

ICEC-CERN-STFC RTT Technological Options Study

Review Meeting

CERN

Thursday 8th March 2018

Agenda

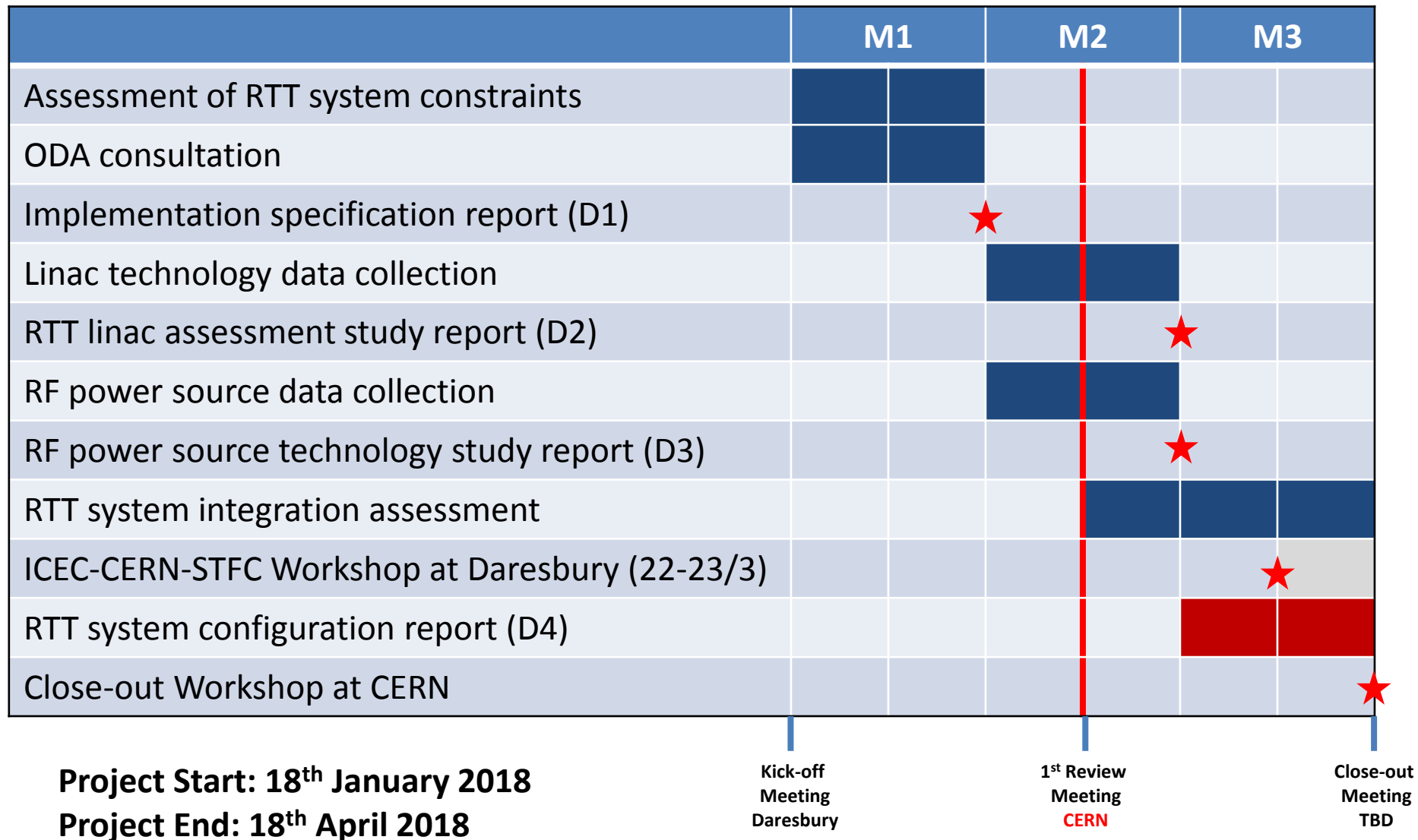
13:00	Welcome and Introductions	
13:05	Objectives for the day	P McIntosh
13:15	Update on ICEC-CERN-STFC Workshop 21-23/3	P McIntosh
13:25	Progress with the RTT specifications report	R Apsimon
14:10	Progress with the ODA RTT operations survey	H Foy
14:55	Coffee Break	
15:10	Progress with the RTT technology options process	D Constable
16:10	Next steps	P McIntosh
16:30	Test stand tour	
17:30	Meeting close	

Objectives for Today

- To review material collated for the specifications report:
 - Is everything captured, what's missing?
 - Is the representation format appropriate?
 - Do we have enough information to provide a basis for a specification?
- To review the ODA RTT operator consultation information:
 - Does this highlight any clear patterns for requirements and/or problematic areas?
 - Do we have enough inclusion of ODA country experiences?
 - What are the critical aspects which drive the specification?
- To review RTT technology data collected:
 - Is everything captured, what's missing?
 - Is the representation format appropriate?
 - Do we have enough information to provide a basis for linac/RF technology assessment?
- Review the upcoming CERN-ICEC-STFC Workshop and expected material to present.

Summary of Kick-off Meeting

18th January Daresbury



Workpackages and Deliverables

WP1: Determination of RTT system implementation constraints:

- Deliverable: Implementation specification report (M1).

WP2: Assessment of SW/TW linac performance capabilities appropriate for RT treatment application:

- Deliverable: RT linac assessment study report (M2).

WP3: Assessment of RF amplifier technologies appropriate for RT treatment application:

- Deliverable: RF amplifier technology study report (M2).

WP4: RT system integration assessment:

- Deliverable: Linac system configuration report which can define a more effective RT treatment platform, utilising more efficient, cost effective and robust linac and RF technologies (M3).

Proposed Scope of Programme

- Assessment of suitable **linac and RF amplifier configurations** will enable exploration of **both low and high frequency technologies** which offer the ability to exploit modern, high operational performance devices which can provide a more **modular approach** for RT system integration.

Low Frequency

- Taking advantage of high power, solid-state amplifier solutions at frequencies below 1GHz are of particular interest, whereby such implementation can **significantly simplify the RT system integration complexity** through **removal of all high-voltage power supply systems**.

High Frequency

- At higher frequencies above S-band, advanced linac technologies also offer the advantage of **very high accelerating gradients** (approaching 50MV/m) which can **significantly reduce the physical footprint** of the linac structure within the RT treatment platform.
- In addition at such high frequencies, the development of multi-beam klystron technologies has advanced considerably, offering **high efficiencies and reduced HVPS complexity and associated costs**.

Configurations

- In terms of the modularity which can then be employed, an assessment of configuration options will fundamentally explore the necessity for having the linac embedded within the rotating gantry and whether there are more effective approaches in **detaching not only the RF amplifier system, but also the linac structure itself**.

Technology Limitations

- The intricacies of then providing robust RF and/or electron beam delivery through rotating RF and beam delivery interfaces has been a fundamental inhibitor for limited commercial system solutions which have adopted this approach in the past and so **reassessing current technology viability** will be of particular significance.

Africa RTT Consultation

- Hubert Foy (African Center for Science and International Security, Ghana) offered to perform a selected consultation with a core group of current linac operators in 6-8 key countries in Africa.
- To provide an opportunity to learn from a diverse audience, some of the design needs associated with current linac technology operation in the continent.

RTT Technology Options

		Frequency Range			Cost Comparison	Operability
		<1GHz	1-3 GHz	>3GHz		
Amplifiers	Klystron					
	Magnetron					
	Solid State					
Linac	Standing Wave					
	Travelling Wave					
Magnet	Electro					
	Permanent					
Configurations	All RF in RTT gantry					
	Linac only in RTT gantry					
	No RF in RTT gantry					
Simplification	Removal of key components					
	Modular systems					

CERN-ICEC-STFC Workshop – 21-23 March, Park Royal Hotel, Daresbury

- Event information: <https://indico.cern.ch/event/698939/>
- Lab Tour on Wednesday: 15:00 – 17:00

Thursday 22nd

- Session 1: Setting the Scene
- Session 2: Accelerator Technology Options
- Session 3: Robust Permanent Magnet Delivery Systems
- Session 4: RF Power Systems and Optimised RF Structures
- Session 5: Linear Accelerator Simulations

Friday 23rd

- Session 6: Recap Sessions 2 – 5
- Session 7: Cloud Based Electronic Infrastructure
- Session 8: Re-engineering for the Next Generation of RTT linacs
- Session 9: Next steps

Session 2: Accelerator Technology Options

Thursday 22nd

11:00 – 11:15	Overview of Technology Options Study	P McIntosh
11:15 – 11:35	RTT platform specification assessment	R Apsimon/D Constable/G Burt
11:35 – 11:50	ODA country operation perspectives	H Foy
11:50 – 12:10	Preliminary technology option data capture	R Apsimon/D Constable/G Burt
12:10 – 12:30	Discussion	

Next Steps

- Completion of implementation specification report D1:
 - Inclusion of ODA operations survey material.
 - Assessment and definition of agreed specification.
 - Consultation needed with ICEC representatives.
- Complete technology data collation for linac and RF systems D2 and D3.
- Complete RTT system integration assessment D4.