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Institutional Experience Commissioning Varian ARIA 18.1/18.2 in a Multi-Vendor Radiation Therapy Environment

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Objective

We share our institutional experience upgrading Varian ARIA to v18.1/18.2 in a multi-vendor radiation therapy environment, highlighting practical challenges, mitigations, and actionable lessons for centers planning similar upgrades. Our aim was to verify safe, end-to-end continuity of imaging, planning, and treatment-delivery data across multi-vendor systems before resuming clinical operation, and to define a governance and testing framework that peer centers can adapt for comparable upgrades.

Methods

- A risk-based assessment identified failure modes across image transfer, plan transmission, treatment execution, and treatment data return.
- Interoperability testing evaluated DICOM RT/HL7 pathways across integrated imaging and delivery systems. Data-transfer QA verified DICOM RT objects, imaging records, and fraction delivery documentation.
- Additional checks confirmed standardized nomenclature, plan integrity, and accurate execution of OIS-transmitted parameters on treatment machines.
- End-to-end test cases spanned routine and edge-case scenarios—multi-modality image registration, adaptive re-plans, and interrupted or resumed fractions—to surface latent interface and mapping faults.
- Each pathway was validated in isolated test and pre-production environments before clinical release, with discrepancies logged, triaged, and re-tested until closure.

Methods

- Operational readiness included:
  - ensuring adequate hardware/software resources and sufficient license pools to support parallel validation under timeline pressure;
  - defining end-user testing strategy in test versus pre-production environments;
  - early coordination with third-party vendors to confirm compatibility of interfaced software/hardware;
  - assigning named physics points-of-contact with divided task ownership, escalation pathways, and accountability tracking; and
  - recurring vendor–IT–clinic meetings for issue triage and closure. Lessons learned from a peer center that previously completed the upgrade were incorporated into the commissioning checklist.

Commissioning & Interoperability Workflow

1 · Risk-Based Failure Mode Assessment → 2 · Interoperability Testing (DICOM RT / HL7) → 3 · Data-Transfer QA (objects, parameters, fractions) → 4 · Execution Verification on Treatment Machines

Results

- ARIA 18.1/18.2 supported stable workflows with correct transfer and interpretation of images, plans, and treatment records across evaluated systems.
- Key challenges included site-specific interface/mapping adjustments for non-native components, constrained throughput during peak testing due to license/resource limits, and “unknown unknowns” not fully covered by vendor pre-testing, requiring iterative regression cycles.
- Vendor experts/trainers at go-live accelerated issue resolution and supported user adoption. Connectivity between ARIA and our proton therapy system is planned but not yet clinically validated, as the proton program is not yet in clinical operation.

Conclusion

- Commissioning ARIA in multi-vendor environments requires both technical verification and operational governance.
- Centers should plan not only commissioning but also post–go-live surveillance, with clear escalation paths and vendor-backed response expectations to detect latent issues and maintain clinical reliability.

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