



# Quality Assurance and Quality Control in Surveys

---

Lars Lyberg

Statistics Sweden and Stockholm University

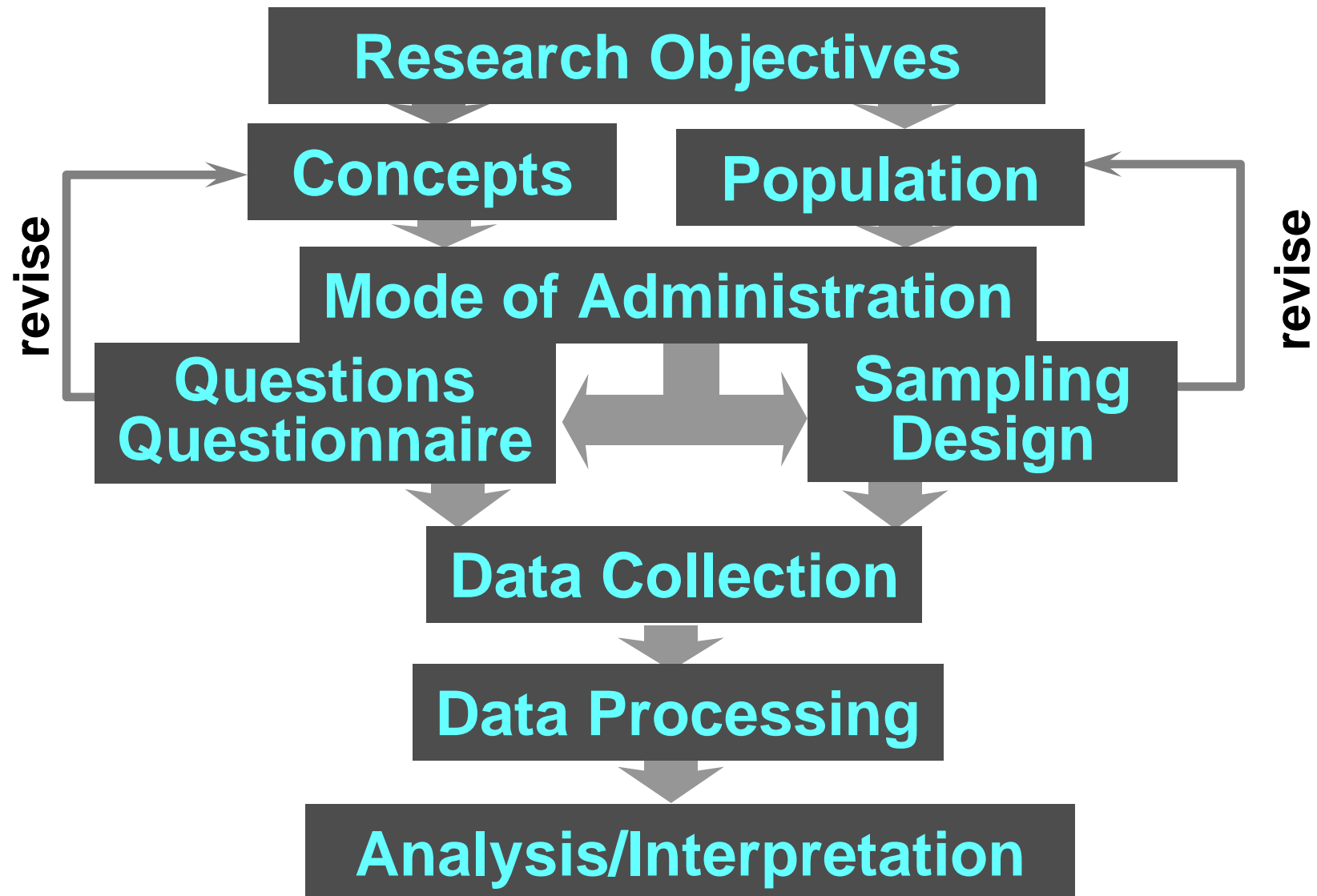
PSR Conference on Survey Quality

April 17, 2009

Email: [lars.lyberg@scb.se](mailto:lars.lyberg@scb.se)



# The survey process



# Overview

- The concept of quality in surveys
- Achieving quality
- The role of quality frameworks
- Quality levels: product, process, organization
- The role of paradata
- Understanding variation
- Business excellence models and leadership

# Survey process and quality

- Design based on user or client demands and knowledge about errors, costs and risks
- Quality should be achieved through prevention but controlling is necessary to check if prevention works and control data are necessary for continuous improvement

# Components of Quality



# The concept of quality

- Statistical Process Control (30's and 40's)
- Fitness for use, fitness for purpose (Juran, Deming)
- Small errors indicate usefulness (Kendall, Jessen, Palmer, Deming, Stephan, Hansen, Hurwitz, Tepping, Mahalanobis)
- Decomposition of MSE around 1960
- Data quality (Kish, Zarkovich 1965)
- Administrative applications of SPC (late 60's)
- Quality frameworks 70's
- CASM movement 80's
- Quality and users 80's
- Business Excellence Models
- Standards and Quality Guidelines

# Quality can mean almost anything

- It's a buzzword
- It's overused
- It's difficult to measure
- Nobody is against
- Indicators such as nonresponse rate, standard error and customer satisfaction do not reflect "total quality"

# So what is quality in surveys?

- Fitness for use (Juran) or fitness for purpose (Deming)
  - A small total survey error
  - The degree to which specifications or other components of some quality vector decided with the user are met
- Ambiguous definitions tend to undermine improvement work
- Any quality definition can be challenged



# Quality frameworks

- Statistics Canada, Statistics Sweden, ABS, IMF, Eurostat, OECD and more
- Typical dimensions include relevance, accuracy, timeliness, coherence, comparability, accessibility
- Dimensions are in conflict
- Accuracy is difficult to beat as *the* main dimension (two exceptions are exit polls and international surveys)

# Quality assurance (QA) and quality control (QC)

- QA is everything we have in place so that the system and its processes are capable of delivering a product that meets customer expectations
- QC makes sure that the product actually is good
- QC can be seen as part of QA and also part of Evaluation

# Examples of QA and QC

- QA: Appropriate methodologies, established standards, documentation
- QC: Verification, process control (control charts), acceptance sampling (sampling inspection of lots), checklists, reviews and audits

# A more detailed example: QA of Coding of occupation

- Suitable mix of manual and automated coding
- Appropriate coding instructions
- Coder training program

# QC of Coding of occupation

1. Process control that separates common cause and special cause variation

OR

2. Acceptance sampling with specified average outgoing quality limits

Validation methods:

- Independent verification system
- Methods for distinguishing between different kinds of coding errors
- Analysis of QC data (paradata) and identification of root causes of quality problems

# Assuring and controlling quality

<b>Quality Level</b>	<b>Main stake-holders</b>	<b>Control instrument</b>	<b>Measures and indicators</b>
Product	User, client	Product specs, SLA, evaluation studies	Frameworks, compliance, MSE, user surveys
Process	Survey designer	SPC, acceptance sampling, CBM, SOP, paradata, checklists, verification	Variation via control charts, other paradata analysis, outcomes of evaluation studies
Organization	Agency, owner, society	Excellence models, ISO, CoP, reviews, audits, self-assessments	Scores, strong and weak points, user surveys, staff surveys

## Some terminology

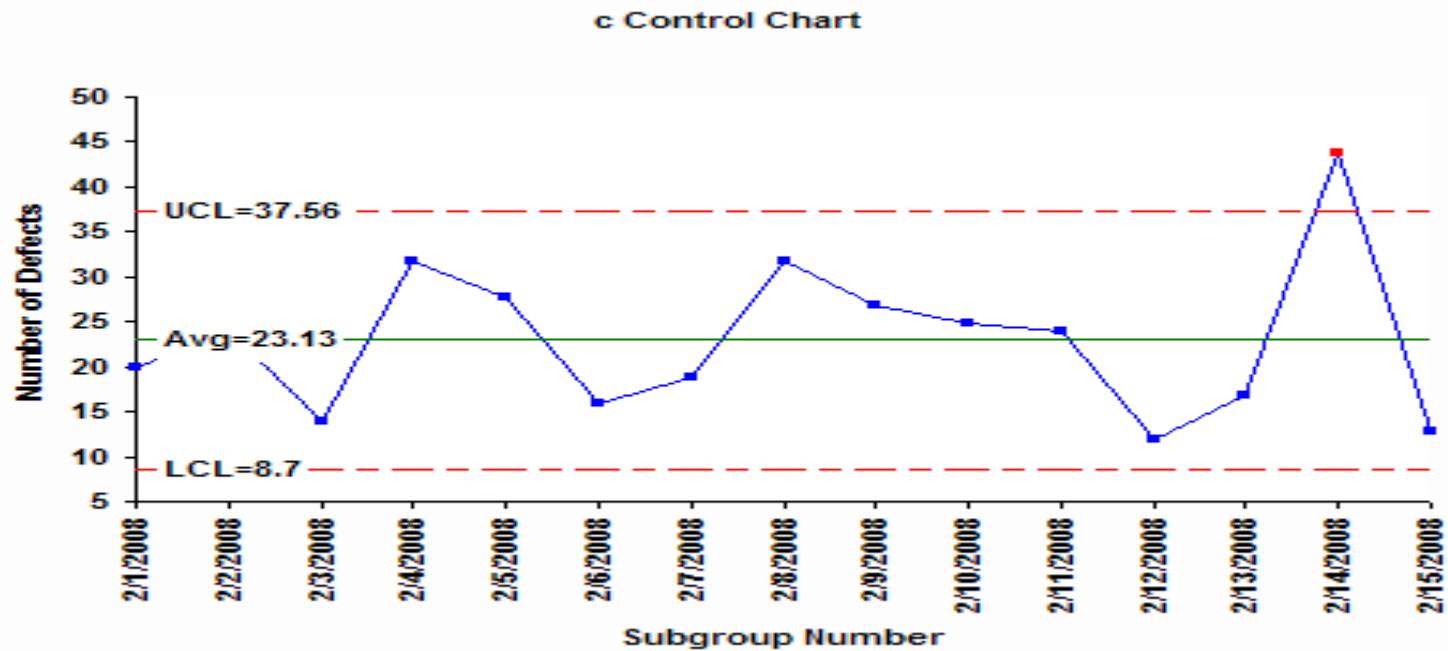
- Data, Metadata, Paradata
- Macro paradata– global process data such as response rates, coverage rates, edit failure rates, sometimes broken down
- Micro paradata– process data that concern individual records such as flagged imputed records, keystroke data
- Formal selection, collection, and analysis of key process variables that have an effect on a desired outcome, e.g., decreased nonresponse bias

# Importance of paradata

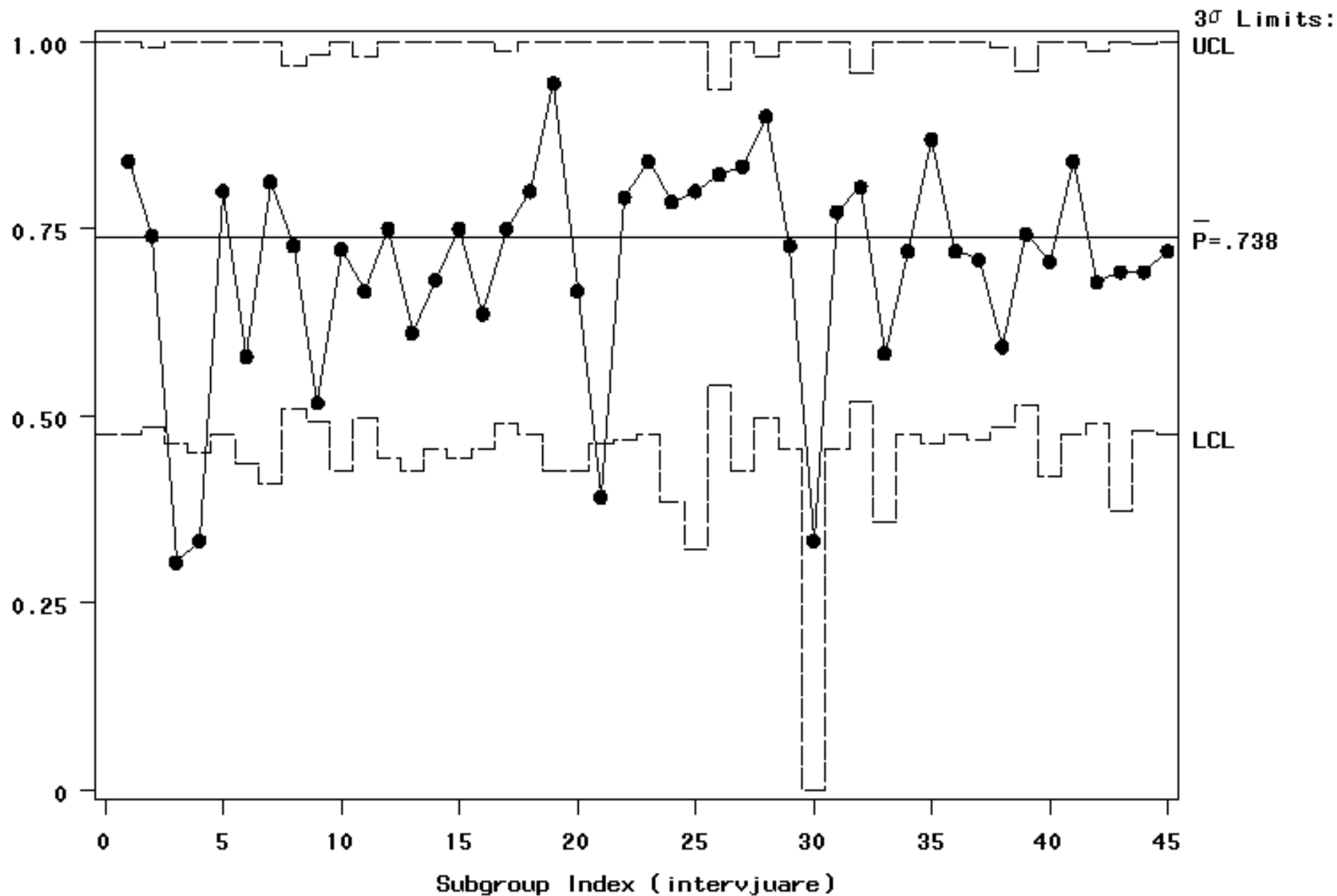
- Continuous updates of progress and stability checks
  - Control charts, standard reports
  - Managers choose to act or not to act
  - Early warning system
- Input to long-run process improvement
  - Analysis of special and common cause variation
- Input to methodological changes
  - Finding and eliminating root causes of problems
- Responsive designs
  - Simultaneous monitoring of paradata and regular survey data to improve efficiency and accuracy
- Input to organizational change
  - E.g., centralization, decentralization, standardization



# Control chart (example)



# P-diagram andel svar per intervjuare ESS



Subgroup Sizes: Min n=3 Max n=45

# Understanding variation (I)

## Common cause variation

- Common causes are the process inputs and conditions that contribute to the regular, everyday variation in a process
- Every process has common cause variation
- Example: Percentage of correctly scanned data, affected by people's handwriting, operation of the scanner...

# Understanding variation (II)

## Special cause variation

- Special causes are factors that are not always present in a process but appear because of particular circumstances
- The effect can be large
- Special cause variation is not present all the time
- Example: Using paper with a color unsuitable for scanning

# Problems with inspection under traditional QC

- Inspection generates limited added value, is costly, and tends to come too late
- Done by the wrong people
- Considerable inspector variability
- Inspection itself must be error-free for acceptance sampling to function as planned BUT when a process is unstable due to staff turnover or poor skills then acceptance sampling is a reasonable alternative to more long-term continuous quality improvement approaches
- We should try to move resources from control (QC) to preventive measures (QA)

# Business excellence models

- Malcolm Baldrige Award Criteria: Leadership, Strategic planning, Customer and market focus, Information and analysis, Human resource focus, Process management, and Results
- Other models include EFQM, SIQ, ISO 9001
- The three questions: What are the (good) approaches? How wide-spread are they within the organization? How are they evaluated?
- Within these models we might have Six Sigma, Lean, Balanced Scorecard, ISO 20252, Code of Practice, etc.

# Quality management, what's needed?

- A committed top management
- A detailed process for strategic planning
- Customer collaboration
- Deep bench of experts
- System for internal and external audits  
(compliance, certification, project and technical reviews, risk analysis)
- Process improvement
- Documenting successes and failures

# Endnote on QA and QC in survey research

- The process view is gradually accepted
- Research goals differ depending on traditions, cultures, and perceptions
- Interest increasing due to user recognition and "quality revolution"
- Astonishing lack of interest for some types of error sources