran

Contribution ID: 33

Type: **not specified**

## **IX. E. How do you deal with cost-effectiveness of a new linear accelerator and its implications for low-resource settings?**

**Presenter:** RODIN, Danielle

**Session Classification:** IX. What Will it Take to Make it Happen?: Moderator: Bruce Curran

Contribution ID: 34

Type: **not specified**

## **IX. C. Entrepreneurial strategies to make it happen**

*Tuesday 8 November 2016 10:55 (15 minutes)*

**Presenter:** SINGH, Ajit

**Session Classification:** IX. What Will it Take to Make it Happen?: Moderator: Bruce Curran

Contribution ID: 35

Type: **not specified**

## X. A. 1. Clinical considerations

*Tuesday 8 November 2016 11:30 (15 minutes)*

Norman Coleman for Niloy Datta

**Presenter:** COLEMAN, C. Norman (National Cancer Institute)

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman

Contribution ID: 36

Type: **not specified**

## **X. B. 1. Using modern technology to share medical knowledge worldwide**

*Tuesday 8 November 2016 13:00 (20 minutes)*

**Presenter:** ZUBIZARRETA, Zubi

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman



Contribution ID: 37

Type: **not specified**

## **X. C. Panel Discussion: Planning for Sustainable Training of Professional and Ancillary Personnel in Developing Countries. Moderator: Yolande Lievens**

1. Overview by the moderator
2. Presentations by panel members: Norman Coleman, ICEC; Bruce Curran, AAPM; Nelly Enwerem-Bromson, IAEA; Patricia Hardenbergh, ASTRO; Ahmed Meghzifene, IAEA; Yakov Pipman, MPWB
3. Open discussion

**Presenter:** LIEVENS, Yolande

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman

Contribution ID: 38

Type: **not specified**

## XI. A. Summary of recommendations from the Workshop

3:00 - 1. Design characteristics for a novel linear accelerator for challenging environments: Alberto Degiovanni or designee

3:15 - 2. Achieving and sustaining the necessary infrastructure in challenging environments: Can we get by with less? Vik Vikram

3:30 - 3. Estimating the needs and planning for sustainable training of radiotherapy professional and ancillary staff in developing countries: Onyinye Balogun

**Presenters:** COLEMAN, C. Norman (National Cancer Institute); PISTENMAA, David (ICEC); DOSANJH, Manjit (CERN)

**Session Classification:** XI. Recommendations from the Workshop and Plans for the Future: Norman Coleman, Manjit Dosanjh and David Pistenmaa

Contribution ID: 39

Type: **not specified**

## XI. B. Next steps

*Tuesday 8 November 2016 16:20 (10 minutes)*

1. Preparation of a Summary Report of the Workshop
2. Dissemination of information from the Workshop
3. Recommended additional actions

**Presenters:** COLEMAN, C. Norman (National Cancer Institute); PISTENMAA, David (ICEC); DOSANJH, Manjit (CERN)

**Session Classification:** XI. Recommendations from the Workshop and Plans for the Future:  
Norman Coleman, Manjit Dosanjh and David Pistenmaa

Contribution ID: 41

Type: **not specified**

## **III. C. Cobalt-60 and Cancer Treatment: the NNSA Radiological Security Mission**

*Monday 7 November 2016 09:20 (15 minutes)*

**Presenter:** HOLT, Katherine

**Session Classification:** III. Unique Partnerships to Improve Radiation Oncology in Low- and Middle-Income Countries: Moderator: Manjit Dosanjh

Contribution ID: 42

Type: **not specified**

## **VII. (Part 2) A. Technical presentations. Co-moderators: Ugo Amaldi and Alberto Degiovanni**

10 Design Considerations (Accelerator Structure operating Frequency; Types of Structure; Power Sources (? Magnetrons); Multi-leaf collimator): Maurizio Vretenar

11 PHASER: Application of Advanced RF Linac Technology to Medical Accelerators: Sami Tantawi and Billy Loo

12 Conclusions: Ugo Amaldi

**Presenters:** DEGIOVANNI, Alberto (CERN); AMALDI, Ugo (TERA Foundation (IT))

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 43

Type: **not specified**

## **VII. B. Open discussion. Co-moderators: Ugo Amaldi, Alberto Degiovanni and David Pistenmaa**

*Monday 7 November 2016 16:30 (30 minutes)*

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 44

Type: **not specified**

## VIII. A. Recommendations emanating from Session VII

*Tuesday 8 November 2016 08:35 (25 minutes)*

**Presenters:** DEGIOVANNI, Alberto (CERN); AMALDI, Ugo (TERA Foundation (IT))

**Session Classification:** VIII. Summary of Design Characteristics for a Novel Linear Accelerator for Challenging Environments: Moderator: David Jaffray

Contribution ID: 45

Type: **not specified**

## VIII. B. Open discussion

*Tuesday 8 November 2016 09:00 (50 minutes)*

**Session Classification:** VIII. Summary of Design Characteristics for a Novel Linear Accelerator for Challenging Environments: Moderator: David Jaffray



Contribution ID: 46

Type: **not specified**

## VII. A. 1. Goals of Session VII

*Monday 7 November 2016 13:00 (5 minutes)*

**Author:** AMALDI, Ugo (TERA Foundation (IT))

**Presenters:** DEGIOVANNI, Alberto (CERN); AMALDI, Ugo (TERA Foundation (IT))

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 47

Type: **not specified**

## VII. A. 2. Experience gained from the GlobalDiagnostics project

*Monday 7 November 2016 13:05 (17 minutes)*

**Presenter:** SAHLI, Romain

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 48

Type: **not specified**

## VII. A. 5. IORT linac and possible developments

*Monday 7 November 2016 13:56 (17 minutes)*

**Presenter:** PICARDI, Luigi

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 49

Type: **not specified**

## **VII. A. 6. Experience on Electron Linacs at NCBJ (Poland)**

*Monday 7 November 2016 14:13 (17 minutes)*

**Presenter:** ADRICH, Przemek

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 50

Type: **not specified**

## **VII. A. 4. Electron Linac Projects in Pakistan with CERN support**

*Monday 7 November 2016 13:39 (17 minutes)*

**Presenter:** ZEESHAN, Sumaira

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 51

Type: **not specified**

## **VII. A. 3. Problems posed by "difficult" environments to present linac-based systems**

*Monday 7 November 2016 13:22 (17 minutes)*

**Presenter:** ALLEN, John

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 52

Type: **not specified**

## VII. A. 7. Robust X-ray imaging

*Monday 7 November 2016 14:30 (17 minutes)*

**Presenter:** JAFFRAY, David

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 53

Type: **not specified**

## **VII. A. 8. Lower cost RT through new software tools (optimization and automation)**

*Monday 7 November 2016 14:47 (17 minutes)*

**Presenter:** LOF, Johan

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.



Contribution ID: 54

Type: **not specified**

## VII. A. 9. Shielding in "difficult" environments

*Monday 7 November 2016 15:30 (17 minutes)*

**Presenter:** KRAWCZYK, Pawel

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 55

Type: **not specified**

## **VII. A. 11. General Design Considerations on Structures, Power Sources and Accessories**

*Monday 7 November 2016 16:04 (17 minutes)*

**Presenter:** VRETENAR, Maurizio

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 56

Type: **not specified**

## **VII. A. 10. PHASER: Application of Advanced RF Linac Technology to Medical Accelerators**

*Monday 7 November 2016 15:47 (17 minutes)*

**Presenters:** LOO, Billy; TANTAWI, Sami

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 57

Type: **not specified**

## VII. A. 12. Conclusions

*Monday 7 November 2016 16:21 (9 minutes)*

**Presenter:** AMALDI, Ugo (TERA Foundation (IT))

**Session Classification:** VII. Options for Achieving a Novel Linear Accelerator for Challenging Environments; Exploiting advances in technology.

Contribution ID: 58

Type: **not specified**

## **X. A. 2. Equipment and facility needs.**

*Tuesday 8 November 2016 11:45 (15 minutes)*

**Presenter:** MEGHZIFENE, Ahmed

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman

Contribution ID: 59

Type: **not specified**

## **X. C. 1. Overview by the moderator**

*Tuesday 8 November 2016 13:25 (5 minutes)*

**Presenter:** LIEVENS, Yolande

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman

Contribution ID: 60

Type: **not specified**

**X. C. 2. Presentations by panel members: Norman Coleman, ICEC; Bruce Curran, AAPM; Nelly Enwerem-Bromson, IAEA; Patricia Hardenbergh, ASTRO; Ahmed Meghzifene, IAEA; Yakov Pipman, MPWB**

*Tuesday 8 November 2016 13:30 (30 minutes)*

**Presenters:** MEGHZIFENE, Ahmed; CURRAN, Bruce; COLEMAN, C. Norman (National Cancer Institute); ENWEREM-BROMSON, Nelly; HARDENBERGH, Patti; Dr PIPMAN, Yakov (MPWB)

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman

Contribution ID: **61**

Type: **not specified**

## **X. C. 3. Open discussion**

*Tuesday 8 November 2016 14:00 (30 minutes)*

**Session Classification:** X. Essential and Sustainable Infrastructure Needs in Challenging Environments: Moderator: Norman Coleman



Contribution ID: 62

Type: **not specified**

## **XI. A. 1. Design characteristics for a novel linear accelerator for challenging environments**

*Tuesday 8 November 2016 15:05 (15 minutes)*

**Presenter:** DEGIOVANNI, Alberto (CERN)

**Session Classification:** XI. Recommendations from the Workshop and Plans for the Future: Norman Coleman, Manjit Dosanjh and David Pistenmaa

Contribution ID: 63

Type: **not specified**

## **XI. A. 2. Achieving and sustaining the necessary infrastructure in challenging environments: Can we get by with less?**

*Tuesday 8 November 2016 15:20 (15 minutes)*

**Presenter:** VIKRAM, Bhadrasain

**Session Classification:** XI. Recommendations from the Workshop and Plans for the Future:  
Norman Coleman, Manjit Dosanjh and David Pistenmaa

Contribution ID: 64

Type: **not specified**

## **XI. A. 3. Estimating the needs and planning for sustainable training of radiotherapy professional and ancillary staff in developing countries**

*Tuesday 8 November 2016 15:35 (15 minutes)*

**Presenter:** BALOGUN, Onyinye

**Session Classification:** XI. Recommendations from the Workshop and Plans for the Future:  
Norman Coleman, Manjit Dosanjh and David Pistenmaa