

Supporting Innovation: Bridging Across Analytical Methods

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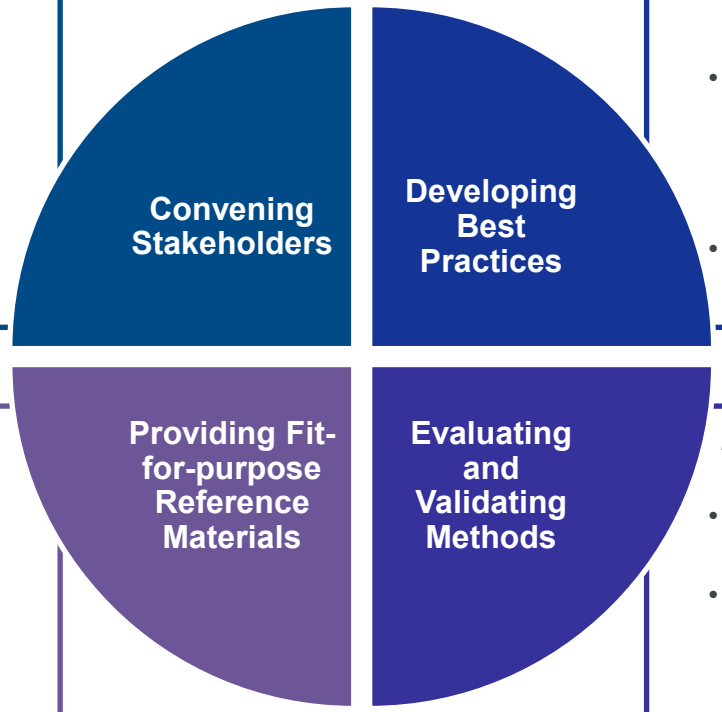
How USP Supports Innovation

Open Forums, workshops and roundtables

- Discuss industry challenges
- Identify gaps and industry needs
- Align on opportunities to mitigate challenges
- Define next steps



General Chapters and early engagement

- Engage industry experts to build consensus
  - Emerging Standards for early, pre-compendial engagement
  - General Chapters numbered 1000 -1999
- Provide opportunities for public comments and subsequent refinement

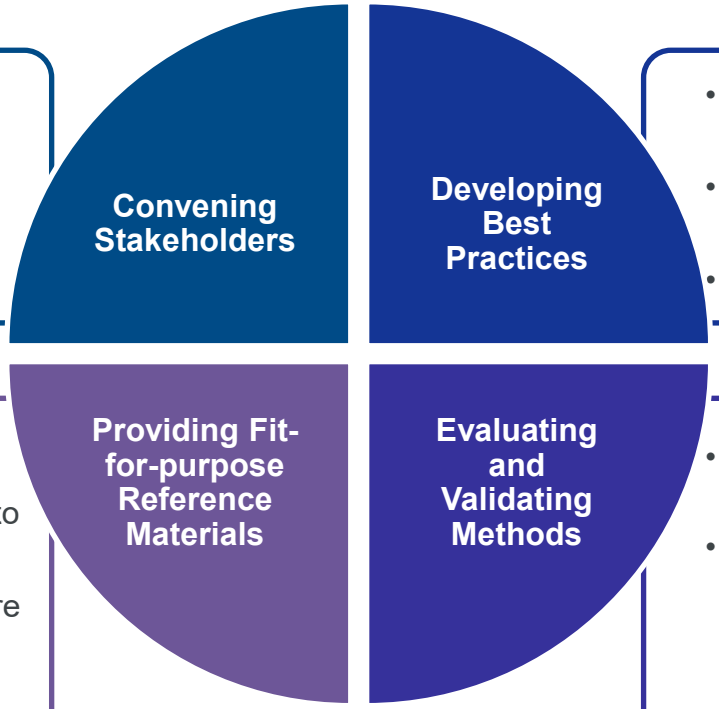
Physical reference materials to support assay quality and consistency

- Establish system suitability
- Monitor assay performance over time and across sites
- Serves as a benchmark for bridging to new technologies

Enabling more efficient development

- Provide validated method in a General Chapter or monograph
- Share methodology outside the compendial process
  - Emerging Standard
  - Reference Standard certificate
  - Application note

Example: Multi-attribute method (MAM)



- 2020 Stakeholder Forum on MAM identified industry needs for best practices and reference standards to support adoption

- Convened Expert Panel to draft chapter on MAM
- General Chapter <1060> published in PF for public comment in Sep 2023
- Chapter official in USP-NF in Aug 2025

- Incorporated existing USP RS into workflow to establish System Readiness
- Analyzing additional USP RS using same core MAM method and providing list of modifications on USP certificate

- Research on impact of sample preparation parameters on artifacts
- FDA-funded project under BsUFA III Pilot Regulatory Research Program comparing MAM to conventional methods
  - Roadmap for MAM implementation published in *Pharmaceuticals* **2026**, *19*(10), 1648; https://doi.org/10.3390/ph19101648

Similar pathway to support adoption of other innovative technologies

Host Cell Protein analysis by MS	PAT for Biologics*	Antibody Drug Conjugates (ADCs)*

** in development*

Reference Standards Support Bridging Across Orthogonal Methods

USP mAb Reference Standards

(IgG1, IgG4, Rituximab, Bevacizumab)

Multiple Suitable Methods for Charge Variants

cIEF	icIEF	CEX	LC-MS (MAM)

Expanded Reference Standard Characterization

Multiple methods included in collaborative study	Results reported on USP Certificate

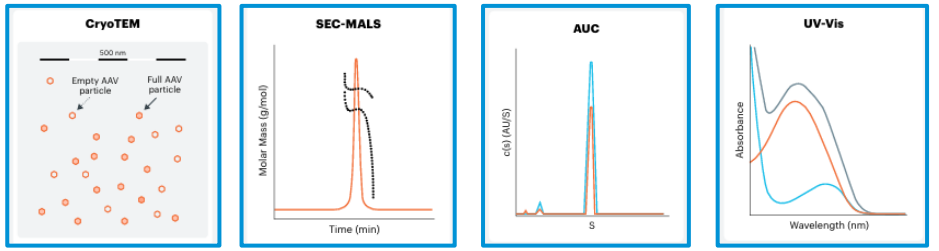
Methods provided in

General Chapters	Emerging Standards	USP Certificate	Application Note

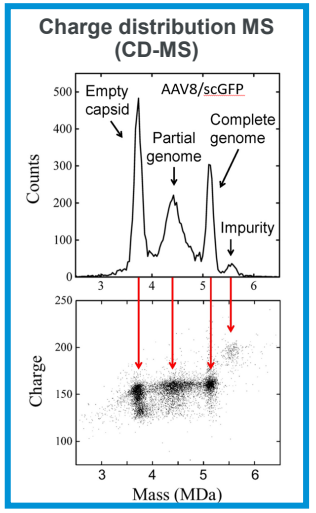
AAV Capsid Content

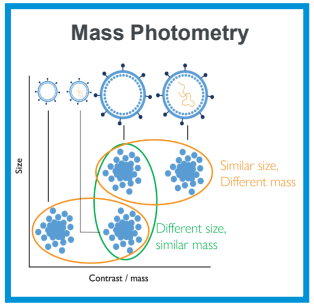
(Empty vs Full Capsids)

- Traditional Methods



- Emerging Methods





Testing method	AAV8 (Full Capsids)		AAV8 (Empty Capsids)	
	% Full	% Empty	% Full	% Empty
CryoTEM	92	5	2	98
SEC-MALS	98	2	2	98
Mass Photometry	91	6	5	95
CDMS	80	4	1	99
AUC	91	3	1	91
UV (A260/A280)	95	5	0	100