

# Target Project Status

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# Status of Target Project In-Kind Packages



Target Project has 22 in-kind work elements

– TA or CA signed for 3 work elements

– Partner selected for 13 work elements

– No partners selected yet for 2 work elements

– Four IKC packages remain to be released

– “Last Call” dates set for all remaining elements

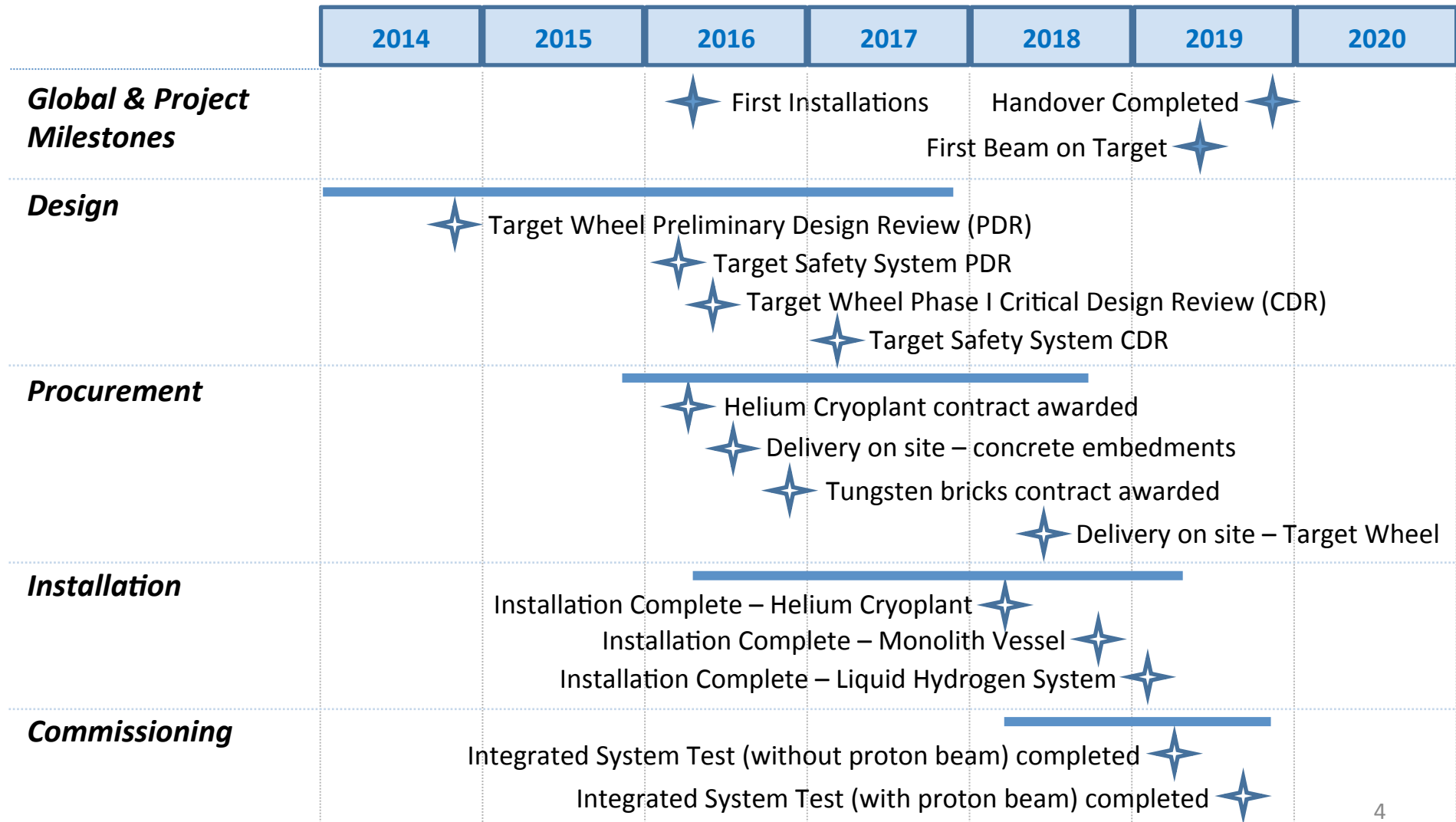
Work Package	In-Kind ID	In-Kind Contribution	Last Call or IKRC Approval Date	Cost Book Value (M€)
2 Target Systems	TIK.2.1	Target Wheel	19-Nov-15	8.4
	TIK.2.2	Target He Cooling system	19-Nov-15	5.6
3 Moderator & Reflector	TIK.3.1	Moderator & Reflector Plugs		4.7
	TIK.3.2	Cryogenic Moderator System (LH2)		4.4
	TIK.3.3	Cryoplant		14.3
4 Monolith Systems	TIK.4.1	Target Monitoring Plug	01-Nov-16	0.5
	TIK.4.2	Proton Beam Instrumentation Plug		0.5
	TIK.4.3	Irradiation Module		0.2
	TIK.4.4	Proton Beam Window		0.9
	TIK.4.5	Monolith Vessel		4.6
	TIK.4.6	Neutron Beam Windows		0.5
	TIK.4.7	Monolith Atmosphere System	01-Nov-16	1.2
	TIK.4.8	Monolith Shielding Systems	02-May-16	15.1
	TIK.4.9	Tuning Beam Dump		2.5
5 Fluid Systems	TIK.5.1	Primary Water Cooling Systems		2.5
	TIK.5.2	Intermediate Cooling Systems		2.0
	TIK.5.3	Ventilation & Confinement		7.6
	TIK.5.4	Proton Beam Window Primary Cooling System	15-May-16	0.6
6 Remote Handling	TIK.6.1	Active Cells		21.5
	TIK.6.2	Internal Casks and Handling Devices	15-Sep-16	3.4
	TIK.6.7	Remote Handling Support	15-Dec-16	1.2
8 Physics	TIK.8.1	Tungsten Release Factors	19-Nov-15	0.2

# Strategy for the six remaining Target Project IKC Packages



- TIK.4.1: Target Monitoring Plug - **0.5 M€**
  - Serious interest expressed, partnering likely
  - Will release for partnering in September 2016
- TIK.4.7: Monolith Atmosphere System – **1.2 M€**
  - Released Mar 2015 but no interest from partners
  - Undergoing revision due to evolution in the design
  - Will be re-released in September 2016
- TIK.4.8: Monolith Shielding Systems – **15.1 M€**
  - Released June 2015 but no interest from partners
  - Breaking into several pieces and working to combine some with existing packages
  - Remainder will be re-released for partnering in March 2016
- TIK.5.4: Proton Beam Window Primary Cooling System – **0.6 M€**
  - Scope of work under revision due to evolution in the design of the PBW
  - To be released in May 2016
- TIK.6.2 & 6.7: Internal Casks and Handling Devices & Remote Handling Support – **4.6 M€**
  - Serious interest expressed, partnering likely
  - Will release in July and October 2016 for partnering and expect positive outcome

# Target Project Schedule: High Level Milestones



# Planned Dates of Design Reviews



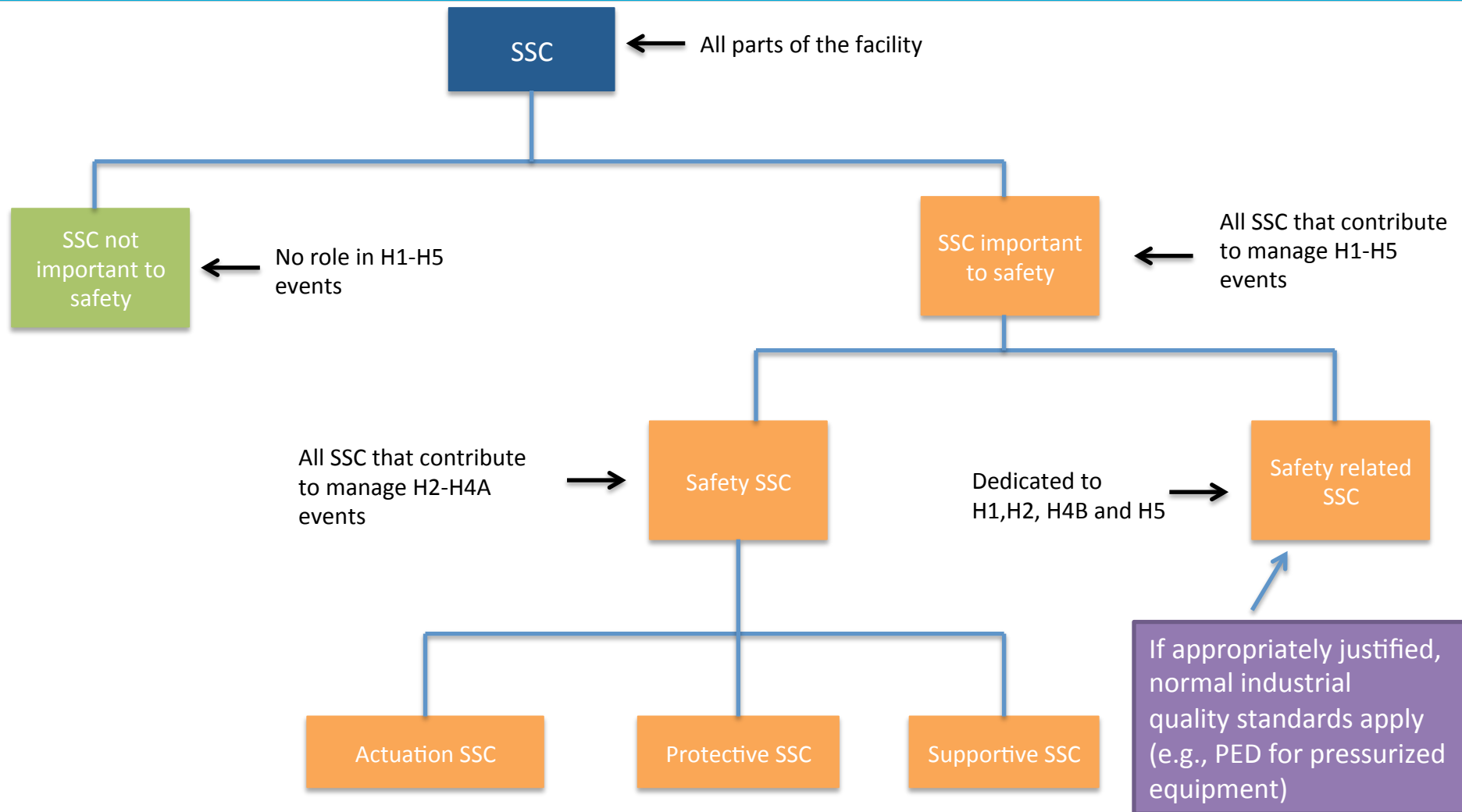
	2016Q1	2016Q2	2016Q3	2016Q4	2017Q1	2017Q2	2017Q3
WP2			▲ CDR Cassettes and Spallation Material	▲ CDR Target Helium Cooling System ▲ CDR Target Drive and Shaft			
WP3		▲ CDR MR Handling System	▲ CDR Reflector	▲ CDR Thermal Moderator ▲ CDR Cold Moderator		▲ CDR Hydrogen System (to be replanned) ▲ CDR Vacuum System	
WP4		▲ PDR Proton Beam Instrumentation Plug ▲ PDR Internal Monolith Structures (to be replanned) ▲ PDR Beam Extraction System (to be replanned)	▲ PDR Monolith Removable Shielding ▲ PDR Helium Atmosphere System ▲ PDR Monolith Atmosphere System	▲ PDR Monolith Shielding System ▲ PDR Monolith Bulk Shielding			

# Planned Dates of Design Reviews



	2016Q1	2016Q2	2016Q3	2016Q4	2017Q1	2017Q2	2017Q3
WP5		<ul style="list-style-type: none"> <li>▲ CDR Monolith Helium Purification (to be replanned)</li> <li>▲ PDR Radiolysis Gas Treatment System</li> <li>▲ PDR Proton Beam Window Cooling (to be replanned)</li> <li>▲ PDR Off-Gas System</li> <li>▲ CDR Ventilation</li> <li>▲ CDR Primary Water Systems</li> <li>▲ CDR Intermediate Water Systems</li> <li>▲ PDR Radiation Monitoring System</li> </ul>					
WP6		<ul style="list-style-type: none"> <li>▲ CDR Active Cells Confinement</li> <li>▲ CDR Active Cells Handling</li> <li>▲ CDR Active Cells Equipment</li> <li>▲ PDR Mock-up Facility</li> <li>▲ PDR Internal Casks</li> </ul>					
WP7	<ul style="list-style-type: none"> <li>▲ PDR Pilot Target Safety System</li> </ul>				<ul style="list-style-type: none"> <li>▲ CDR Target Safety System</li> </ul>		

# Systems, Structures and Component (SSC) Classification



# Radiation Hazards Analysis and Safety Functions



- Hazards analyses identified 350 events from which 21 were deemed “bounding”
- Bounding events:
  - 8 events with abnormal heating of tungsten due to beam excursions or loss of cooling
  - 6 events associated with the Active Cells
  - 5 events associated with water leaks, hydrogen explosion or fire, chopper malfunction, and errant beam on tuning beam dump
  - 2 events associated with earthquake
- Safety functions identified:
  - Safety related SSCs
    - Helium loop components
    - Helium purification
    - Utility room ventilation system
    - Target drive unit and associated control system
    - ...
  - Safety SSCs
    - Target Safety System: safety-class beam permit
    - Personnel Safety System: personnel access control
    - ...



# Summary of Input to 2<sup>nd</sup> License Application (due May 2)



- Target input to 2<sup>nd</sup> License Application:
  - General description of the target station systems
  - Hazards analysis summary
  - Summary of 6 bounding event analyses
  - Summary of all safety functions identified to date
  - Shielding and activation calculation procedures

# Baseline changes recently approved or in the queue

WP	Item	Status
2	Simplified Pressure Control of the Target Helium Cooling System	Approved
4	Monolith vessel atmosphere and lid structure	
2	Target wheel drive unit outside monolith	
4 & 3	Move Irradiation Module Work Unit from WP4 to WP3	

# ESS is working towards hardware standardization



- Handling, lifting and personal safety
  - Hoists
  - Straps
  - Lifting fixtures
- Mechanical systems
  - Vacuum systems
  - Cryogenic systems
  - Process/Plant/Utilities systems
  - Survey, Alignment and Metrology
  - Fasteners and other mechanical components
- Electronic systems
  - Electronic Infrastructure
  - Data capture and motion control
  - Computing, timing, networking
  - Motion Control
  - Automation solutions
  - Generic IO
- Electrical systems
  - Power distribution
  - Cables

# Handbooks are under development to guide Target staff in best practices



- Materials Handbook
- Vacuum Handbook
- Remote Handling Handbook
- Integrated Controls Systems Handbook

# Upcoming Meetings



- Technical Advisory Committee (TAC-13)
  - April 6-8
- 3<sup>rd</sup> Annual Review
  - April 20-23
  - Poster session on the evening of April 20  
*All partners are encouraged to attend and present posters on their work.*