Example of Quantitative Research
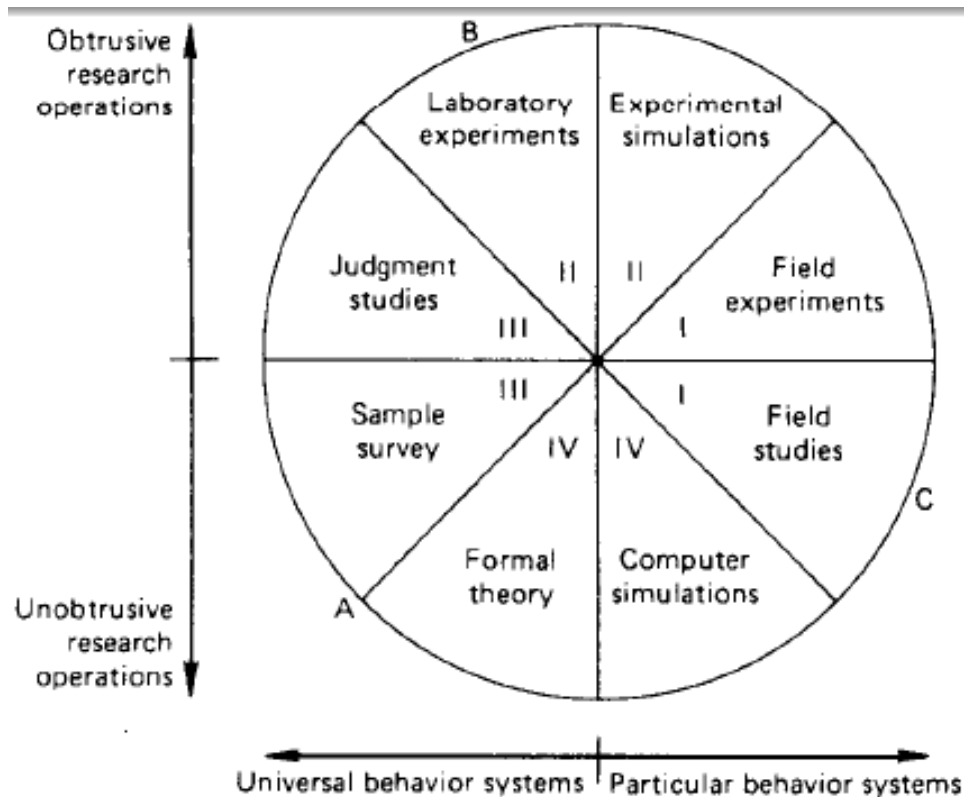
John Krogstie, Professor
Information Systems

IT-Topics 11/3-2015

Starting point

- Area of research – research traditions
- Research Question (s)
- Research method to respond to the research question
  - General/specific
  - Obtrusive or unobtrusive research
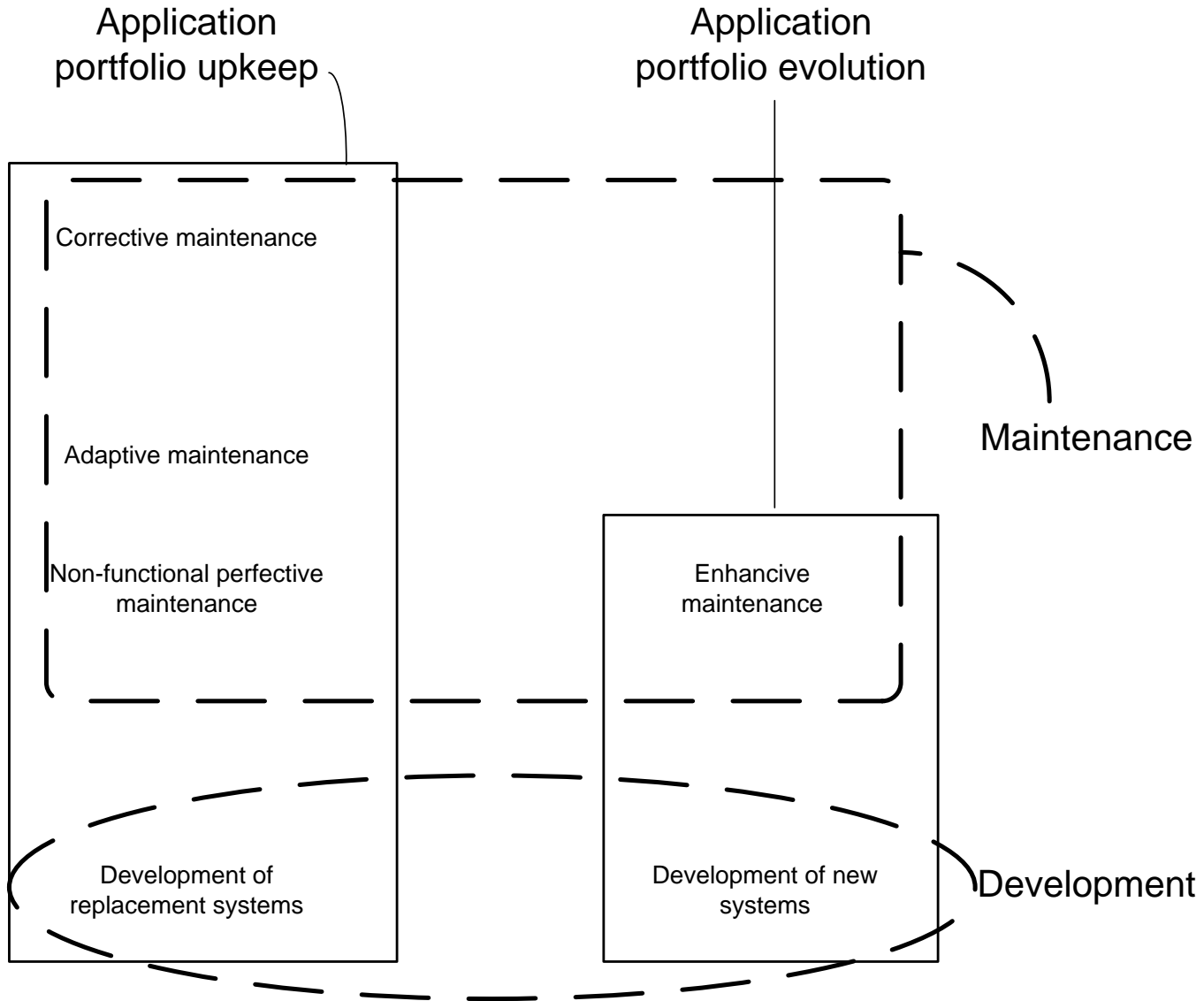- Research design

McGrath – Specter of research methods

I. Settings in natural systems.
II. Contrived and created settings.
III. Behavior not setting dependent.
IV. No observation of behavior required.
A. Point of maximum concern with generality over actors.
B. Point of maximum concern with precision measurement of behavior.
C. Point of maximum concern with system character of context.

Example – from article

- Setting: In Norway – Selected Norwegian organizations, use of resources in IT-department
- Survey: First time in 1993, then every fifth year (fifth time in 2013). Web-form with questions
- Lientz/Swanson-tradition (1977)
- H1: There is no difference between the percentage of maintenance time in our survey and what are reported in previous surveys.
- H2…

Short on the concrete research area

Application portfolio upkeep

Application portfolio evolution

Corrective maintenance

Adaptive maintenance

Non-functional perfective maintenance

Enhancive maintenance

Maintenance

Development of replacement systems

Development of new systems

Development

Points relative to research design

- Population-selection (member-organizations of Dataforeningen)
- Decide hypothesis
- Design survey form
- Pilot survey-form
- Implement surveyform in SurveyMonkey
- Send (and resend) invitation
- Select, clean and transfer data to SPSS
- Check characteristics of variables
- Do analysis relative to the hypothesis

Quantitative technique enable the use of statistics

- 40+ items (e.g. organizations in this case)
- The more the better (easier to find significant differences) - practical limitations
- Correlation vs causation
- Numbers are deceptive, enable analysis, but removes context (are the items really equal in the relevant dimension?)
- Tempting to use the data exploratory
- Takes skill to use statistics correctly, there is always another layer of statistical method discussion

Issues with survey investigations

- Population – Norwegian organization with own IT-activity
- Response rate
- Respondents (managers or developers)
- Equal understanding of concepts
- Biased questions
- Quality of data

Combining quantitative and qualitative techniques

- Cases to dig more deeply into one or a few specific cases (i.e. to check certain assumptions)

- Generalizability issue of case results

Some literature

- Wohlin C., Aurum A. (2014): Towards a decision-making structure for selecting a research design in empirical software engineering. Empirical Software Engineering Journal, Springer, 1-29

- Kitchenham, B.A., Pfleeger, S.A. (2002): Principles of Survey Research Part 2: Designing a Survey. ACM SIGSOFT Software Engineering Notes 27(1):18-20.

- Pinsonneault A., Kraemer K. (1993): Survey Research Methodology in Management Information Systems: An Assessment. Journal of Management Information Systems 10(2):75-105.

- McGrath, J. E. (1984). *Groups: Interaction and Performance*. Inglewood, N. J.: Prentice Hall, Inc.