



Quality Assurance/Quality Control and Verification

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Outline

- Aims
- Definition (from 2006 IPCC Guidelines)
- Practical considerations
- Major elements





QA/QC and Verification – Why?

- QA/QC and verification procedures serve:
 - ✓ to develop national GHG inventories that can be readily assessed in terms of quality
 - ✓ to drive inventory improvement
- A QA/QC and verification system contributes to improvement of national GHG inventory
 - Transparency
 - Consistency
 - Comparability
 - Completeness
 - Accuracy





What is “Quality Control”?

- System of routine technical activities to assess and maintain the quality of the inventory as it is being compiled
- Performed by personnel compiling the inventory
- QC system is designed to:
 - ✓ Provide routine and consistent checks to ensure data integrity, correctness, and completeness
 - ✓ Identify and address errors and omissions
 - ✓ Document and archive inventory material and record all QC activities





What is “Quality Assurance”?

- Planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process (preferably by independent third parties)
- Performed upon a completed inventory following the implementation of QC procedures
 - ✓ Verify that measurable objectives were met
 - ✓ Ensure that the inventory represents the best possible estimates given the current state of scientific knowledge and data availability
 - ✓ Support the effectiveness of the QC programme

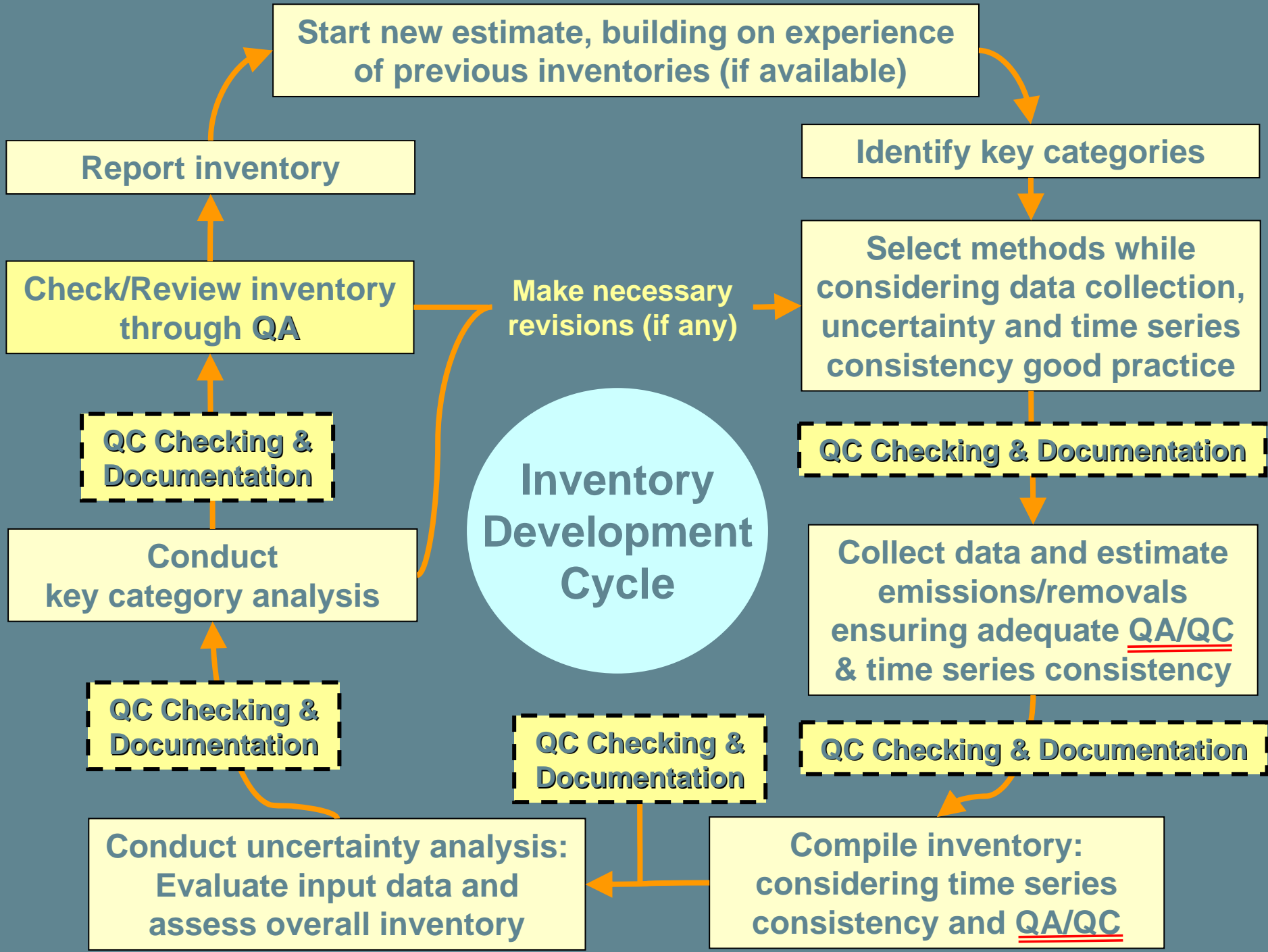




What is “Verification”?

- Collection of activities and procedures conducted during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of the inventory
- Methods that are external to the inventory and apply independent data, including comparisons with inventory estimates made by other bodies or through alternative methods
- May be constituents of both QA and QC





Start new estimate, building on experience of previous inventories (if available)

Report inventory

Identify key categories

Check/Review inventory through QA

Select methods while considering data collection, uncertainty and time series consistency good practice

QC Checking & Documentation

Make necessary revisions (if any)

QC Checking & Documentation

Inventory Development Cycle

Conduct key category analysis

Collect data and estimate emissions/removals ensuring adequate QA/QC & time series consistency

QC Checking & Documentation

QC Checking & Documentation

QC Checking & Documentation

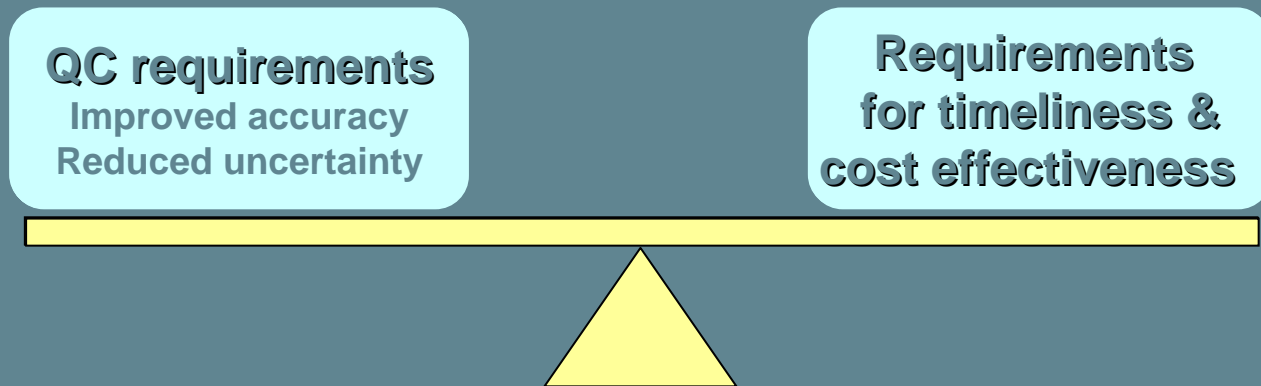
Conduct uncertainty analysis: Evaluate input data and assess overall inventory

Compile inventory: considering time series consistency and QA/QC



Practical Considerations

- Seek to achieve the balance of both requirements



- Also seek to enable continuous improvement of inventory estimates
- Try to identify where to focus more intensive analysis and review





Major Elements

- Participation of an inventory compiler who is also responsible for coordinating QA/QC and verification activities and definition of roles/responsibilities within the inventory
- A QA/QC plan
- General QC procedures that apply to all inventory categories
- Category-specific QC procedures
- QA and review procedures
- QA/QC system interaction with uncertainty analyses
- Verification activities
- Reporting, documentation, and archiving procedures





Roles and Responsibilities

- The inventory compiler should:
 - ✓ Be responsible for coordinating the institutional and procedural arrangements for inventory activities.
 - ✓ Define specific responsibilities and procedures for the planning, preparation, and management of inventory activities.





QA/QC Plan

- Fundamental element of the system
- Should include a scheduled time frame for the QA/QC activities
- A key component – List of data quality objectives (measurable)
- Important to accommodate procedural changes and a feedback of experience
 - ✓ The periodic review and revision of the QA/QC plan is an important element to drive the continued inventory improvement.





General QC Procedures

- Generic quality checks applicable to all source and sink categories, related to:
 - ✓ Calculations
 - ✓ Data processing
 - ✓ Completeness
 - ✓ Documentation
- Automated checks are encouraged where possible – to effectively check large quantities of input data





Category-specific QC Procedures

- Complements general QC procedures
- Directed at specific types of data used in the methods for individual source or sink categories
- Applied on a case-by-case basis focusing on:
 - ✓ key categories
 - ✓ categories where significant methodological and data revisions have taken place



QA Procedures

- Activities outside the actual inventory compilation, performed preferably by third party reviewers who are independent from the inventory compiler
 - ✓ Expert peer review
 - ✓ Audits
- Priority should be given to:
 - ✓ key categories
 - ✓ categories where significant methodological and data revisions have taken place



QA/QC and Uncertainty Estimates

- Provide valuable feedback to each other on critical components of the inventory estimates and data sources that:
 - ✓ Contribute to both the uncertainty level and inventory quality
 - ✓ Should therefore be a primary focus of inventory improvement efforts
- Uncertainty analysis can provide insights into:
 - ✓ Weaknesses in the Estimate
 - ✓ Sensitivity of the estimate to different variables
 - ✓ The greatest contributors to uncertainty





Verification

- Activities to provide information for countries to improve their inventories
 - ✓ Comparisons of national estimates
 - Applying different tier methods
 - Comparisons with independently compiled estimates
 - Comparisons of intensity indicators between countries
 - ✓ Comparisons with atmospheric measurements





Documentation, Archiving and Reporting

- Document and archive all information relating to the planning, preparation, and management of inventory activities
 - ✓ Records of QA/QC procedures are important information to enable continuous improvement to inventory estimates.
- Report a summary of implemented QA/QC activities and key findings as a supplement to each country's national inventory

