

Are TR/RTTs prepared for the technological revolution and equipped with the digital skills required for their clinical practice? - an European survey.

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- **Background**
 - Society's digitalisation
 - RTT/TRs European regulation
- **1st phase: Literature search**
 - Materials and methods
 - Results
- **2nd phase: Survey**
 - Materials and methods
 - Results
- **Discussion/Conclusion**
- **Future directions**

Content

Society's digitalisation

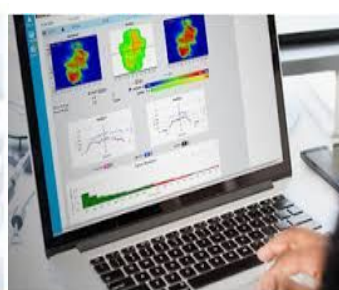
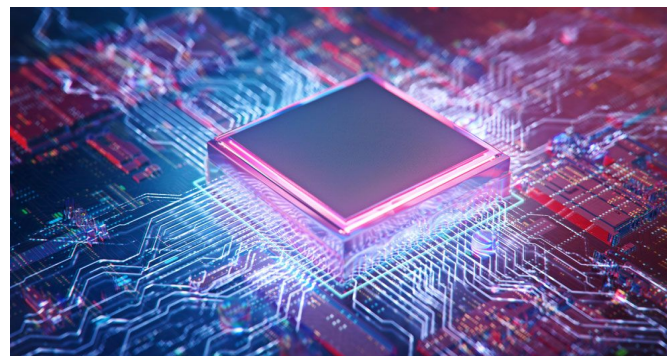
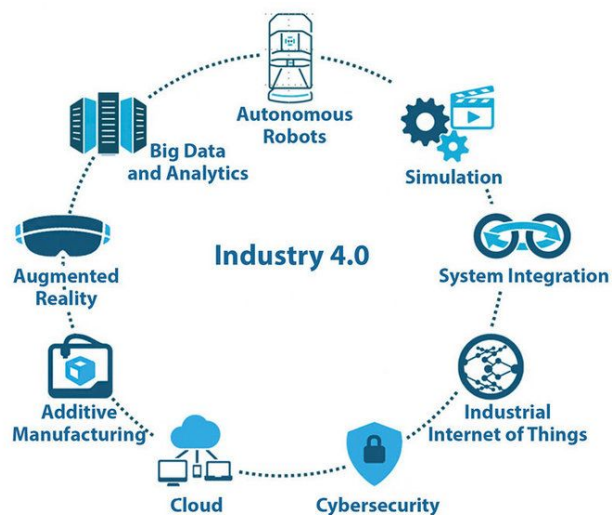


Image acquisition

Evaluation

Planning

QA

Delivery



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Radiography



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RTT/TRs European Regulation



**RTT/TR education not
regulated**



**differences in skills
variation in care level**



**Need for
standardisation
of RTT/TRs
training
programmes**

✓ **AIM:** identify RTT/TRs' digital skills through the analysis of published literature.


1st phase: Materials and methods



Literature search

Systematic search of the white literature

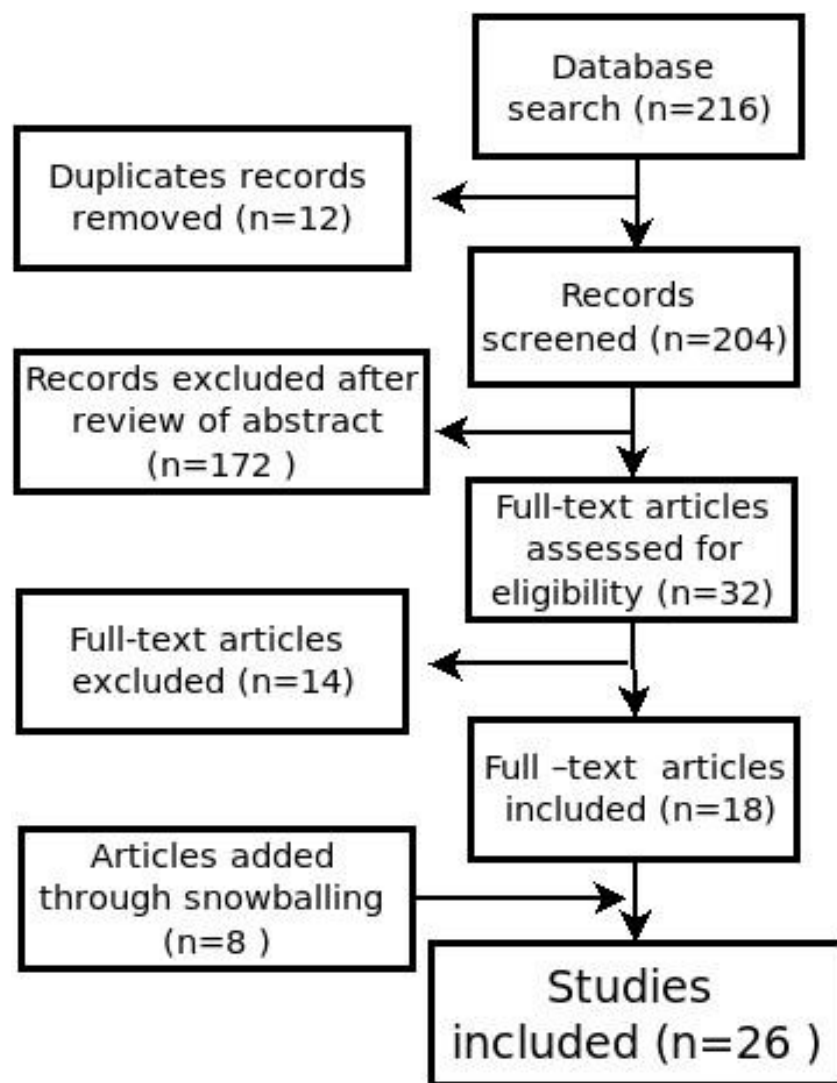
Identification of relevant grey literature

- 
- ❖ Databases and journals:
 - PMC
 - Science Direct
 - PubMed
 - ERIC
 - Cochrane Library
 - IEEE Xplore
 - Radiography
 - tipsRO

Keywords searched: Digital skills, TR/RTT, Rt (and synonyms)

- ❖ Educational guidelines
- ❖ Recommendation and benchmark documents
- ❖ Reports, projects and frameworks

Literature search: Results



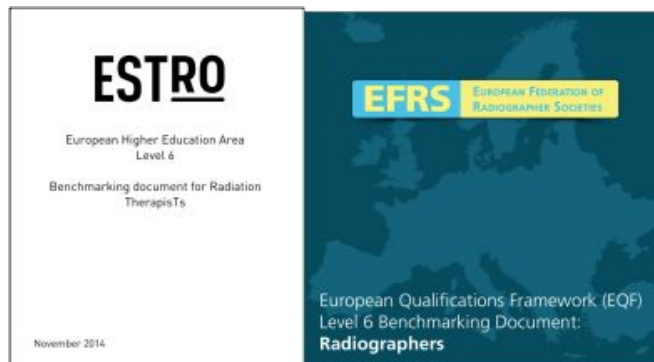
Inclusion criteria:

- Last 10 years
- English language
- Focus on digital skills or tasks performed digitally by RTT/TRs

Exclusion criteria:

- Other healthcare professionals
- Non-digital skills of RTT/TRs

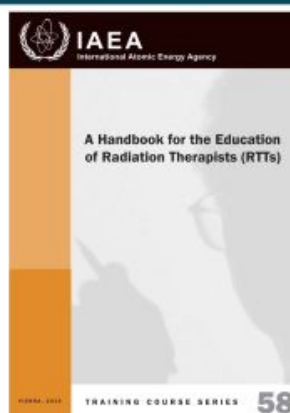
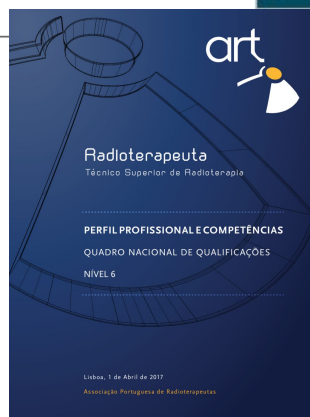
Literature search: Results



Brussels, 10.6.2016
COM(2016) 381 final

VARIAN
medical systems

Elekta



COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS

A NEW SKILLS AGENDA



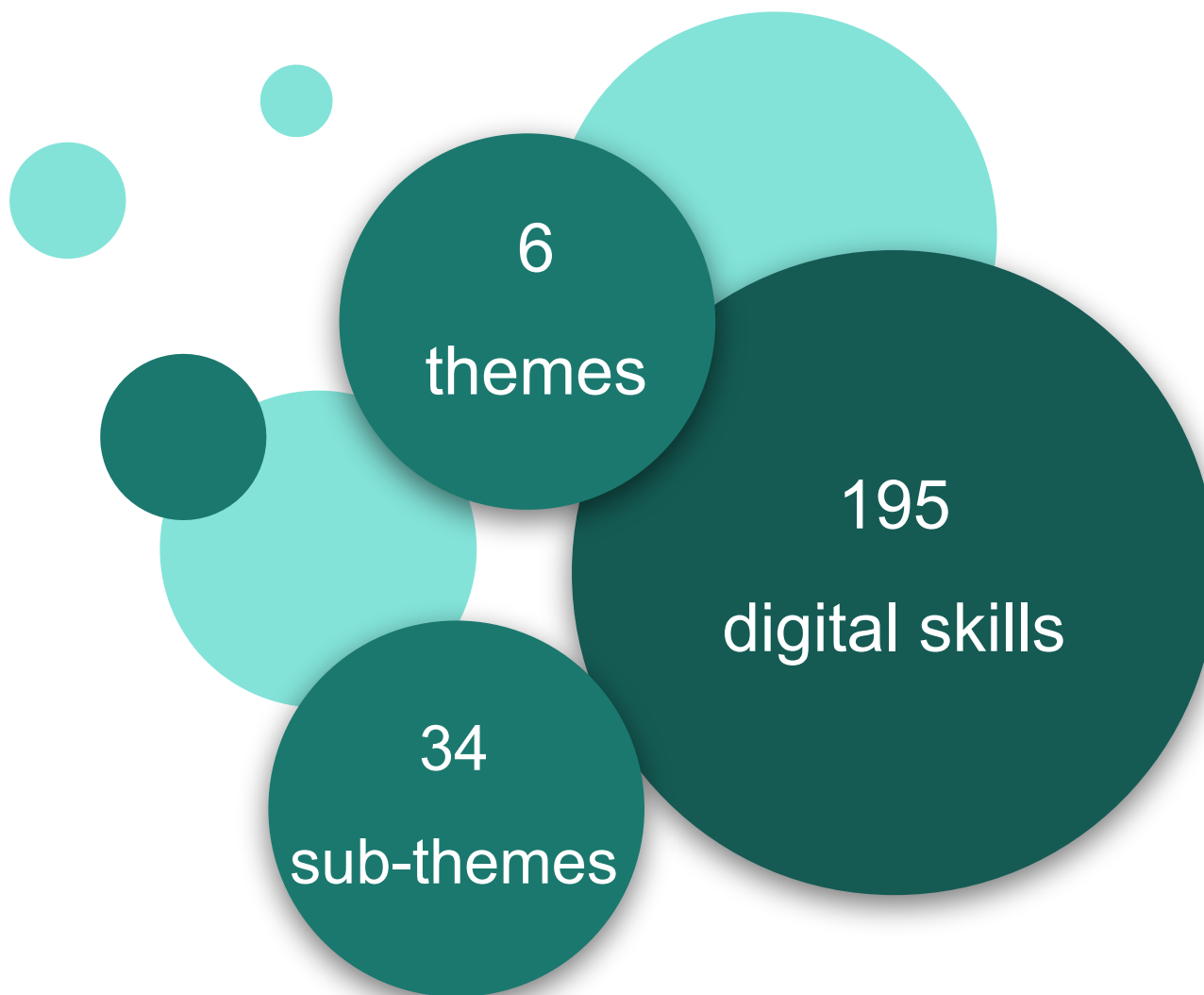
BRAINLAB

SIEMENS
Healthineers

67



Literature search: Results



Transversal Digital Skills

- Technologies/ Information Systems (IS)
- Communication
- Electronic Patient Record (EPR)
- Patient Agenda
- Workstation

RT Treatment Administration

- System Setup
- Treatment Delivery Preparation
- Treatment Verification: Conventional Techniques
- Treatment Verification: Advanced Techniques
- Image Matching
- Image Analysis
- Treatment Delivery
- Respiratory Gating Treatment Delivery
- SRS/SBRT Treatment Delivery

RT Planning Image

- Computerised Tomography (CT)
- 4D Computerised Tomography
- Image Processing and Enhancement
- Image Registration and Correlation
- Image Segmentation and Contouring

Quality, Safety and Risk Management

- Quality Assurance
- Security
- Risk Management
- Data Protection
- Information Integrity

RT Treatment Planning

- Plan Treatment
- Plan Parameters (forward planning)
- Inverse Planning (IMRT/VMAT)
- 4D Planning
- SRS/SBRT Planning
- Dose Calculation
- Plan Evaluation
- Prerequisites for Treatment

Management, Education and Research

- Department Administration and Management
- Education
- Research



Examples

Transversal Digital Skills	Communication	<ul style="list-style-type: none"> • Use an internal communication channel • Create multimedia content for patient education
RT Planning Image	Computerised Tomography (CT)	<ul style="list-style-type: none"> • Create scan protocols • Set acquisition parameters
RT Treatment Planning	Dose Calculation	<ul style="list-style-type: none"> • Select calculation parameters • Calculate dose distribution
RT Treatment Administration	Image Analysis	<ul style="list-style-type: none"> • View online/offline images • Use analysis tools
Quality, Safety and Risk Management	Security	<ul style="list-style-type: none"> • Record all procedures concerning the radiation delivered • Review LINAC, MLC and imaging system failures/interlocks
Management, Education and Research	Research	<ul style="list-style-type: none"> • Use search engines and digital libraries • Use data analysis software



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INSTITUTO PORTUGUÊS DE
ONCOLOGIA



Association of
Radiation Technicians



L'Università ta' Malta



National Institute for Research and
Innovation in Health Sciences

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Survey: Materials and methods



- ✓ **AIM:** Assess the level of development and training needs of RTT/TRs regarding digital skills.

Survey to European TR/RTTs, divided into 2 parts:

- (1) socio-demographic characteristics
- (2) level of development of RTT/TRs' skills

Sections
Transversal
Planning Image
Treatment Planning
Treatment
Quality, Safety and Risk
Management and Research

Self-design questionnaire:

- Validity test
- Test-retest reliability
- Ethics approval (Ulster University)

Pilot Study:

- 52 answers collected → 46 valid answers
- amendments & internal consistency reliability

Survey: Materials and methods



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Section 1 of 15

Badanie umiejętności cyfrowych wymaganych przez elektroradiologów pracujących w radioterapii w UE

Zaproszenie

Szanowny uczestniku,

Chcielibyśmy zaprosić Cię do wzięcia udziału w badaniu ankietowym, które jest częścią projektu Safe and Free Exchange of EU Radiography Professionals across Europe – SAFE EUROPE (www.safeeurope.eu) oraz studium doktoranckiego zatyłowanego "Digital Skills for Therapeutic Radiographers (TRs/RTTs)".

Cel i założenia

Celem tego badania jest ocena wiedzy na temat umiejętności cyfrowych wymaganych przez elektroradiologów, którzy pracują w dziedzinie radioterapii. Badanie ma również na celu określenie czynników, które wpływają na poziom uzyskanej wiedzy, etap rozwoju tych umiejętności, jak również zwrócenie uwagi na nowe pojawiające się umiejętności cyfrowe, które są wymagane w pracy.

Metodologia

Niniejsza anketa zostanie rozprawdzona w całej Europie przez krajowe i europejskie towarzystwa i stowarzyszenia naukowe elektroradiologów, będącymi podmiotem partnerami programu SAFE EUROPE. Wypełnienie ankiety zajmie około 30 minut. Wypełniając ankietę, w każdej chwili można się wycofać.

Względnie etyczne

Wszystkie dane będą traktowane zgodnie z Ogólnym Rozporządzeniem o Ochronie Danych Osobowych Uniwersytetu w Usterze i będą dostępne tylko dla zespołu badawczego. Niektóre z Twoich odpowiedzi tekstowych mogą zostać włączone jako bezpośrednie cytaty do opublikowanego materiału, jednakże zapewnimy, że indywidualni uczestnicy nie będą mogli zostać zidentyfikowani. Wszystkie zebrane dane będą wykorzystywane i przechowywane zgodnie z ustawą o ochronie danych osobowych z 1998 roku. Wszystkie dane elektroniczne będą anonimowo przechowywane na chronionym hasłem komputerze w zamkniętym budynku Uniwersytetu Uster przez okres 10 lat. Następnie materiały zostaną zniszczone zgodnie z polityką Uniwersytetu. Badanie to zostało wcześniej zgłoszone do Komisji Etycznej Uniwersytetu w Usterze i przez nią zatwierdzone.

Dociekujemy za Państwa wkład.

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Section 1 of 15

An investigation of Digital Skills required by Therapeutic Radiographers/Radiation Therapists in the EU

Invitation and Information Letter

Dear participant,

We would like to invite you to participate in a survey which is part of the Safe and Free Exchange of EU Radiography Professionals across Europe – SAFE EUROPE project (www.safeeurope.eu) and the PhD study entitled "Digital Skills for Therapeutic Radiographers/Radiation Therapists (TRs/RTTs)".

Aim and Objectives

The aim of this survey is to assess the knowledge of digital skills required by TRs/RTTs who practice Radiotherapy. The study also aims to identify the factors that influence the level of knowledge obtained, the stage these skills are developed, as well as highlight new emerging digital skills that are required for the job.

Methodology

This survey will be distributed across Europe by national and European professional associations, through SAFE EUROPE's partners. It will take approximately 30 minutes to complete. You can withdraw at any time before your submission.

Ethical considerations

All data will be treated under the General Data Protection Regulation of the University of Uster and will be accessed by the research team only. Some of your free text responses may be included as direct quotes in published material however, we will ensure that individual participants cannot be identified. All the data collected will be used and stored in accordance with the Data Protection Act 1998. All electronic data will be anonymously stored on a password protected computer in a locked room at Uster University for 10 years. The materials will then be destroyed in line with the University policy. This study was previously submitted to and approved by the Ethics Committee of the University of Uster.

Thank you for your input.

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Section 1 of 15

Investigação das Competências Digitais do Técnico de Radioterapia/Radioterapeuta na UE

Caro participante,

Gostaríamos de convidá-lo a participar num inquérito integrado no projecto "Safe and Free Exchange of EU Radiography Professionals across Europe – SAFE EUROPE project" (www.safeeurope.eu) e na investigação, no âmbito de um doutoramento, intitulada "Digital Skills for Therapeutic Radiographers/Radiation Therapists (TRs/RTTs)".

Objectivos

O objectivo deste inquérito é avaliar o nível de desenvolvimento das competências digitais, dos Técnicos de Radioterapia, no exercício da sua profissão. O estudo visa também identificar os factores que influenciam esse mesmo nível, a fase em que estas competências são desenvolvidas, bem como evidenciar as competências digitais emergentes.

Metodologia

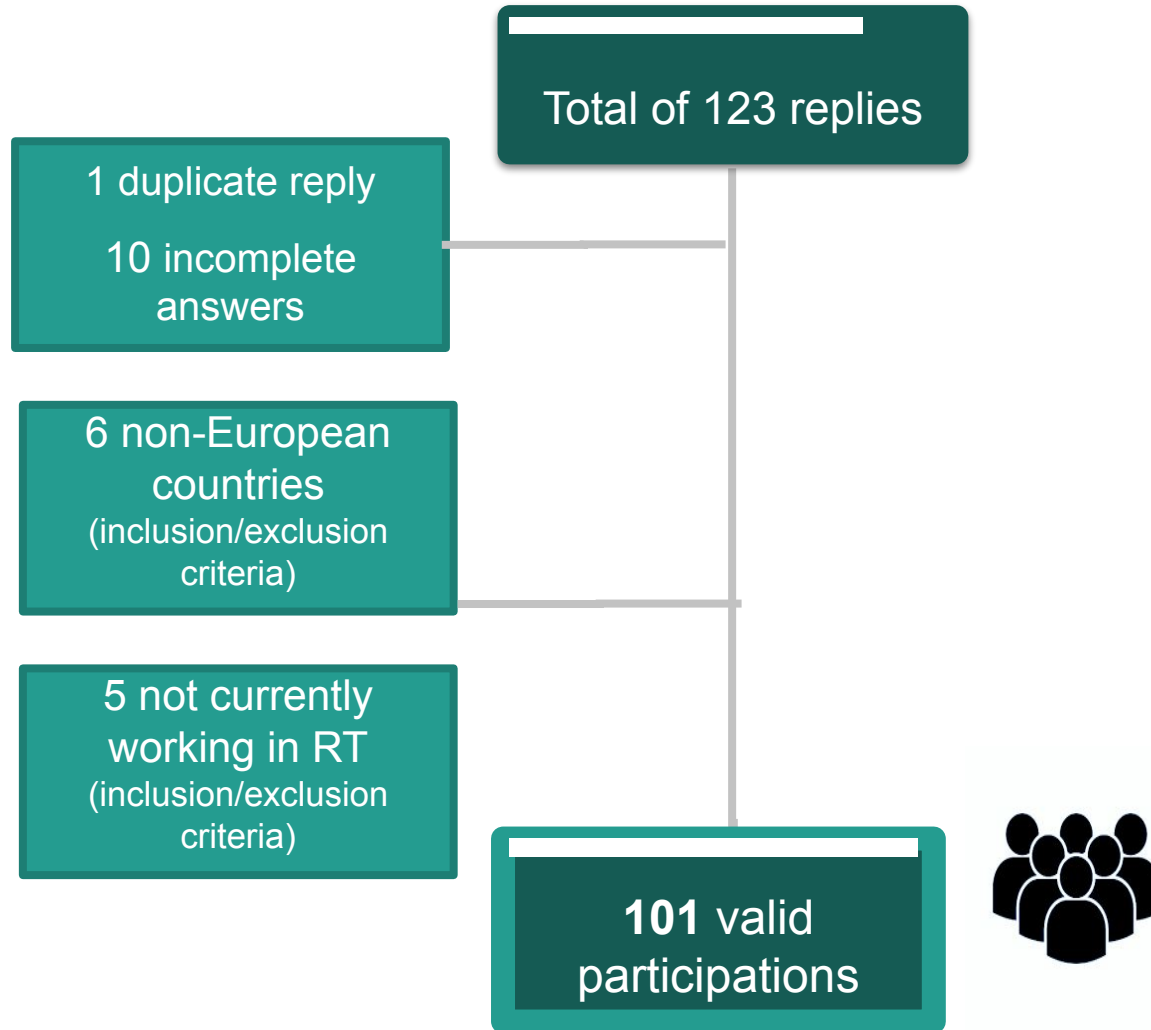
Este inquérito será distribuído, por toda a Europa, por Associações Profissionais nacionais e europeias, através dos parceiros do SAFE EUROPE. Demorará cerca de 30 minutos a concluir, podendo desistir em qualquer momento antes da sua submissão.

Considerações éticas

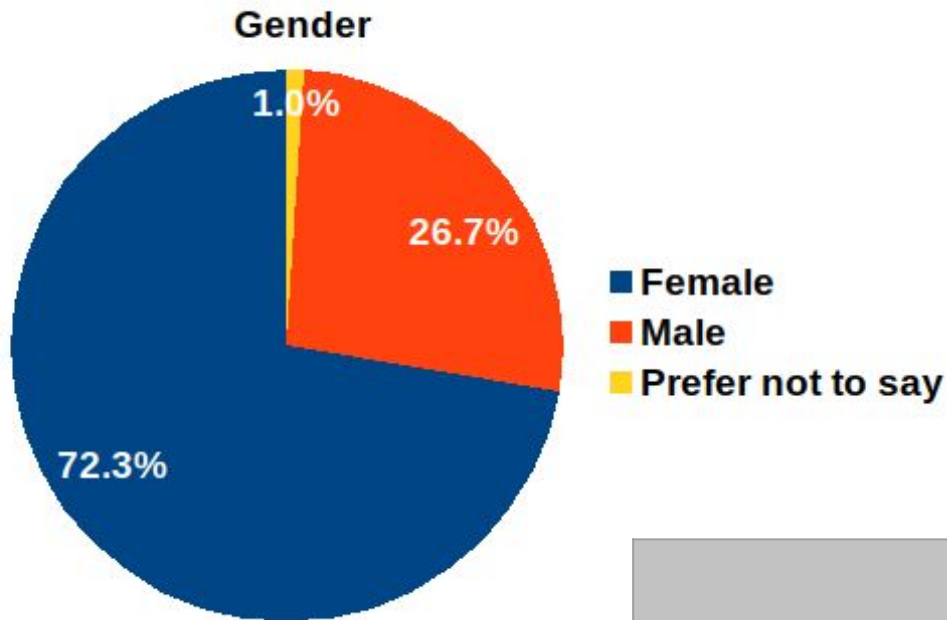


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Survey: Results

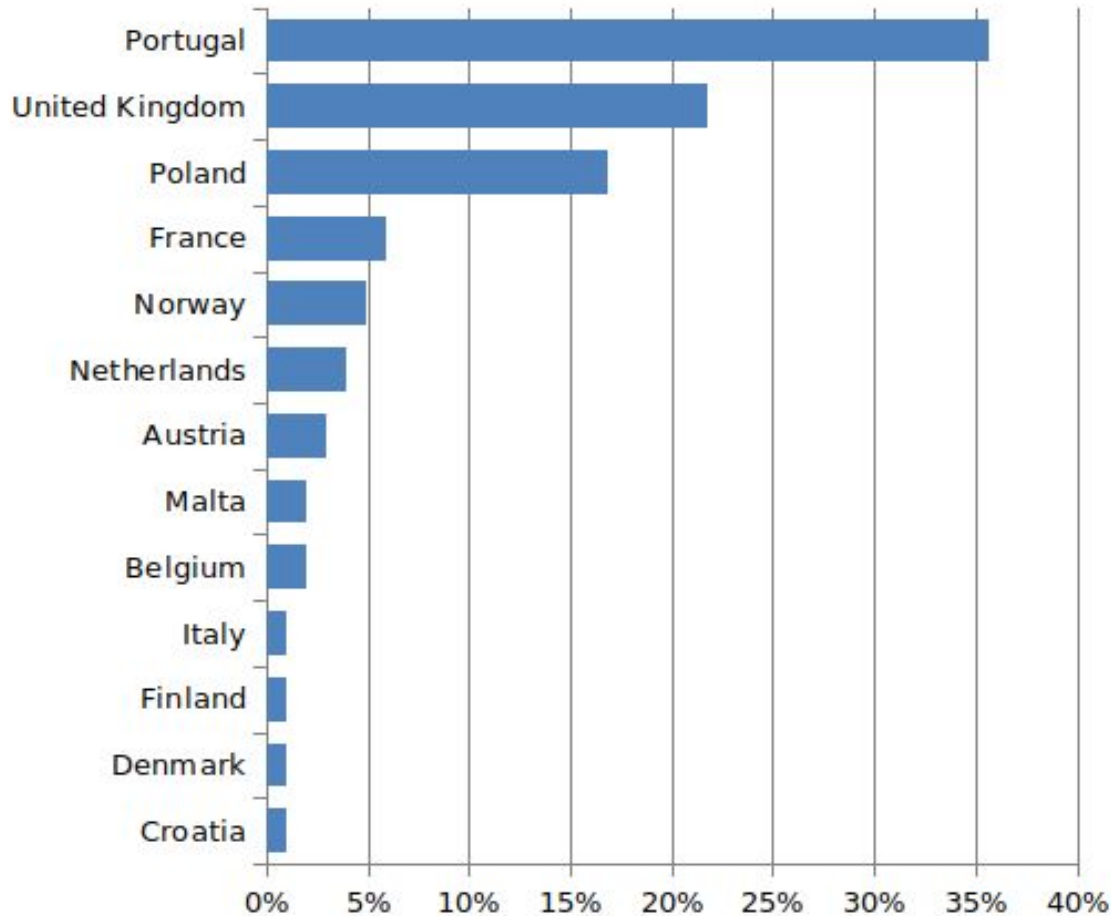


Socio-demographic characteristics



Descriptive Statistics			
	Minimum	Maximum	Median
Age	23	66	34
Conclusion year - academic level to practice RT	1985	2021	
Time practising RT (years)	0	36	12

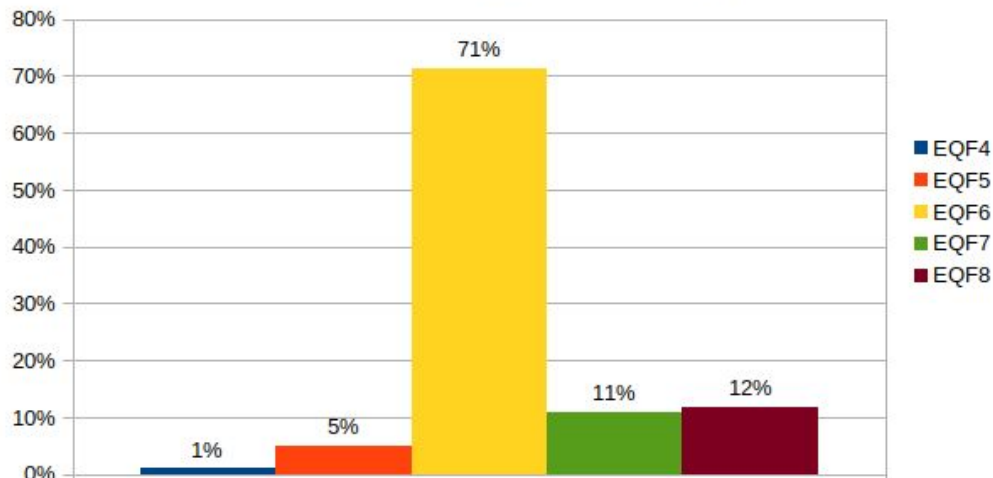
Socio-demographic characteristics



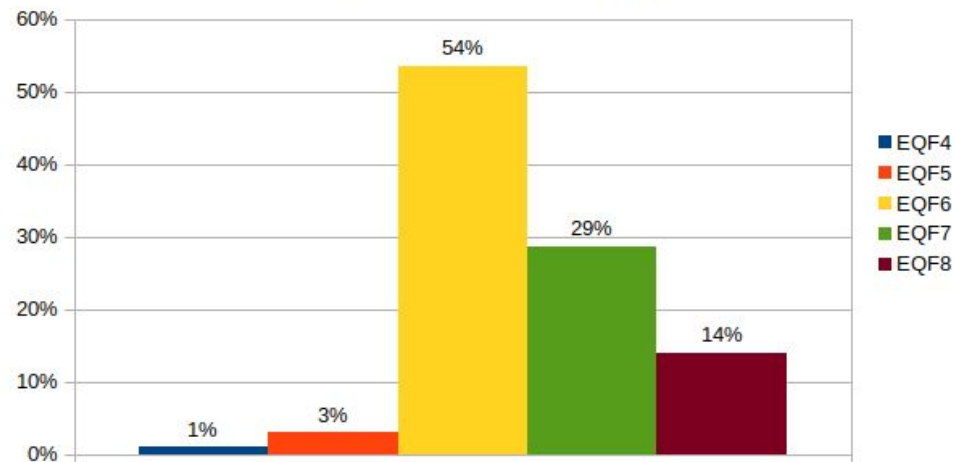
Socio-demographic characteristics



Academic level to practice RT (EQF)



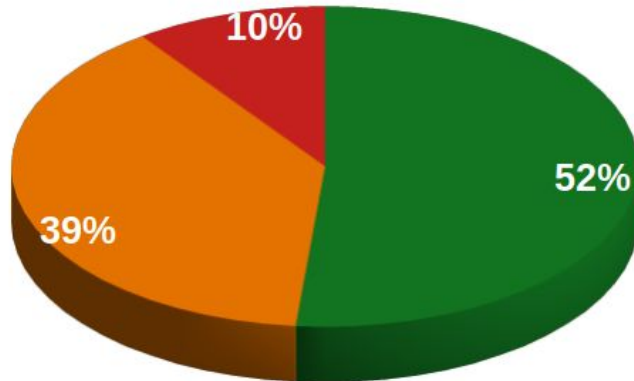
Highest academic level (EQF)



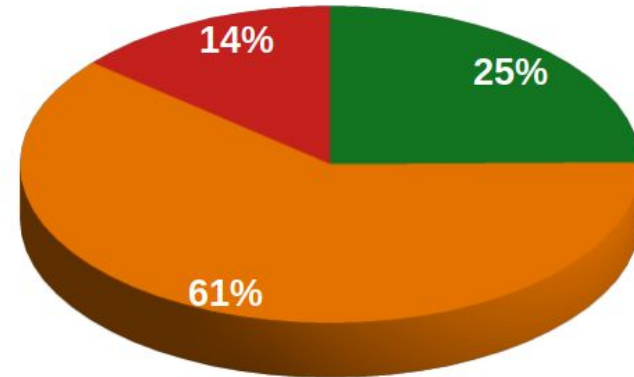
Generic ICT Skills



Information processing

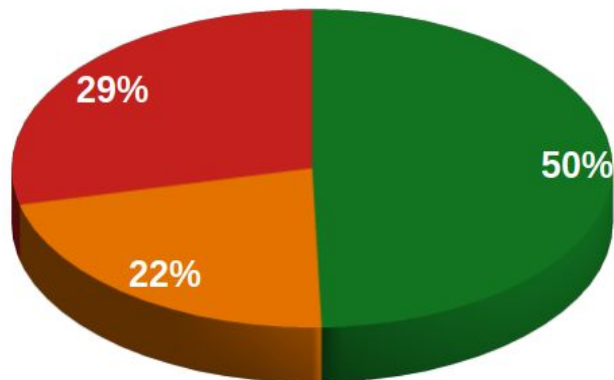


Communication

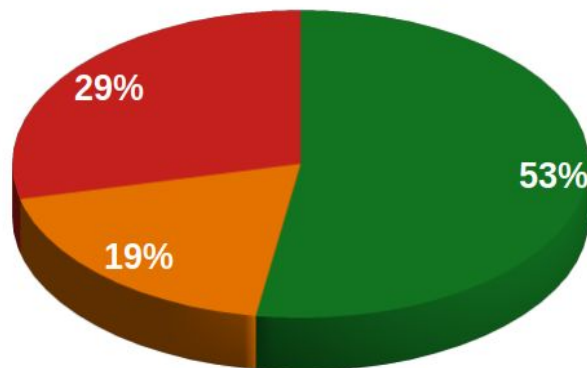


■ Basic user
■ Independent user
■ Proficient user

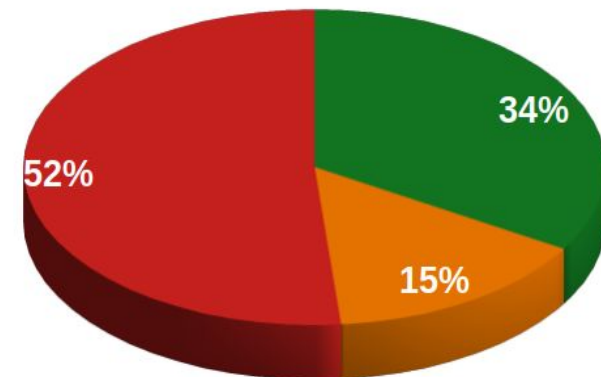
Safety



Problem solving



Content creation



RTT/TRs' skills - level of development



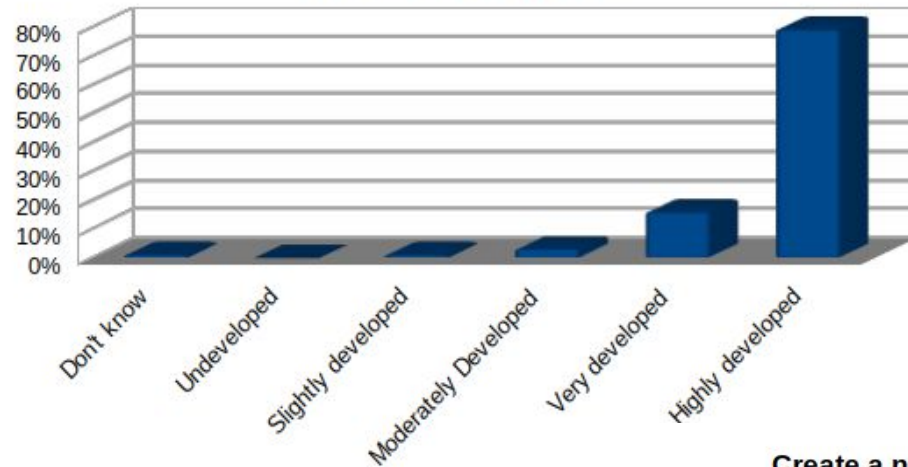
Sections	Number of questions	Score Median (Min-Max)	p-value (Friedman test)
Transversal	27	85.2 (35.2-100.0)	<0.001
Treatment	59	75.5 (0.4-100.0)	
Planning Image	29	69.8 (3.4-100.0)	
Quality, Safety, and Risk	25	57.0 (4.8-100.0)	
Management and Research	14	50.0 (0.0-100.0)	
Treatment Planning	41	31.0 (0.0-100.0)	
Total	195	62.4 (20.6-98.4)	

RTT/TRs' skills - level of development

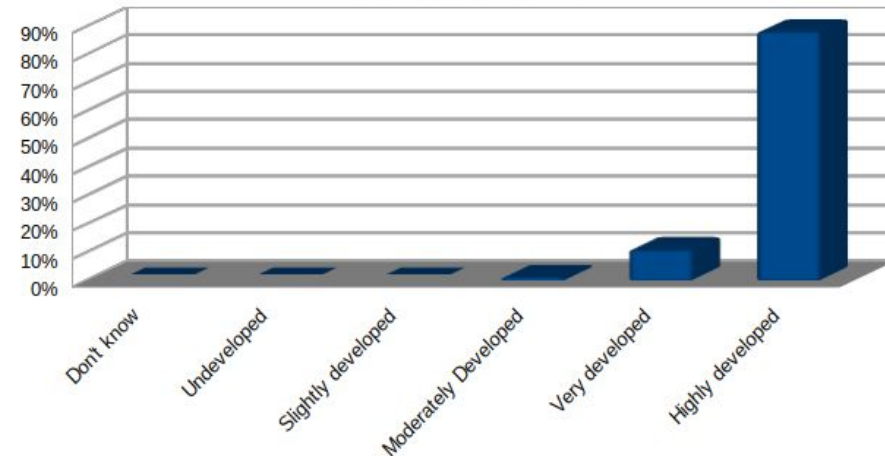


Transversal

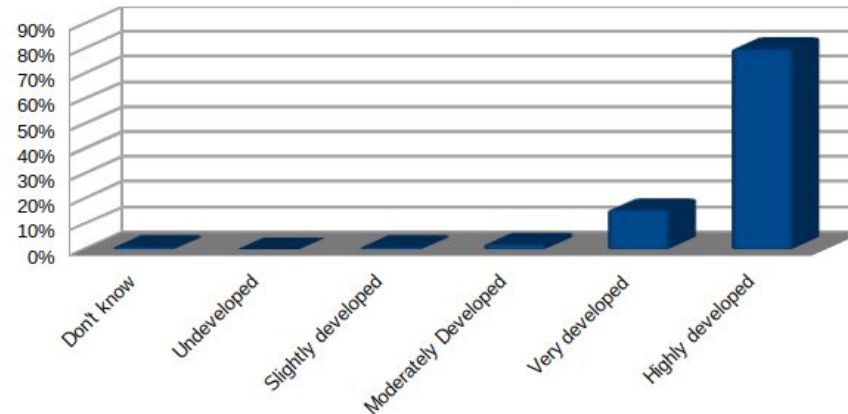
Access Patient Data



Edit patient status



Create a new appointment

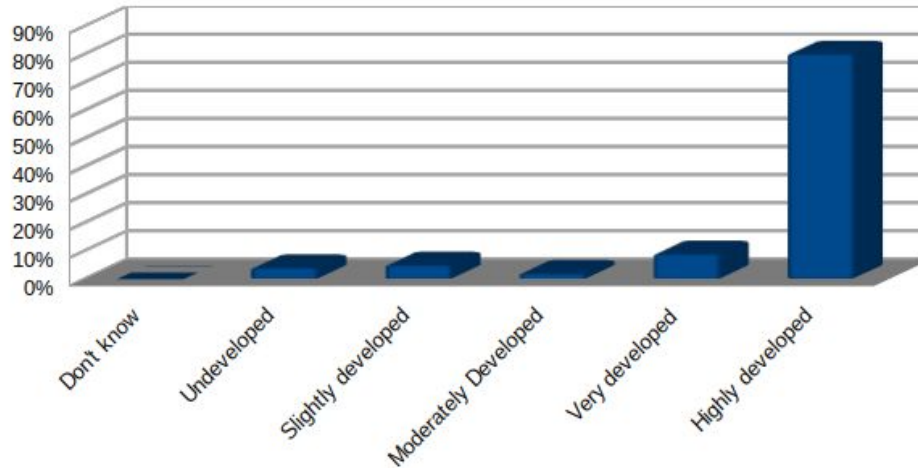


RTT/TRs' skills - level of development

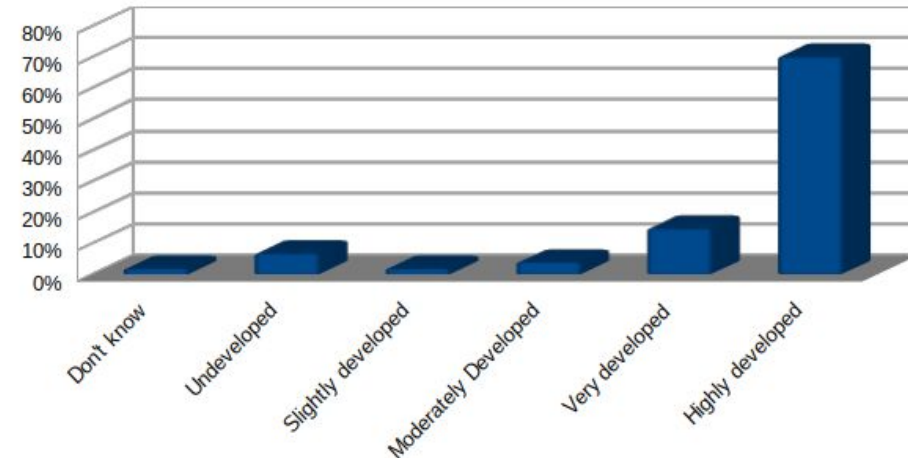


Treatment

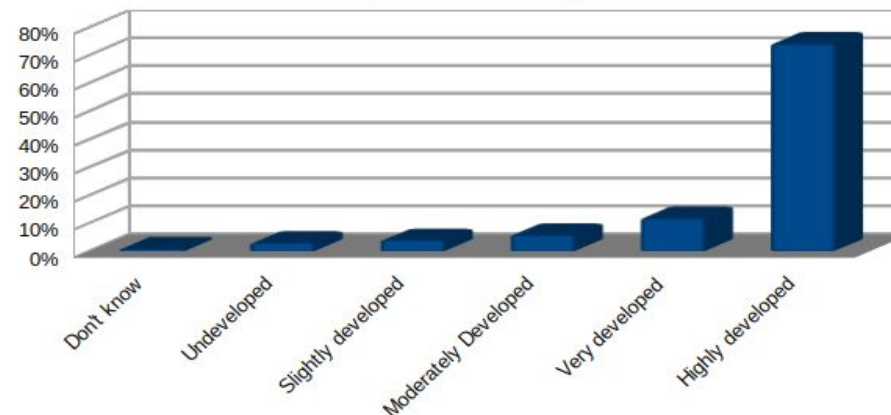
Schedule treatment sessions



Acquire KV CBCT images



View online/offline images

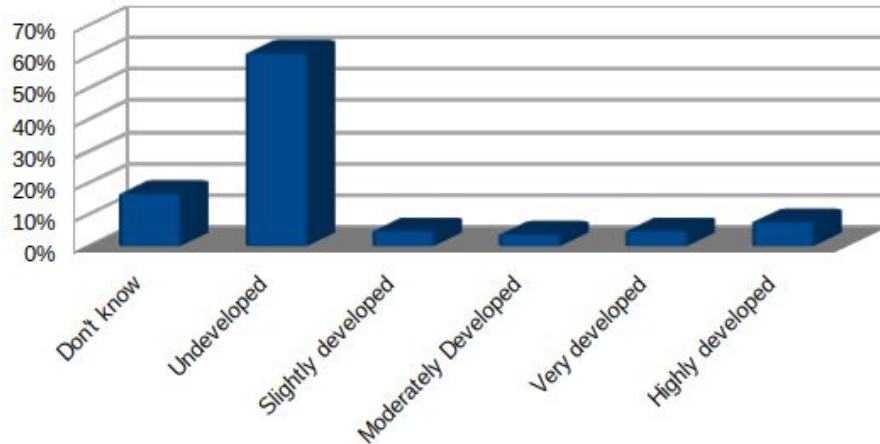


RTT/TRs' skills - level of development

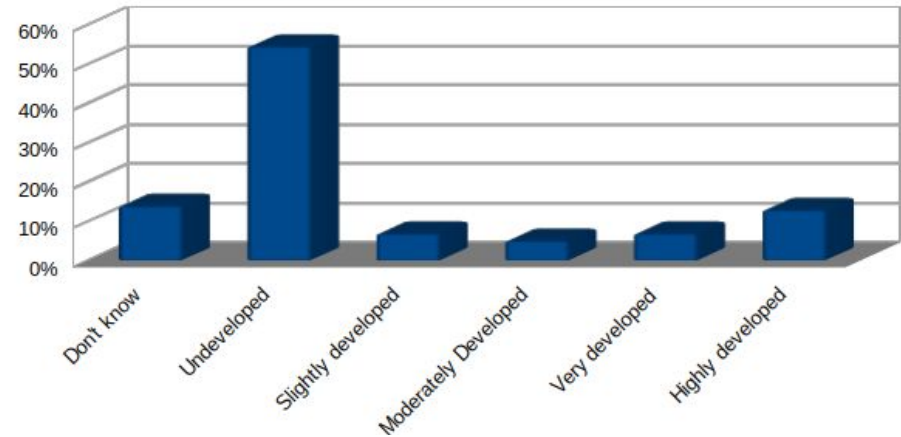


Treatment Planning

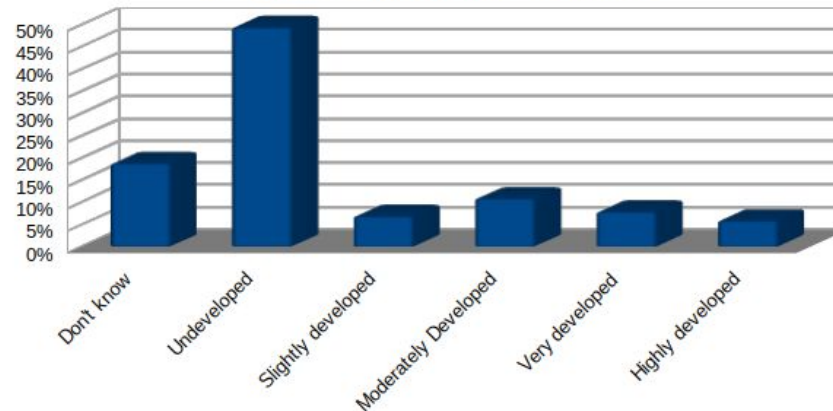
Set calculation properties - SRS/SBRT



Set respiratory gating parameters



Use biological optimization tools

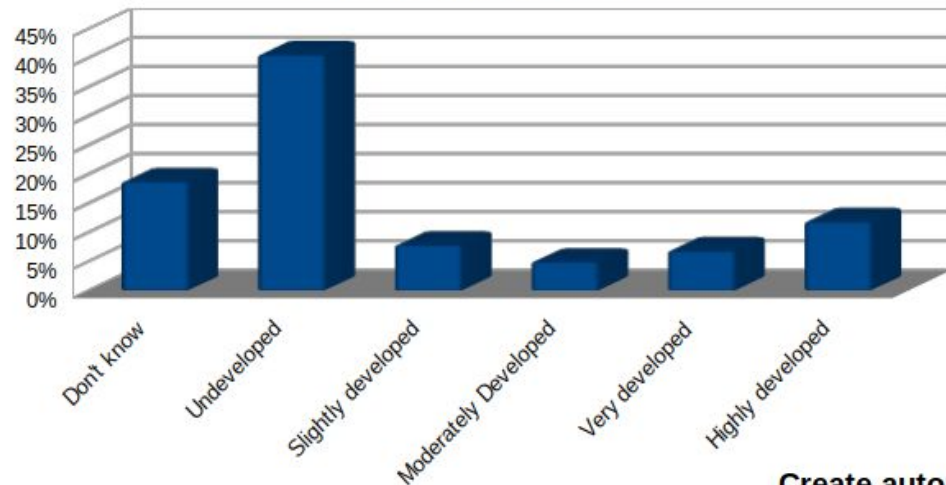


RTT/TRs' skills - level of development

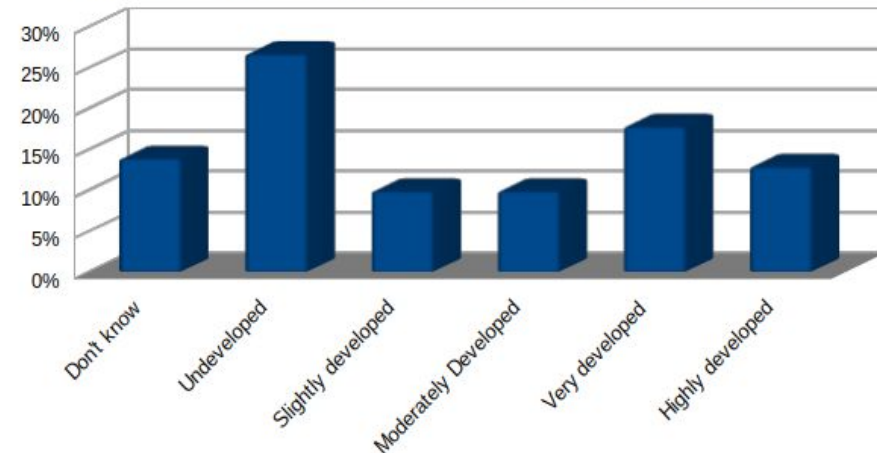


Management and Research

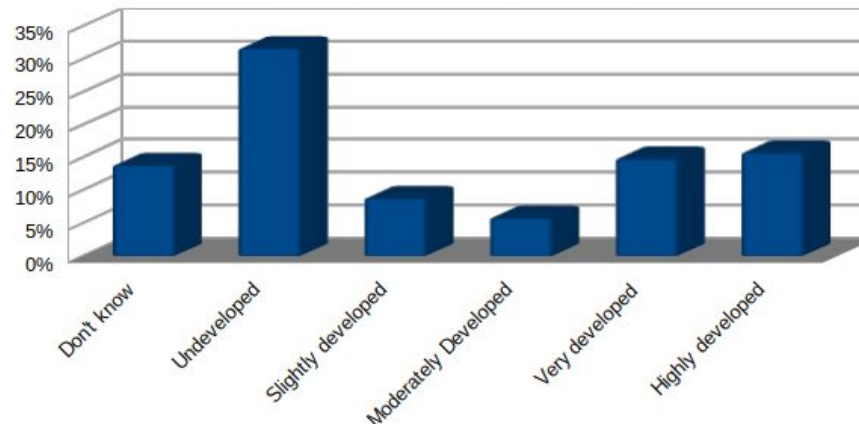
Perform market research



Use data collection tools of the activities performed



Create automatic reports



Survey: Results



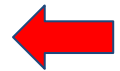
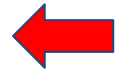
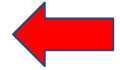
Generic ICT skills	Total Score Median (Min-Max)	p-value
Information processing		
Basic user	54.4 (39.7-80.3)	0.130
Independent user	66.9 (27.6-98.4)	
Proficient user	63.0 (20.6-97.7)	
Communication		
Basic user	54.5 (20.6-75.2)	0.008
Independent user	68.7 (27.6-98.4)	
Proficient user	58.3 (31.9-96.6)	
Content creation		
Basic user	58.8 (20.6-96.6)	0.005
Independent user	76.3 (43.6-98.4)	
Proficient user	67.5 (31.3-97.7)	
Safety		
Basic user	60.7 (41.1-97.7)	0.190
Independent user	73.7 (40.3-98.4)	
Proficient user	62.1 (20.6-97.0)	
Problem solving		
Basic user	59.3 (27.6-92.5)	0.048
Independent user	72.6 (40.3-98.4)	
Proficient user	63.7 (20.6-97.7)	



Survey: Results



	Total Score	p-value
Gender		
Female	60.6 (20.6-98.4)	0.028
Male	74.4 (40.3-97.7)	
Age		
23-66	62.4 (20.6-98.4)	0.047 (Rs = 0.2)
RTT initial academic level (EQF)		
EQF4	74.7 (74.7-74.7)	0.211
EQF5	73.4 (61.5-82.6)	
EQF6	63.7 (31.3-98.4)	
EQF7	60.6 (50.7-93.2)	
EQF8	55.8 (20.6-84.5)	
RTT's highest academic level (EQF)		
EQF4	74.7 (74.7-74.7)	0.364
EQF5	75.5 (61.5-82.6)	
EQF6	62.9 (39.7-98.4)	
EQF7	63.7 (31.3-93.2)	
EQF8	59.7 (20.6-84.5)	
Time practising RT		
0-36	62.4 (20.6-98.4)	0.005 (Rs = 0.3)
Areas of RT (number of areas)		
1	49.9 (20.6-76.3)	<0.001
2	60.4 (33.8-98.4)	
3	69.8 (31.3-97.7)	
4	78.1 (63.3-97.0)	



RT areas where participants have experience:

- Planning Image
- Treatment Planning
- Treatment
- Other: Management, Mold room, Research, Education..



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SAFE EUROPE Radiotherapy Final Conference

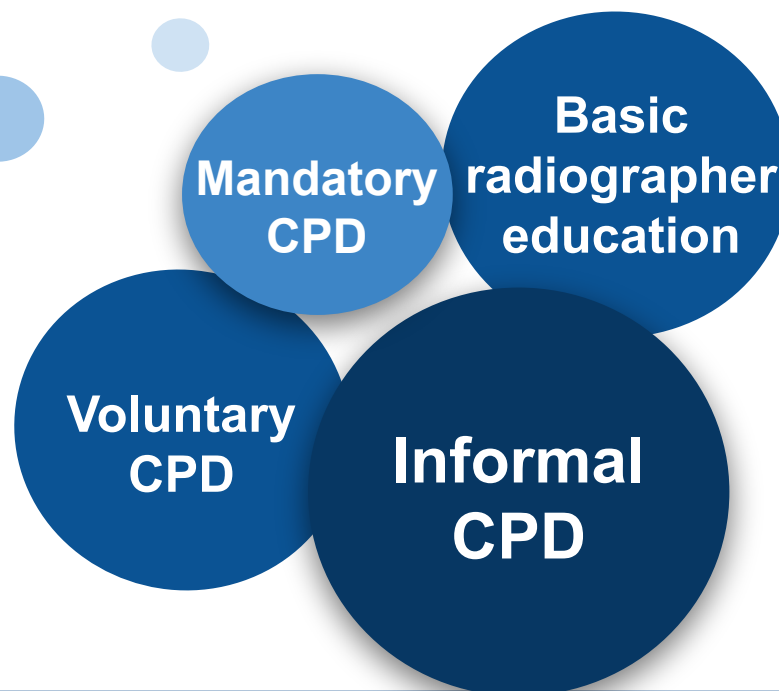
May 5th, 2022

Radisson Scandinavia Hotel, Copenhagen / Online

Survey: Results



Digital Skills - education	Value (%)	p-value (Friedman test)
Informal CPD	33.3 (0-100)	<0.001
Basic radiographer education	20 (0-100)	
Voluntary CPD	20 (0-40)	
Mandatory CPD	16 (0-40)	
Postgraduate education	0 (0-60)	



Discussion



Survey results:

- Lower development level in the dimension “Treatment Planning” and “Management and Research”
- Higher development level in the dimension “Transversal” and “Treatment”.
- Digital skills' development: CPD Informal



Suggestions:

- Promote the development of DS related to treatment planning & management and research:
 - CPD activities: in-house training, hands-on sessions, training courses (EFRS/ESTRO)
 - Basic education
 - Master's Programmes

Discussion



✓ Socio-demographic characteristics vs Score:



Gender

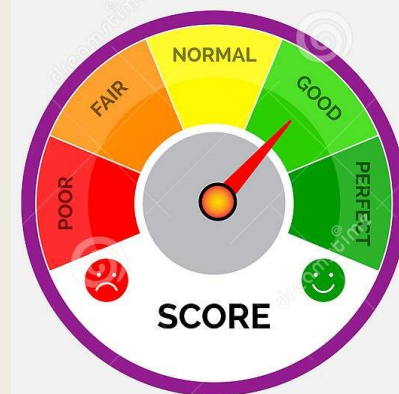


Age

Time practising RT

Areas of RT

Generic ICT skills: communication, content creation and problem-solving



❖ Suggestions:

- Develop ICT skills
- TR/RTTs should rotate through the various areas of the RT department

Future directions



- ✓ Focus group interviews design:
 - Based on the results of the European survey
 - Stakeholders: RTT Managers, Lecturers, Vendors representatives, Supervisors, Students

- ✓ Recommendations:
 - Ensure that the RTT/TRs are educated with the necessary skills to enable them to practice across Europe

Manuscript under review “Digital Skills of Therapeutic Radiographers/Radiation Therapists - document analysis for a European educational curriculum”.



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Safe And Free Exchange of
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Take home message

- ✓ The least developed digital skills, in Treatment Planning and in Management and Research, should be developed to ensure full competence in these area.
- ✓ Digital Skills can be developed across all levels of education, but the importance of Basic education and CPD is clear.

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❖ Research Team

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❖ Expert group - Digital skills list and survey design

- Ana Filipa Barros, Carla Pereira, Diana Pinto, Diana Ribeiro, Fátima Borges, Isabel Pinto, Liliana Gonçalves, Lourenço Carvalho, Luís Cunha, Paula Rocha, Silvana Miranda, Teresa Viterbo.

Thank you



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