SKA Telescope Manager (TM)

Project Status Report
ICALEPCS Oct 2015

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SKA Overview

World's Largest Radio Telescope

SKA Phase 1 comprised of:

Mid-Frequency Dishes

Located in South Africa

- 64 x 13.5m MeerKAT Dishes
- 133 x 15m SKA Dishes
- 350 MHz – 13.8GHz Freq. Range
- Core diameter ~1km
- 3 x spiral arms radius ~100km
- Offset-Gregorian design

SKA Overview

World's Largest Radio Telescope

SKA Phase 1 comprised of:

Low-Frequency Aperture Array

Located in Australia

- ~131,000 Antenna Elements
- Dual-polarised, log-periodic
- 50 MHz – ~350MHz Freq. Range
- Core diameter ~1km
- 512 stations 35m diameter each
- Stations spread over 40km radius

SKA Elements

TM Consortium

Self Funded Partners

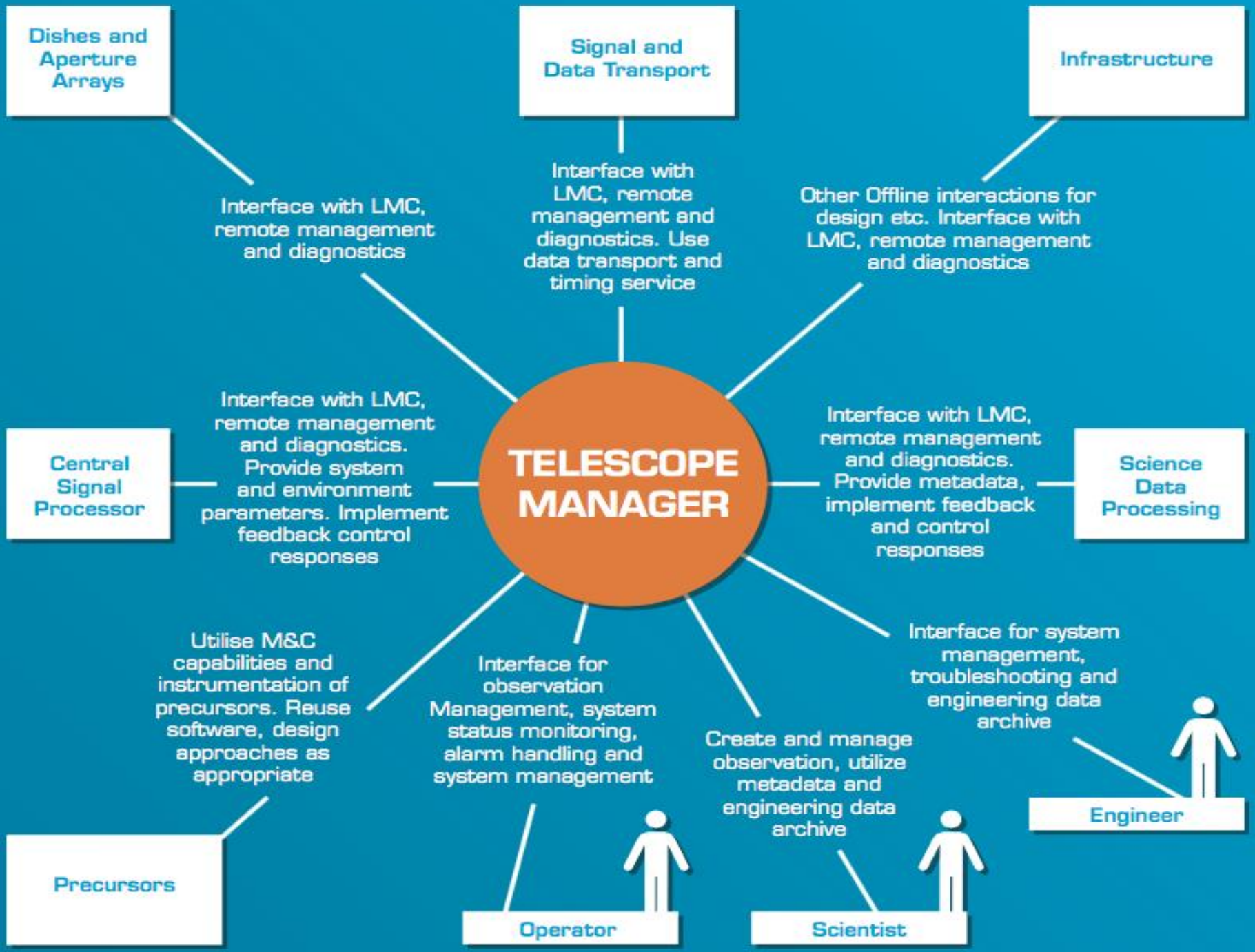
- Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia
- Engage SKA Consortium, Portugal
- GTD GmbH, Germany
- **National Centre for Radio Astrophysics (NCRA), India**
- National Institute for Astrophysics (INAF), Italy
- National Research Council of Canada (NRC), Canada
- Science and Technologies Facilities Council (STFC), UK
- SKA South Africa (SKA SA), South Africa

Industry Partners

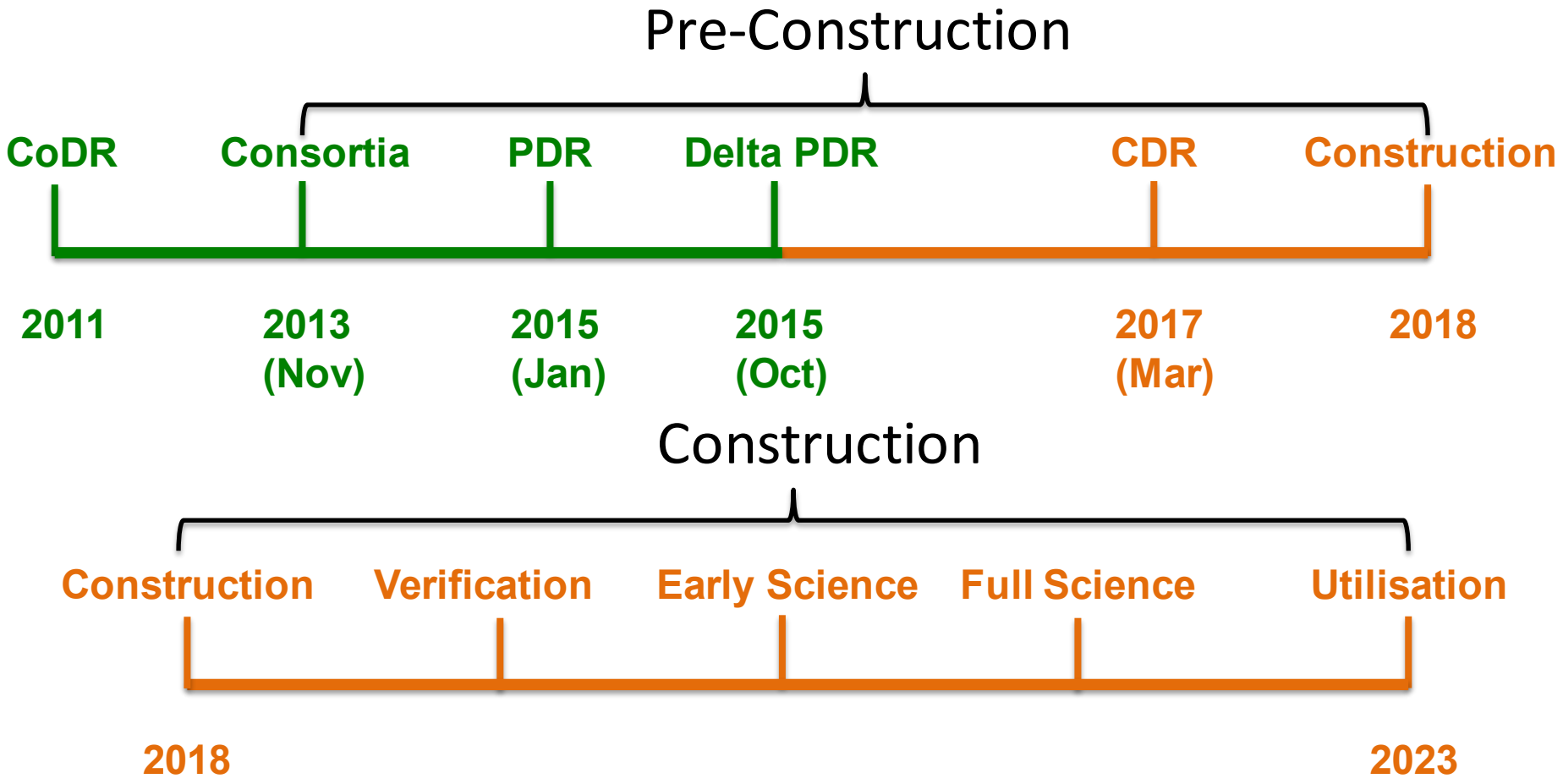
- Persistent Systems Limited (PSL), India
- SCISYS UK Ltd, UK
- Tata Consultancy Services (TCS), India

TM Primary Responsibilities

- Management of Astronomical Observations
- Management of Telescope Hardware & Software Subsystems
- Management of the Data to Support Operations and all Stakeholders

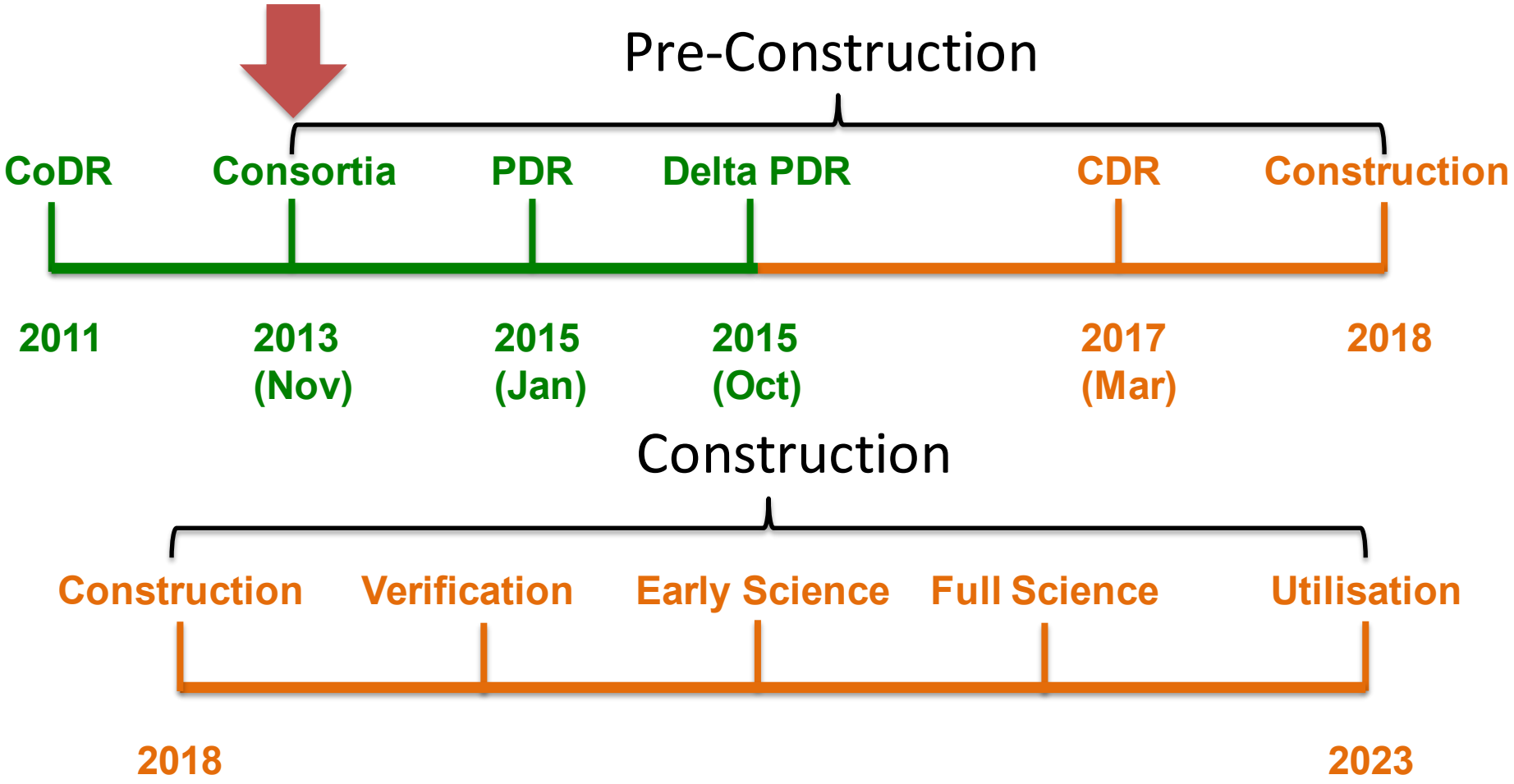

Dishes and Aperture Arrays
Signal and Data Transport
Infrastructure
Interface with LMC, remote management and diagnostics
Interface with LMC, remote management and diagnostics. Use data transport and timing service
Other Offline interactions for design etc. Interface with LMC, remote management and diagnostics
Central Signal Processor
Interface with LMC, remote management and diagnostics. Provide system and environment parameters. Implement feedback control responses
TELESCOPE MANAGER
Interface with LMC, remote management and diagnostics. Provide metadata, implement feedback and control responses
Science Data Processing
Utilise M&C capabilities and instrumentation of precursors. Reuse software, design approaches as appropriate
Interface for observation Management, system status monitoring, alarm handling and system management
Create and manage observation, utilize metadata and engineering data archive
Interface for system management, troubleshooting and engineering data archive
Precursors
Operator
Scientist
Engineer

TM Development Plan



CDR – Critical Design Review PDR – Preliminary Design Review CoDR – Concept Design Review

TM Development Plan



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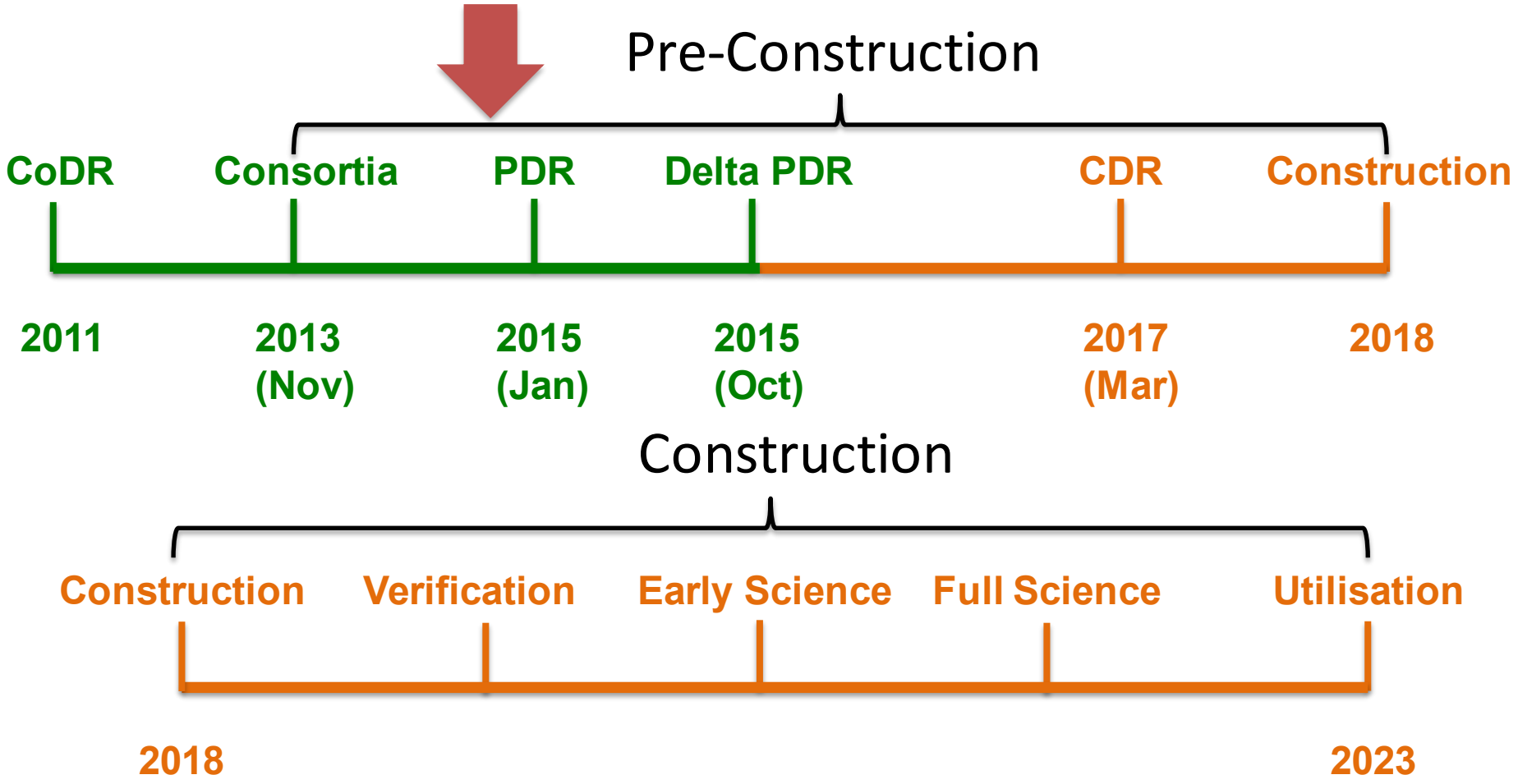

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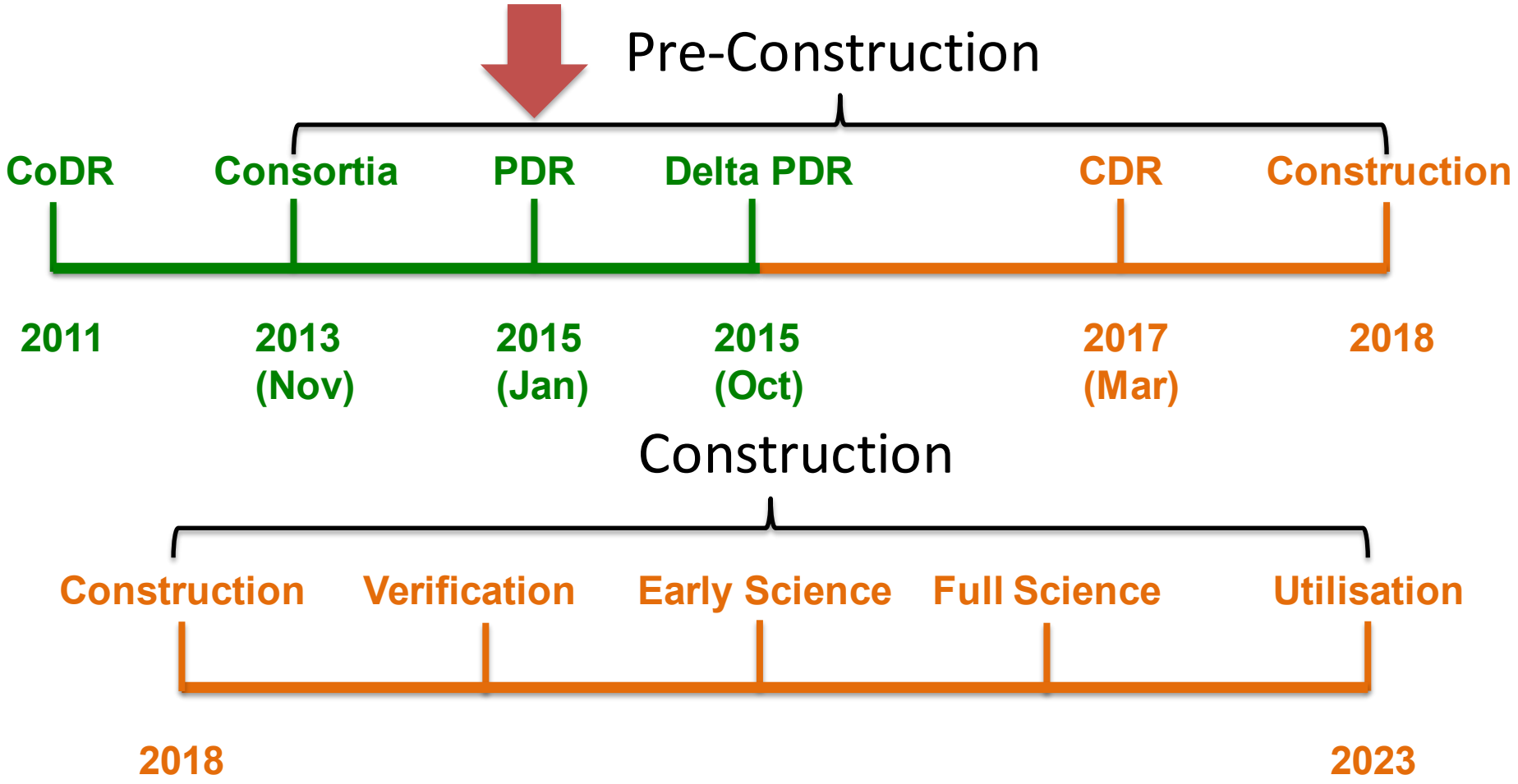

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TM PDR Outcome

- Responsive, collaborative…deep understanding of key design issues;
- High quality PDR data pack;
- Technology choices were outstanding;
- Telescope level operations concept was immature;
- ‘Rebaselining’ needed to be considered;
- Graphical user interface (GUI) design and scripting approach was immature;

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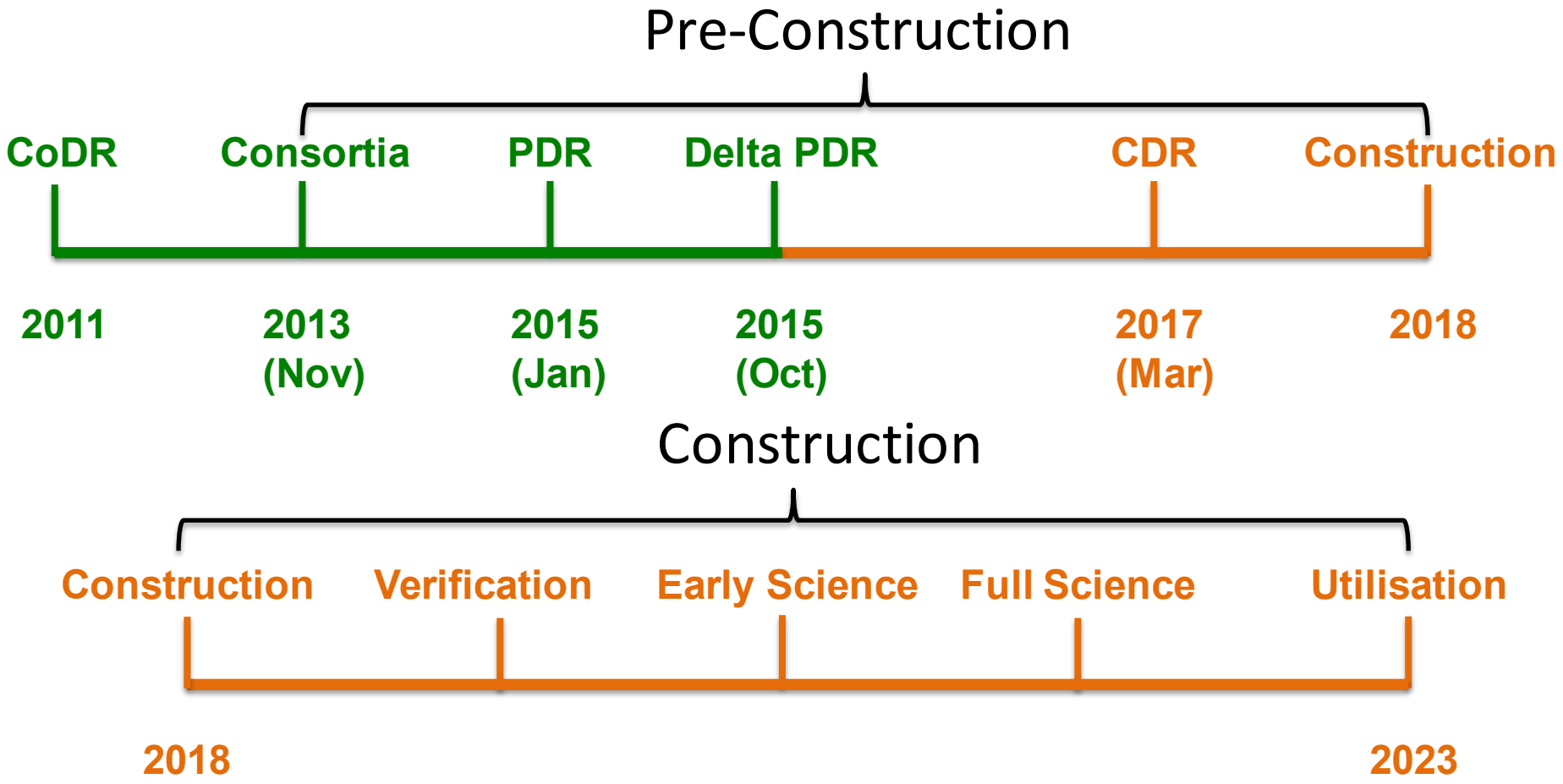
Delta PDR Required

TM Development Plan



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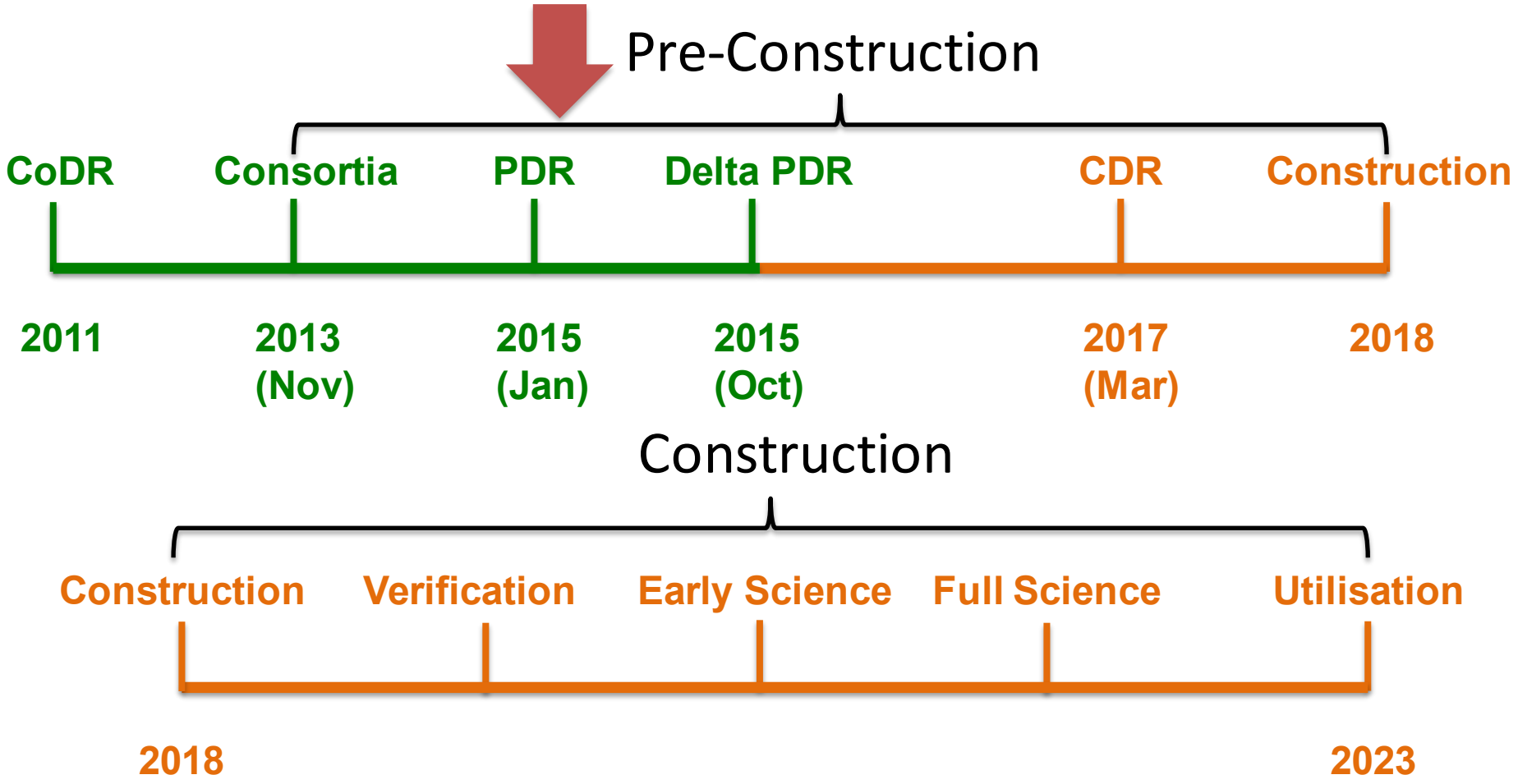

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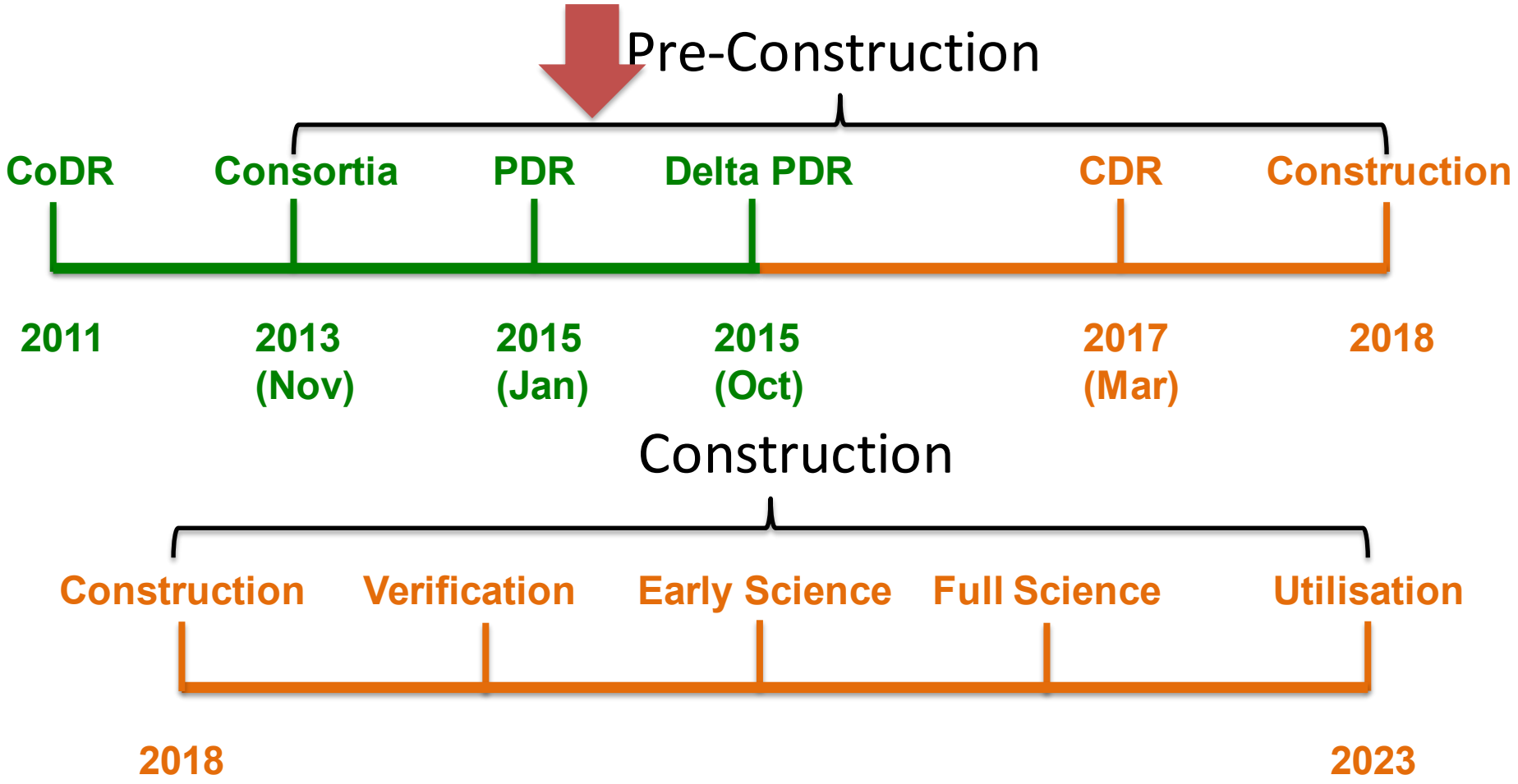

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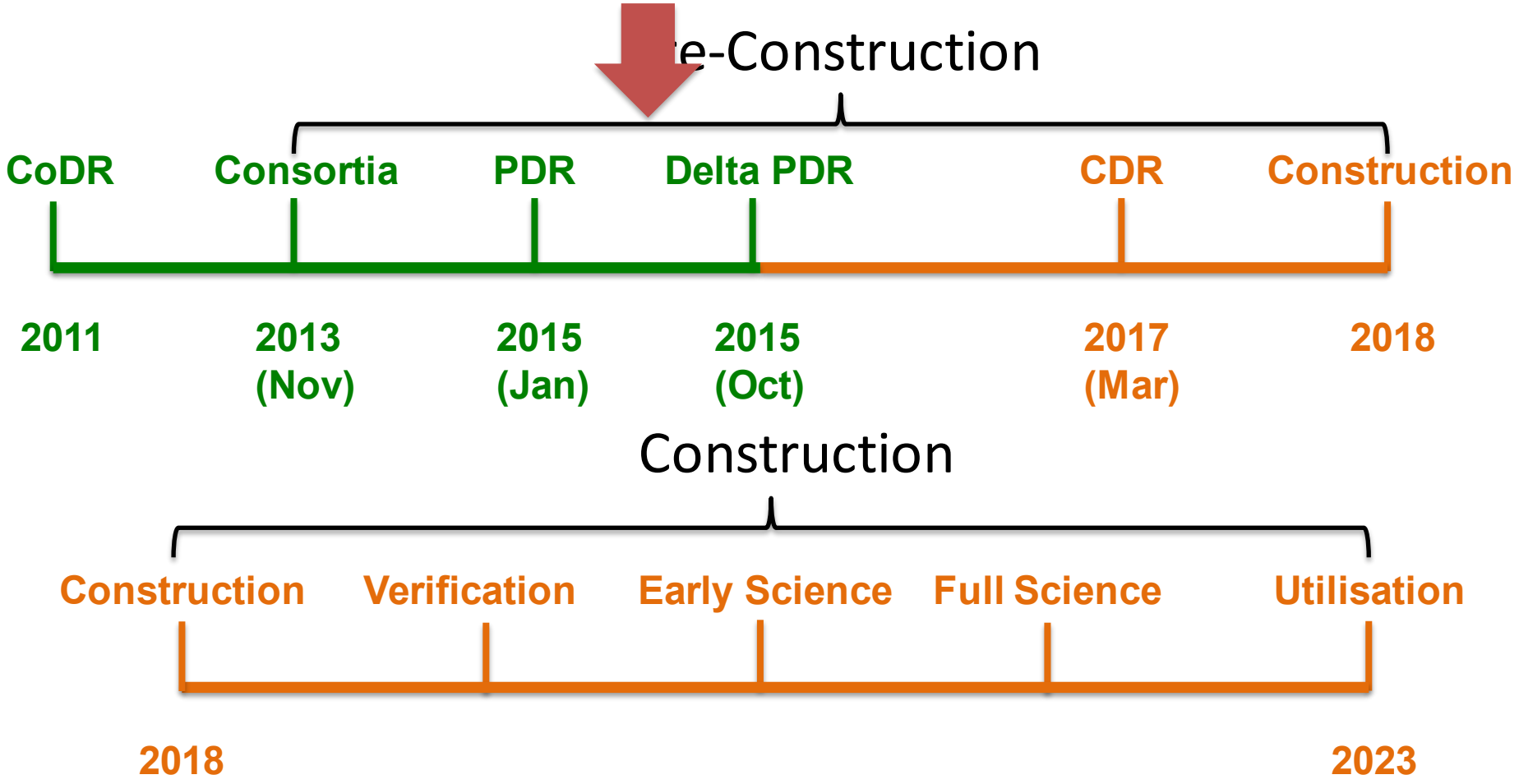

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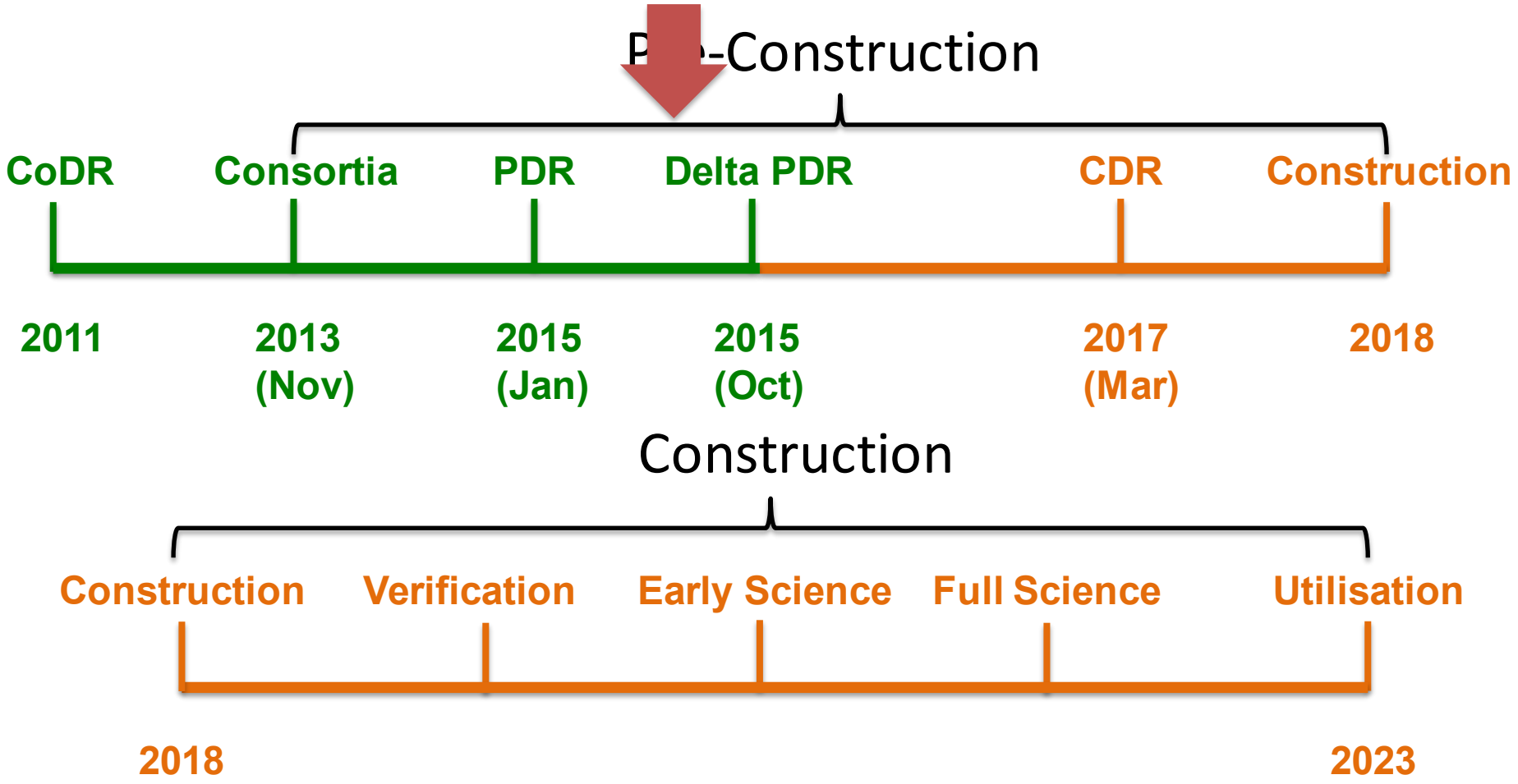

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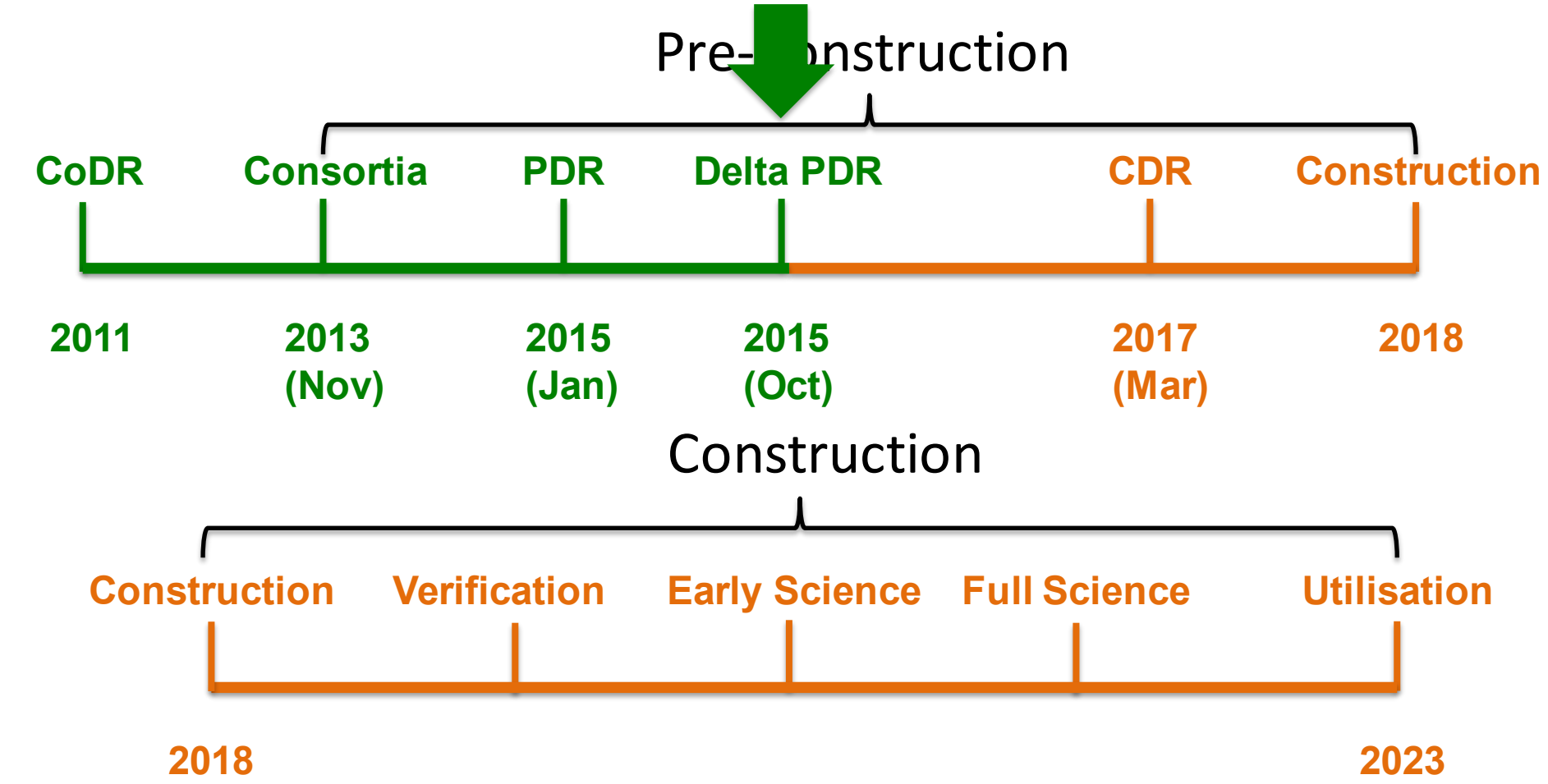

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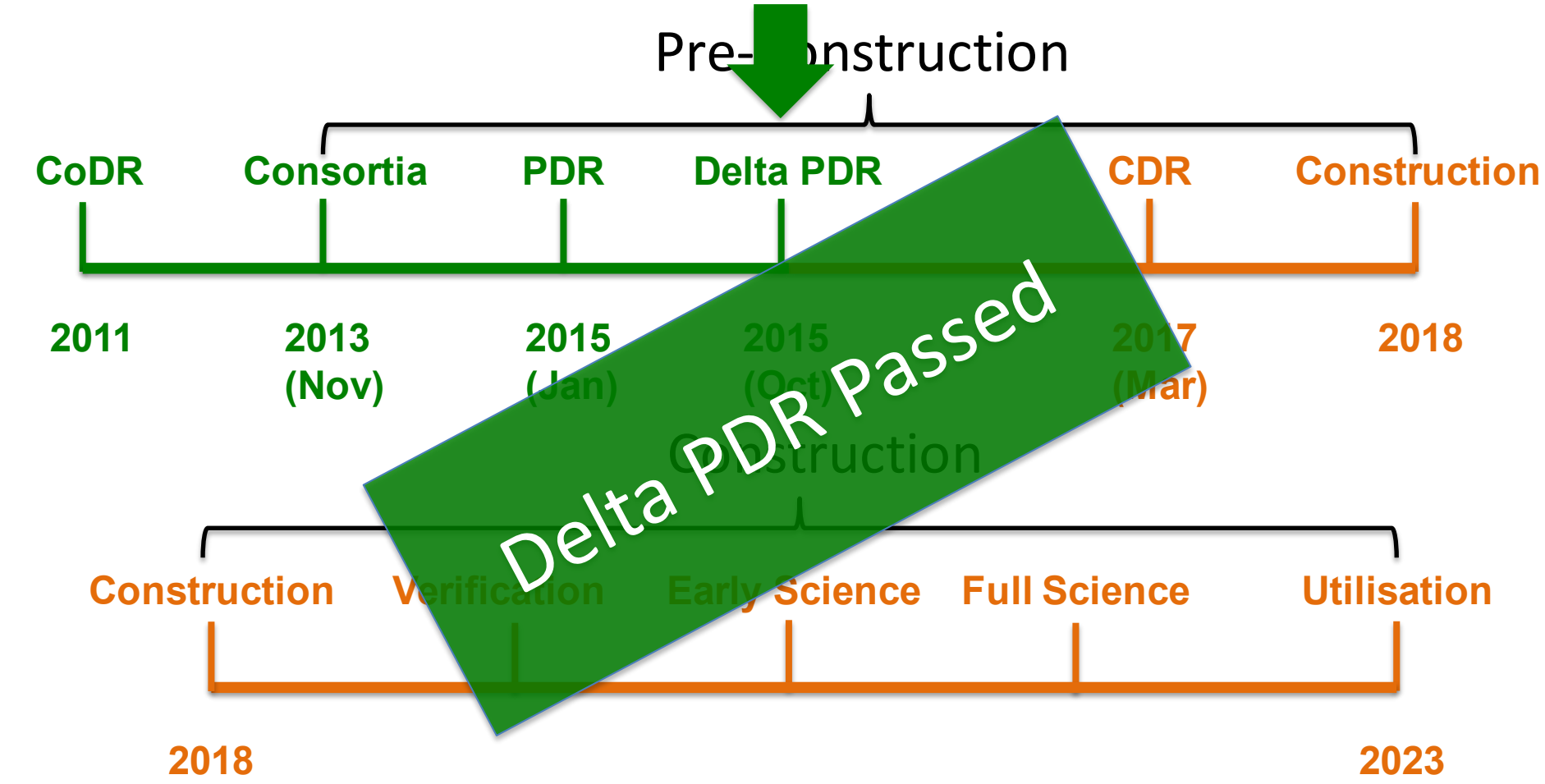

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Future Milestones

• Development Baseline Formed	4th Qrt 15
• Rebaselining changes implemented	4th Qrt 15
• Element Level RBL / DBL	2nd Qrt 16
• Prototyping Report	2nd Qrt 16
• Sub Element Level RBL / DBL	3rd Qrt 16
• Application Level RBL / DBL	1st Qrt 17
• CDR Submission	1st Qrt 17
• CDR Closure	3rd Qrt 17

CDR – Critical Design Review RBL – Requirements Baseline DBL – Design Baseline

RISKS

- Dependency on Operations Concept Documents
- Dependency on Telescope Level Architecture Pack
- Scope and boundaries regarding Enterprise functionality unclear
- Uncertainty in ability to align with the construction assembly, integration and verification (AIV) schedule
- Assumptions made in the interim to continue development
- Next 6-9 months critical

AIV – Assembly Integration & Verification

Telescope Manager Tools

Google Drive

CDR – Critical Design Review

RBL – Requirements Baseline

DBL – Design Baseline

Conclusion

- Telescope Manager is an integral part of the SKA Observatory.
- Telescope Manager is responsible for observation, telescope and data management.
- Significant progress has been made in developing the TM since project kick-off in Nov 13.
- Most notably, the Delta PDR has been PASSED in the last week.
- Detailed Design and Prototyping are current focus areas.
- Risks still expose the Telescope Manager, next 6-9 months are critical

Questions

TM F2F Meeting, Pune, June 2015