



## Balancing Innovation with Regulatory Requirements in a CRDMO Setting

**Alok Mehrotra**  
Chief Quality Officer,  
Syngene International

Contract Research Development and Manufacturing Organizations (CRDMOs) play a vital role in bridging the gap between scientific discovery and patient care. They act as trusted partners for pharmaceutical and biotech companies, offering a complete spectrum of services to navigate the complex process of developing new drugs, from the initial research phase to final production. **Alok Mehrotra** talks about how Contract Research Development and Manufacturing Organizations (CRDMOs) play a critical role in maintaining compliance with Good Manufacturing Practice (GMP).

However, CRDMOs must carefully balance two important aspects: innovation to create new and improved therapies and strict adherence to regulatory guidelines to ensure the safety and effectiveness of the drugs. This balance is crucial. It allows CRDMOs to deliver life-changing medicines faster to patients in need, while prioritizing their well-being.

### Evolution of CRDMOs

The CRO and CDMO industry is experiencing significant growth, with the global market for Contract Research Organizations (CROs) projected to reach USD 63.35 billion by 2028 (Source: Market Watch) and the CDMO (Contract Development and Manufacturing Organizations) market reaching USD 295.95 billion by 2033 (Source: BioSpace). Over the years, CRDMOs have undergone significant transformation. Initially, these organizations were primarily focused on providing supplementary research and manufacturing services to pharmaceutical companies. As the landscape of drug discovery was revolutionized by the advent of new therapeutic modalities, innovations such as CAR-T cell therapies, PROTAC degraders and highly targeted monoclonal antibodies emerged, demanding specialized expertise far beyond traditional small molecule drug development.

These innovative approaches necessitate a comprehensive understanding of advanced biological processes, complex manufacturing techniques and stringent quality control measures. CRDMOs have risen to this challenge, evolving their capabilities to include expertise in biologics, advanced analytics, and state-of-the-art manufacturing technologies. This evolution has positioned CRDMOs like Syngene as indispensable partners in the ecosystem, capable of bridging the gap between groundbreaking scientific discoveries and large-scale clinical application.

### The regulatory landscape

Recognizing the critical role innovation plays in developing life-changing medicines, CRDMOs, as partners to pharma and biotech companies, must also adhere to strict regulatory requirements to ensure the safety and efficacy of new therapies. Regulatory bodies such as the FDA, EMA, and others have established comprehensive guidelines that govern every aspect of drug development and manufacturing. Compliance with

these regulations is non-negotiable, as it ensures that therapies are safe for patients and effective in treating their intended conditions.

CRDMOs play a critical role in maintaining compliance not only with Good Manufacturing Practice (GMP) standards but also with Good Laboratory Practice (GLP) standards. They implement robust quality management systems, conduct thorough preclinical and clinical testing and ensure that manufacturing processes adhere to both GMP and GLP guidelines. Quality in the laboratory is essential to ensure data integrity and the reliability of experimental results, making adherence to GLP standards equally vital alongside GMP standards. This involves meticulous documentation, regular audits and continuous monitoring to identify and address any potential issues that could compromise the quality or safety of a therapy.

Moreover, the regulatory landscape is constantly evolving, with new guidelines and requirements emerging in response to advances in drug discovery and development. CRDMOs must stay abreast of these changes, adapting their processes and practices accordingly. This requires a proactive approach to regulatory affairs, with dedicated teams that monitor regulatory updates, engage with regulatory agencies, and ensure that their operations remain in compliance.

### Striking the right balance

Drug development thrives on scientific exploration and bold ideas. However, a well-defined path with appropriate controls is essential to navigate the regulatory landscape and ensure future success. The key lies in truly understanding the rationale behind compliance, not just adhering to rigid rules. By implementing effective yet adaptable controls, CRDMOs can safeguard data integrity, patient safety, and fuel innovation without compromising regulatory requirements. This fosters an environment where quality is seen not as a standalone function but as a core value embedded within a company's culture. It's this cultural shift that propels CRDMOs to the forefront of responsible drug development.

### The Indian opportunity

The global shift towards dual supply chains and the "China + 1" strategy has created a opportunity for India in the CRDMO space. Pharmaceutical and biotech



companies are increasingly seeking geographically diversified partners to mitigate risks and ensure supply chain resilience. India's robust scientific talent pool, competitive cost structure, and growing government support for the biopharmaceutical sector position it as a strong contender to capitalize on this opportunity. However, capitalizing on this opportunity hinges on India's ability to establish a reputation for consistent quality that matches global standards. By prioritizing robust quality management systems, regulatory compliance, and fostering a culture of quality within the organization, Indian CRDMOs can build trust with international partners and solidify their place in the global drug development landscape.

### Enablers to ensure a high quality and compliance culture

- **Focus on quality culture:** Building a strong quality culture goes beyond simply having documented procedures in place. It requires fostering a company-wide commitment to quality and a shared understanding of the importance of regulatory compliance. This can be achieved by conducting routine Gemba walks, engaging with employees on the shop floor and demonstrating visible commitment to quality and regulatory standards. Implementing a well-structured reward and recognition process incentivizes compliance and responsible behavior, fostering a culture of accountability and excellence. CRDMOs can enhance compliance awareness and understanding among employees through structured training and capability programs that explain the science and logic behind regulatory requirements.

- **Utilization of digital tools and platforms:** CRDMOs like Syngene and others are increasingly leveraging digital tools and platforms to achieve efficient and compliant data management with comprehensive audit trails. Electronic Lab Notebooks (ELNs) and Electronic Batch Manufacturing Records (eBMRs) offer a prime example. These advanced systems minimize the chances of human errors and ensure adherence to data integrity principles. By embracing such technologies, CRDMOs can streamline data handling processes, enhance traceability, and demonstrably comply with regulatory standards.

- **Simplified operating procedures:** To facilitate better understanding and adherence to compliance protocols, CRDMOs can develop simple and easy-to-follow

operating procedures. Incorporating visual aids such as pictures and flow charts can significantly enhance comprehension and compliance among personnel. Clear and intuitive procedures empower employees to perform tasks accurately and in accordance with regulatory guidelines.

- **Well-developed internal audit process:** A well-defined internal audit program is essential for proactively identifying and addressing potential issues. Regular internal audits evaluate adherence to regulatory requirements, identify areas for improvement, and propose corrective actions. This proactive approach allows CRDMOs to continuously strengthen their quality management systems. For example, at Syngene, "Anytime Audit Ready" is the standard. This rigorous internal program ensures the organization is prepared for not only client and regulatory audits but also self-inspections throughout the year.

- **Risk-based approach:** To optimize resource allocation and ensure patient safety, CRDMOs can adopt a risk-based approach. This prioritizes close scrutiny on processes and materials with the highest potential to impact drug quality. By streamlining procedures for less risky aspects, CRDMOs can achieve greater efficiency while maintaining unwavering focus on critical areas.

- **Continuous improvement:** The regulatory landscape is constantly evolving. CRDMOs must adopt a culture of continuous improvement, staying abreast of regulatory updates and proactively implementing best practices. This ensures that their compliance practices remain robust and adaptable in the face of change.

### Conclusion

CRDMOs are crucial partners to the pharma and biotech companies, which is evident from the increased collaborations over the last years and the anticipated growth in the future. This, therefore, presents the sector with the opportunity to work in tandem with their ecosystem and invest in systems and processes that safeguards and maintains high quality, while driving innovative scientific breakthroughs. ■