Present and future challenges in radiation protection in a medical facility

Niki Bergans – erkend stralingsdeskundige UZ Leuven

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History

- 1997-2003: preclinical research at KU Leuven
  - First contact with radioactive sources (H-3,C-14)
  - Liquid scintillation counting
  - Radioactive waste

Contact person for the lab on lab safety and radioprotection

History

- 2004-2007: Project engineer

  - EFRO-project: Detection and prevention of radioactive contaminations in the environment (screening household/ industrial waste at incinerator, recycling centre, hospital)
    - **Education** (protection against radiation, use of portal monitor, hand-held contamination monitors)
    - **Detection, isolation** and **identification** of radioactive sources present in the waste
    - **Administrative** follow-up
    - **Advise** (choice of equipment, writing work procedures, prevention policy and risk management)

History

- 2004-2007: Project engineer
  - Megaports project
    - **Supporting** the Belgian **customs** with portal monitor controls and the radiological study of container transport in the **harbour of Antwerp**

  - Continued education
    - Radioprotection medical **course of "helper"**(XIOS)
    - **Radiation protection expert training** (XIOS-SCK)

Present

- 2007- present: health physics expert at UZ Leuven


HDR brachytherapy


medical accelerator

cyclotron


radiopharmacy


medical imaging


nuclear medicine


radioisotope therapy

new exciting applications

and …

Present

…and familiar ones

Contamination monitoring

Waste management

Present

- Health physics tasks at UZ Leuven
  - Management of installation-specific **licences**
  - **Research and control** of existing **protective measures** and **resources** concerning ionising radiation
  - **Proposing complementary protection resources** and adapted **working procedures**, in line with the needs of the departments concerned, while observing the **ALARA principle**.
  - **Facility designation, design and shielding**
  - **Reception and physical control** of **new appliances/sources** that transmit ionising radiation
  - **Research and preceding approval** of new or modified **manipulations, experiments, studies and treatments** using radionuclides/ionising radiation

Present

- Health physics tasks at UZ Leuven
  - **Control of ordering/receiving/transporting packages containing radioactive material**
  - **Surveys** and **survey instruments**
  - **Contamination/Spill response**
  - **Incident** analysis and follow-up







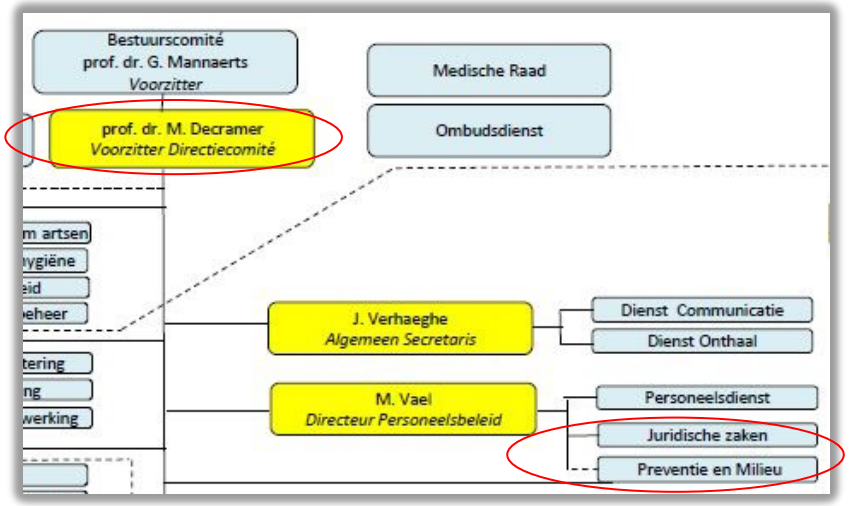





Present

- Health physics tasks at UZ Leuven
  - **Oversee a record system to assure that the appropriate records are maintained in accordance with applicable regulations**
    a) inventory and management of radioactive waste
    b) inventory and monitoring of radioactive sources and X-ray appliances/therapy appliances with ionising radiation
  - **Waste disposal:** return to authorized recipient/ management of the internal stock of waste-by-decay record keeping, control measurements, calculation of released activities (effluents, airborne)
  - **Information sessions on radioprotection**
    a) General introduction for new employees (half-yearly frequency).
    b) Instruction of workers (annually)
  - **Personnel monitoring**

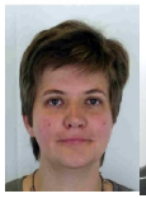
Organisational structure



DIENST PREVENTIE EN MILIEU
(interne dienst)
Ir. Herman Devriese *(niv.1)*

SECRETARIAAT
Nicole Luyten (0,8 VTE)

PBM's
Algemene ondersteuning
Cindy Stroobants (0,8 VTE)



RADIOPROTECTIE
Fysische Controle

Hoofd Fysische Controle
Ir. Niki Bergans (niv. 1)

Radioprotectie
Viviane Dietens *(niv. 2)(0,5 VTE)*
Ing. Andelko Bujanic

PERSONENDOSIMETRIE
Prof. Ria Bogaerts (0,5 VTE)
Jan Van Hellemont (0,5 VTE)

ARBEIDSVEILIGHEID

CAMPUSCOÖRDINATIE
Pellenberg/ Lubbeek
Eddy Peeters *(niv. 2)*

CAMPUSCOÖRDINATIE
Gasthuisberg/ St.-Rafaël/ St.-Pieter
ir. Johan Michiels *(niv. 1)*

Chemische risico's
Arbeidshygiëne
ing. Gert Vanderlinden *(niv. 2)*

Onroerende investeringen
Brandpreventie
ir. Johan Michiels *(niv. 1)*
Jan Van Brussel

Arbeidsongevallen
Arbeidsmiddelen
Externe keuringen
ing. Dirk Wynants *(niv. 1)*

Bedrijfsbezoeken
Koen Boonen (niv. 2)

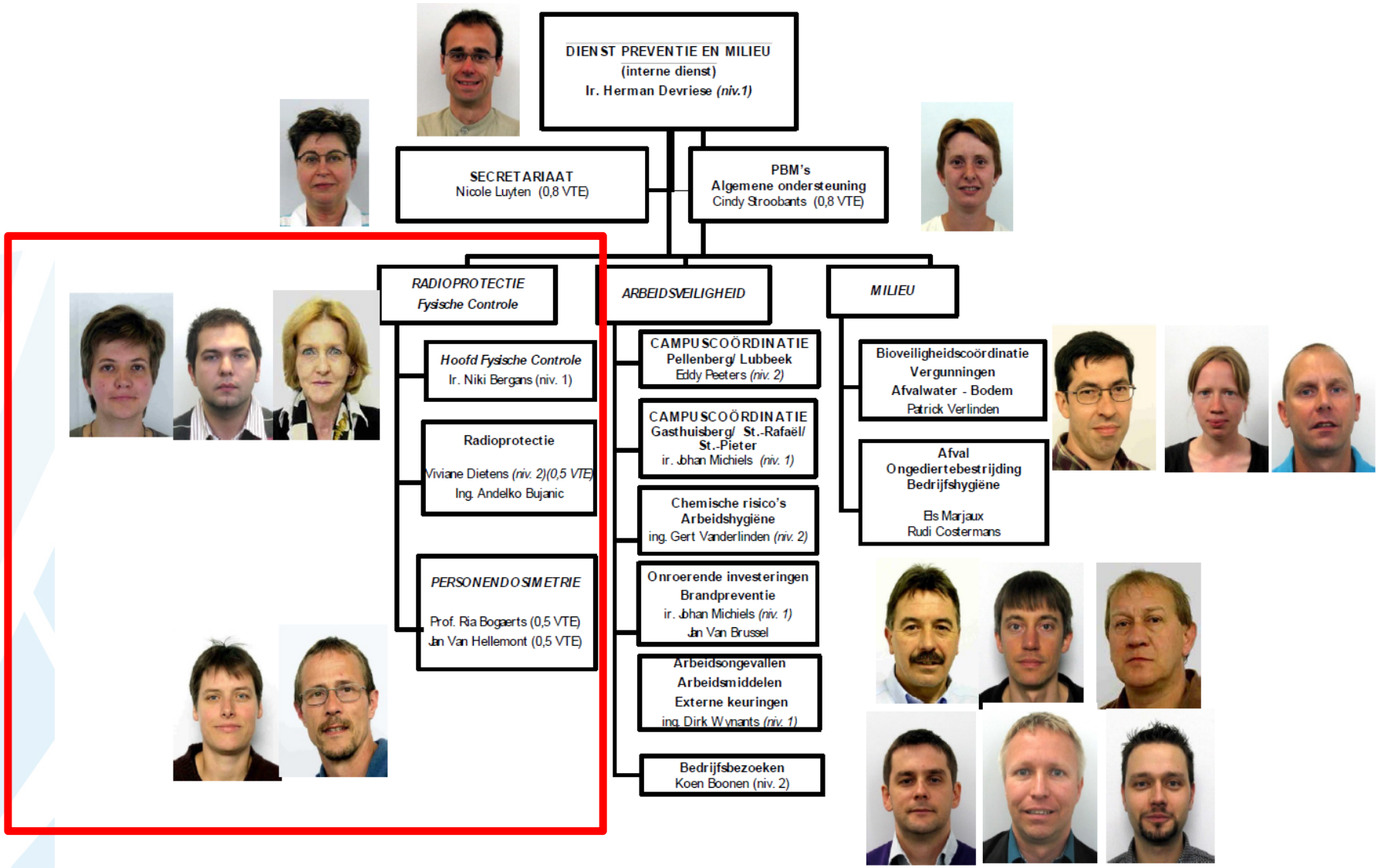
MILIEU

Bioveiligheidscoördinatie
Vergunningen
Afvalwater - Bodem
Patrick Verlinden

Afval
Ongediertebestrijding
Bedrijfshygiëne
Els Marjaux
Rudi Costermans

Present

- Organisational structure



Present

- Organisational structure

ir. Niki Bergans
erkend stralingsdeskundige
hoofd fysische controle UZ Leuven

ir. Herman Devriese
diensthoofd
preventie en milieu

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Present

- structural link between health physics and users of ionizing radiation
  - **Regular (every 2 to 3 months) consultation with important departments**
    - Radiology
    - Radiotherapy-oncology
    - Nuclear medicine
    - Cathlab and Interventional Radiology

    Ad hoc consultation with the other medical departments, technical and logistic services, quality assurance, ….
  - **Participants**
    - Health physics expert
    - Head of internal prevention service
    - Head of the department
    - Local coordinator radioprotection (head nurse)
    - medical physicist
    - + others /specific per department (quality control, technical department, IDEWE, radiopharmacist,…)

Present

- Agenda with fixed items concerning radioprotection
  - **Installation**-specific matters (machines, design, safety precautions, warning symbols, survey monitoring, ...)
  - **Personnel**-specific matters (dosimetry, training, working instructions, ...)
  - **Procedure**-specific matters (new guidelines, working and emergency procedures ,...)
  - **Licence**-specific matters (new applications, inventory, personal licences ...)
  - **Miscellaneous**

Other structural committees

- Preventiecel (internal committee on prevention) - CPBW
- Committee on radiation protection (including external experts)

Present

- Daily job
  - **A never ending story, no dull moments**
    - Very versatile, main focus on radioprotection
    - Interaction with variety of personnel: work floor up to management
    - From measuring waste to aid with installing and implementing new innovative/hightech techniques
  - **Interaction with the work floor pays of**
    - Workplace analysis
    - Ownership in a safety culture
  - **A lot of tasks….always a to do list**

Present

- Challenges
  - A small part in a large framework
  - Find a way to make your point
  - Communication skills

⇒ For radioprotection in medical facility

- Use the systems of accreditation/quality to your benefit
- Use the structures of the internal prevention service
- Use the internal data and procedural management system

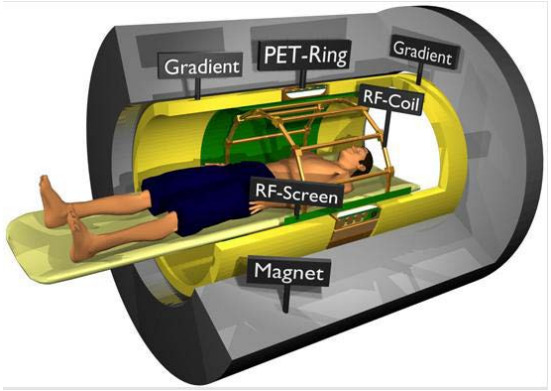
JCI – Muzlidoc – Peoplesoft logistiek/personeelsbeheer - GBS

Future

Challenges today and to come: “The Fast and the furious”

Technology in medical imaging evolves fast

- New hybrid medical imaging systems
  - PET-MRI-CT



- Mobile X-ray systems with higher dose rate
  - mobile CT
  - mobile medical accelerator

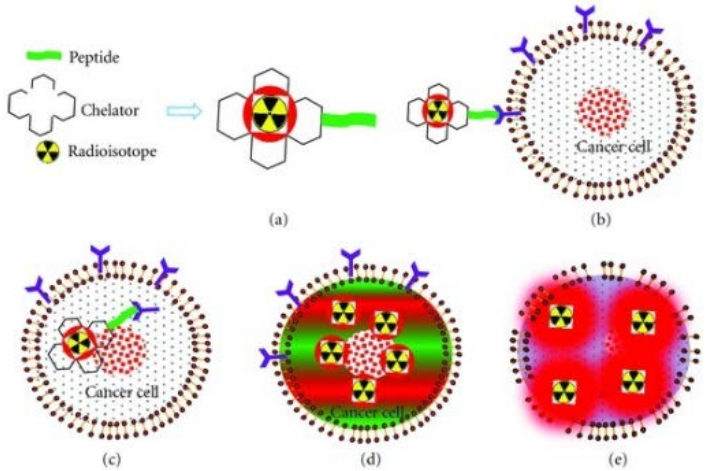
- Dose reducing techniques

Future

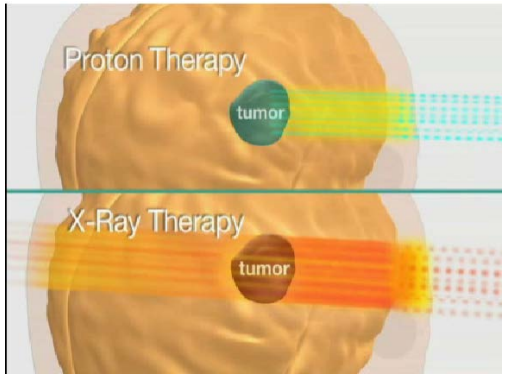
Challenges today and to come: “The Fast and the furious”

New therapeutic treatments

- Radionuclide therapy
  - PRRT (Lu-177, Y-90)
  - Ra-223 dichloride therapy,…



- Proton therapy



Highly specialised treatment planning systems

Future

- Future challenges

Objective: look after the collective dose through justification, optimization and safe practice in the field of medical practices

Organizational level:

– Identify tools for determining the best radiation protection practices
– Risk communication

Staff :

– Safety education and training
– Risk awareness and perception

Equipment:

– Implementation of dose reduction measures
- Implementation of dose management and reporting tools,
  - diagnostic reference levels for interventional radiology
  - use of dose constraints and dose limits for personnel monitoring

Future

- Future challenges
  - Professionals working in the field need a forum where they can meet and discuss multiple aspects of radiation protection in medicine

    The rapid technological development within medical applications is challenging: new applications, procedures and equipment can appear in clinical practice before solid evidence concerning their clinical benefits and the risks they imply has been established.

    ⇒ Enhance the exchange of information on good radiation protection practices and define standards between competent authorities, professionals and manufacturers

    ⇒ Exchange of scientific and technical knowledge and of experience

  - Strengthen radiation safety culture in health care
    - radiation therapy (including planning and verification): external beam therapy, brachytherapy and metabolic therapy: prevention of incidents and accidents in modern radiation therapy – return of experience – lessons learned
    - Engage in stakeholder involvement (patients, medical and technical staff, health physics, medical physicists, manufacturers of radiological devices,…)

  - Strengthen manufacturers' role in contributing to the overall safety regime

Thank you !

More info: niki.bergans@uzleuven.be

I would like to thank my former and present colleagues:

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Pascal Fias

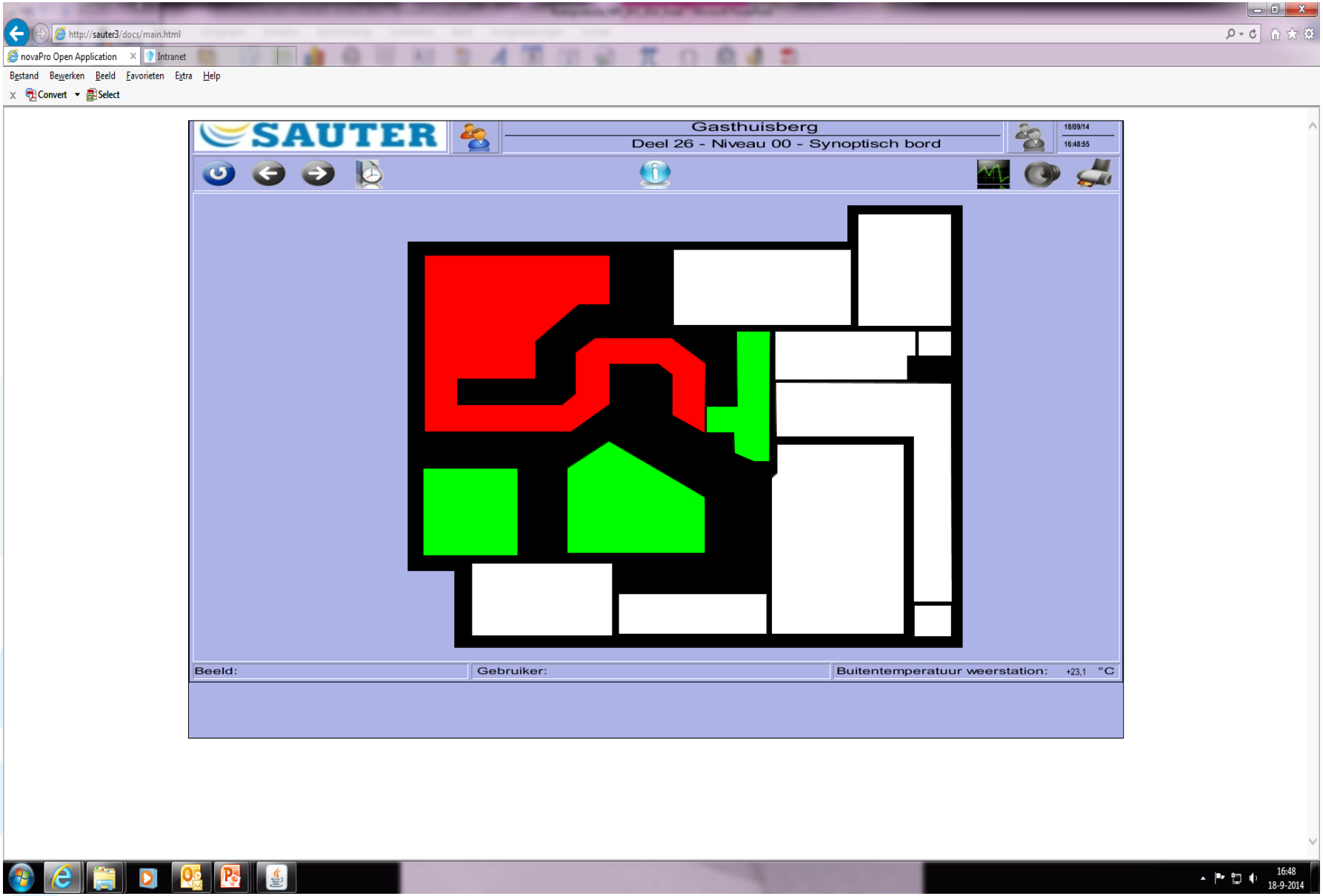
UZ Leuven - radioprotectie

Andelko Bujanic and Viviane Dietens

and the other colleagues of dienst preventie en milieu

Peoplesoft logistiek

GBS: Synoptisch bord



JCI Standards

FMS.2 The organization develops and maintains a written plan(s) describing the processes to manage risks to patients, families, visitors, and staff.

FMS.3 One or more qualified individuals oversee the planning and implementation of the program to manage the risks in the care environment.

FMS.5 The organization has a plan for the inventory, handling, storage, and use of hazardous materials and the control and disposal of hazardous materials and waste.

432 AOP.6.3 (V5) Radiation safety program is in place, followed, and documented, and compliance with the facility management and infection control programs is maintained.