Performance Measurement Systems in Engineering – Their Influence and Challenge

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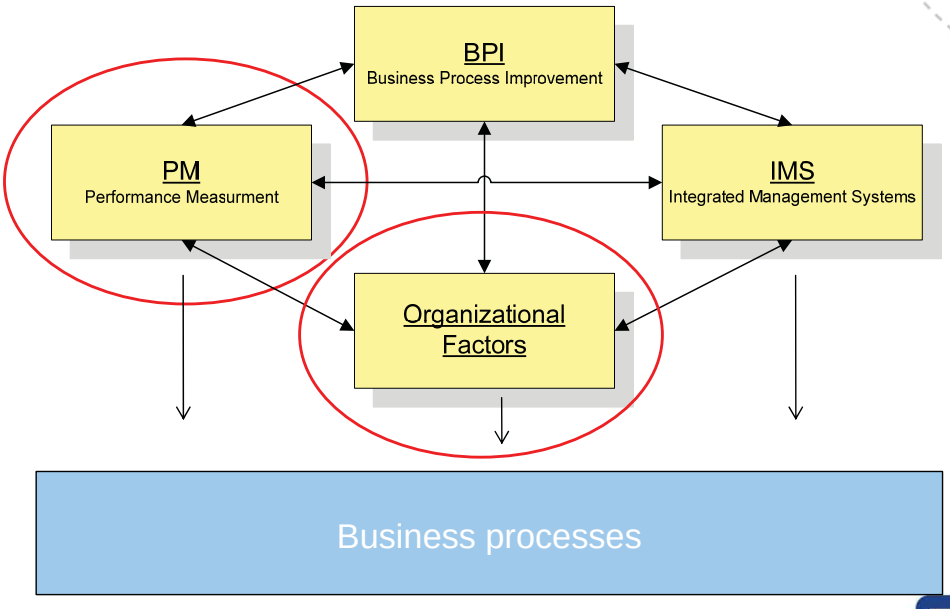
Thesis Overview -

"Improvement processes"



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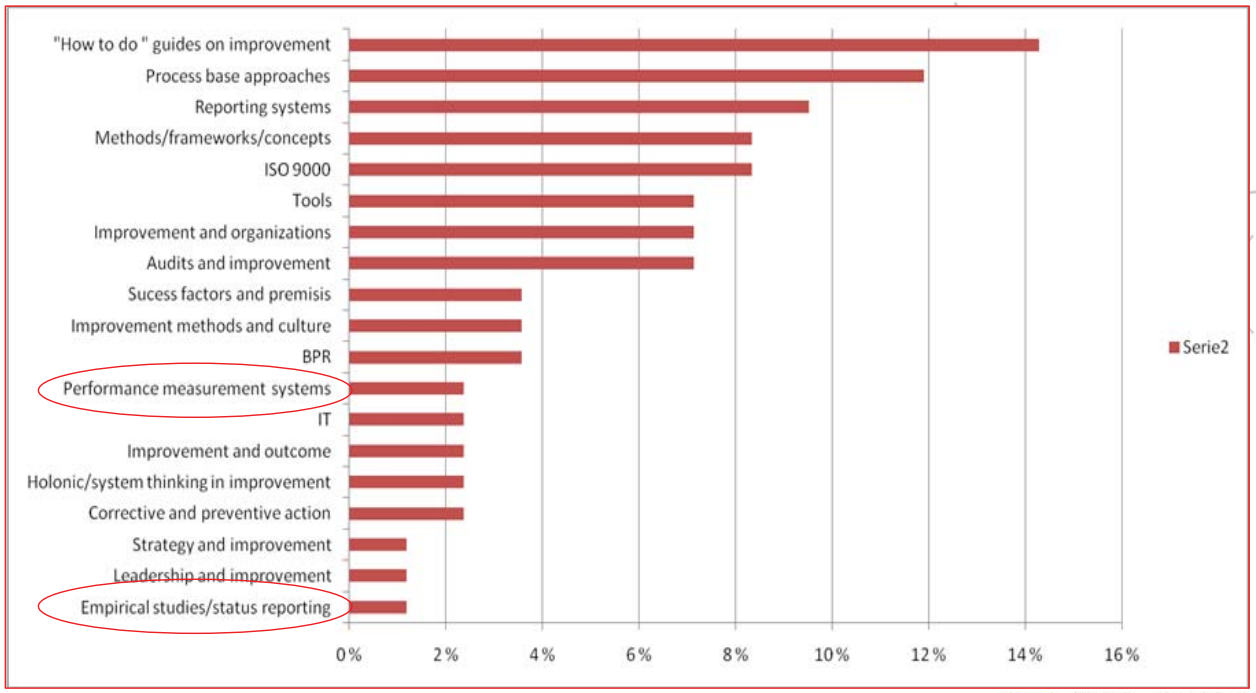
Background I, General

- The common perception in research is that performance measurement as a solution to company's management problems (Salter 2003)
- The concept of quantifying action
- Increased interest in performance measurement as a tool for management (Bourne 2005)
- "When you know what to improve, you have to know how well you are performing"
- Close connected to improvement and quality tools, techniques and processes

Methodologies, techniques, tools



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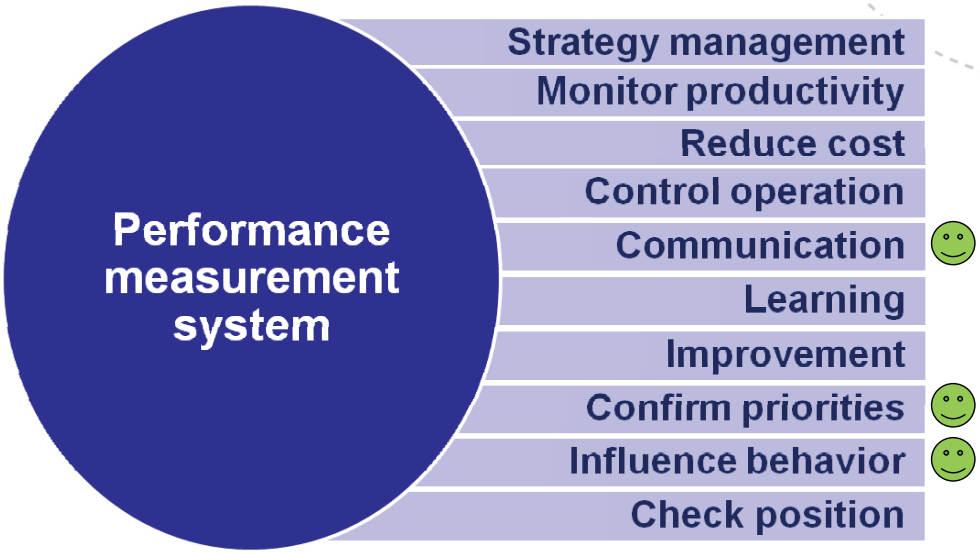
Methode

- Literature review
  - Performance measurements and performance measurement systems
  - Performance measurements in engineering
- Research question
- Survey
  - Web-based questionary, to all project members
  - At to different stages
  - Single factor and multiple regression analysis

Research

- Performance measurement in general:
  - Poorly understood, and not yet been sufficiently explained or shown the necessary attention in research
  - Wide range professional approaches and contribution to the subject
- No common definition
- Focusing on the ”design” and ”implementation”
- Away from financial accounting (cost no longer the most important competitive advantage) to increased interest on critical success factors, shortcomings and challenges
- The effect have in research been debated

Why performance measurement?



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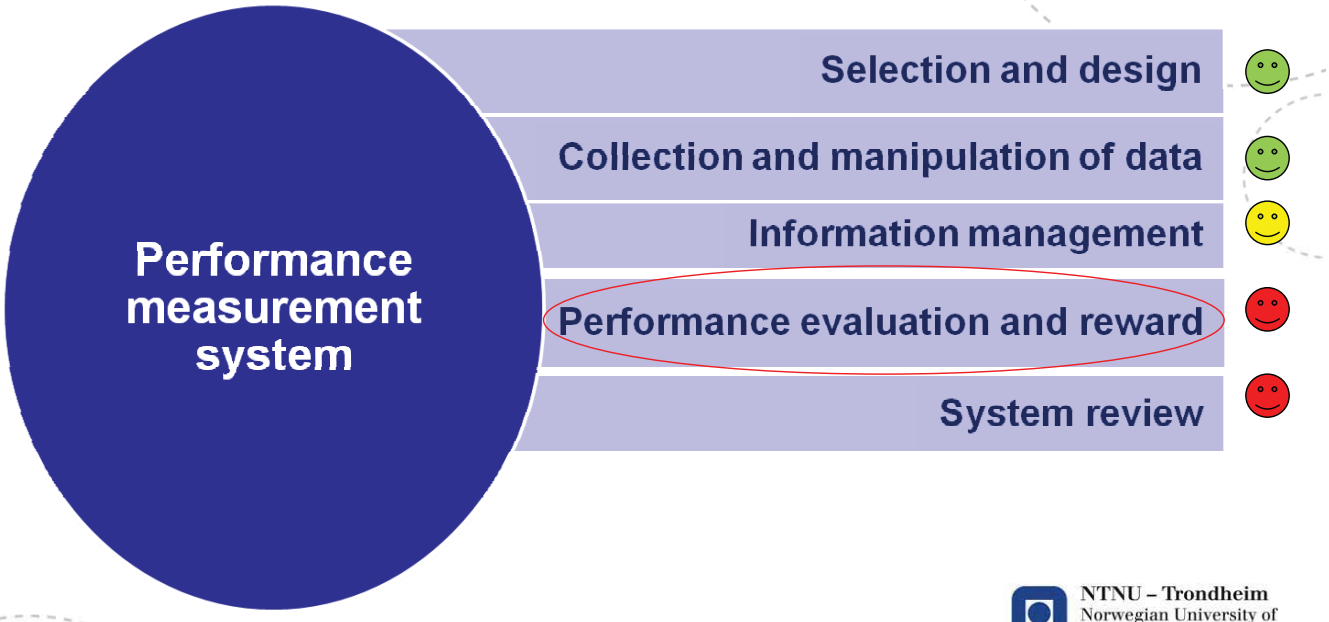
The processes



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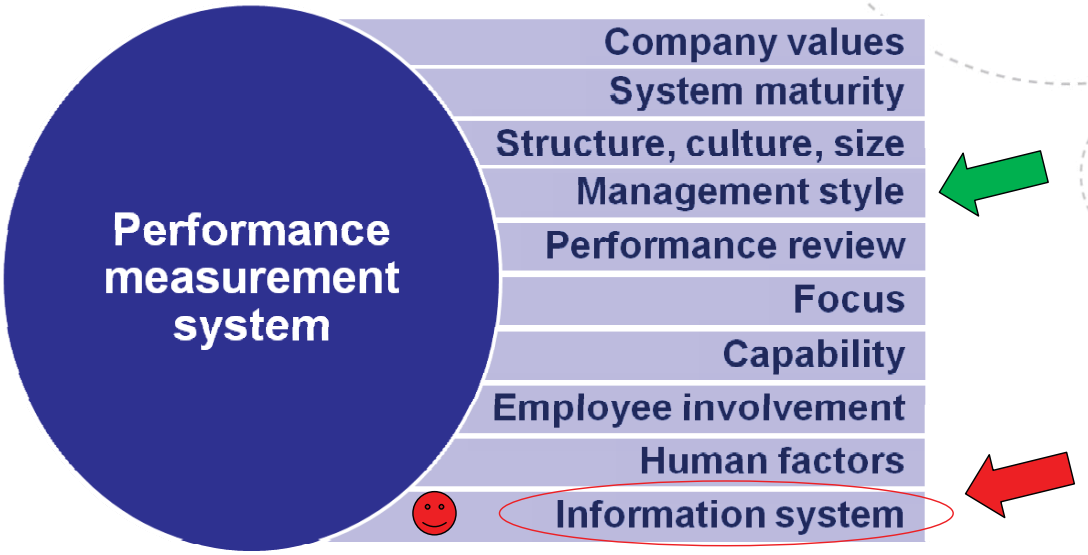
Critical success factors



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Shortcomings & Challenges

- Suited for monitoring and control
- Static
- Not prognostic or preventive measures
- Short-termism
- Lack of strategic focus
- Local optimization
- Lack of information on customer needs

(Neely 2005, Ghalayini 1996)

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Background II, Engineering

- Strong correlation between cost overrun and poor engineering/design performance in projects (Salter 2003)
- Complexity, natural inbuilt unpredictability and hidden knowledge-based processes that's makes them difficult to plan, manage and improve (Johnsson 2008)
- Prejudiced view of experts and others on engineering, claiming that errors and quality problems almost always have their origin in the engineering phase (Chao 2003).

Review Characteristics

Performance Measurements in Engineering

- Focusing on non-financial metrics
- No common model for engineering
- Less focus on improvement and measurements in research on engineering projects
- "How" to establish
- Cost and time focus
- The importance overestimated
- What's easy to measure

Performance Measurement challenge in Engineering

- Engineering's effect on project as a whole/stages
- Feedback in general - “unreliable”
- Feedback from customers
  - Lack of systems
  - Too late
- Introduction of more qualitative measures
  - Time used for correcting errors
  - Number of errors discovered and the number escaped
  - Time as an indicator, is useful and an appropriate indicator to provide early warnings

(Walter 2003)

Review summary

- About trade-offs and “no right answer”
- Continuous improvement one of many objectives
- Which measure to establish is not always obvious (Neely 1999)
- The need and relevancy will change over time (Neely 1999)
- Models are all suitable, depending on purpose and approach (Lin 2007)
- No common model for engineering
- Feedback and effect on projects the main challenge in engineering

Questions……

- Is existing research applicable and suitable for performance measurements in engineering?
- Do we find the same the effects, opportunities and obstacles in engineering ?
- Does performance measurements facilitate improvement activities in engineering?

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Survey

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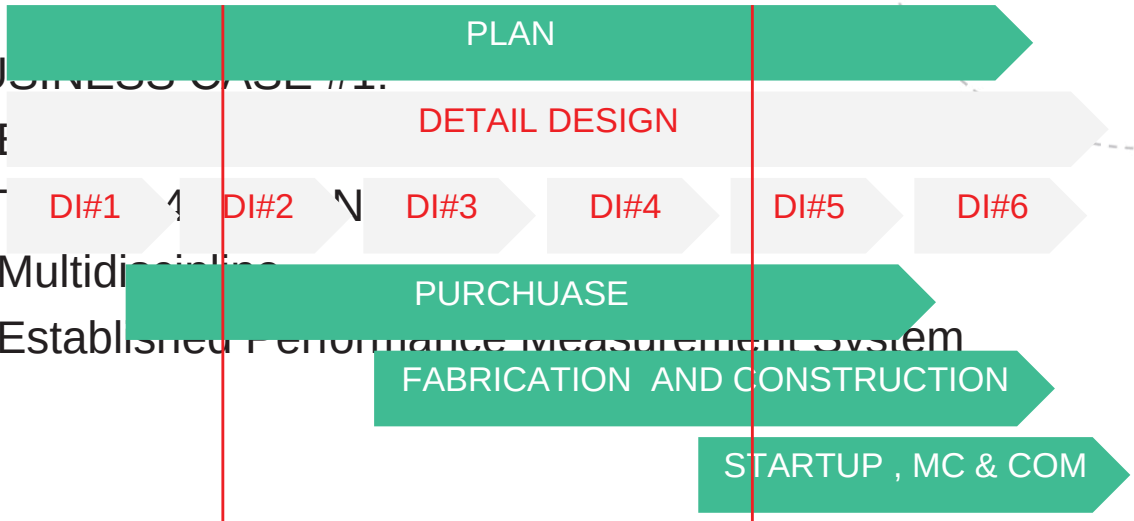

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Findings, correlation analysis

	Areas affected most	Affect	Ind	Areas little affected	Affect	Ind
Early stage of project	Profitability Project objectives (goals) Attitude/influence behaviour Teamwork (within the discipline)	(+) (+) (+) (+)	LA LA LE LE	Control Improvement	(+) (+)	LE LE
Late stage of project	Project objektives (goals) Profitability Improvement Teamwork (within the discipline)	(+) (-) (+) (+)	LA LA LE LE	Attitude/influence behaviour Feedback/monitoring Control	(-) (+) (-)	LE LE LE
Change of affect during project	Attitude/influence behaviour Control	(-) (-)	LE LE	Project objectives (goals) Improvement	(-) (-)	LA LE

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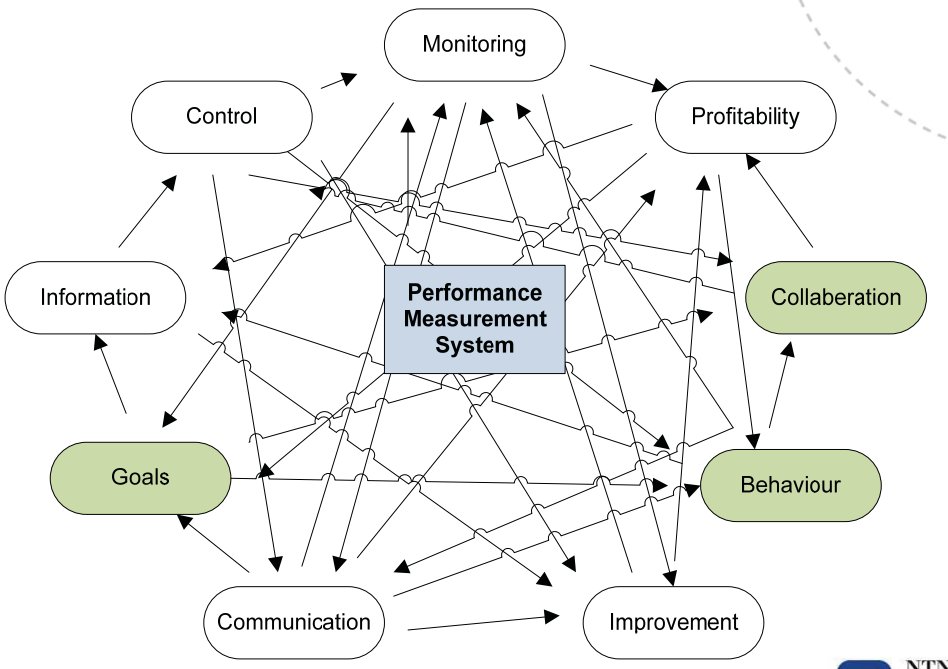
Multiple factor analysis, early stages



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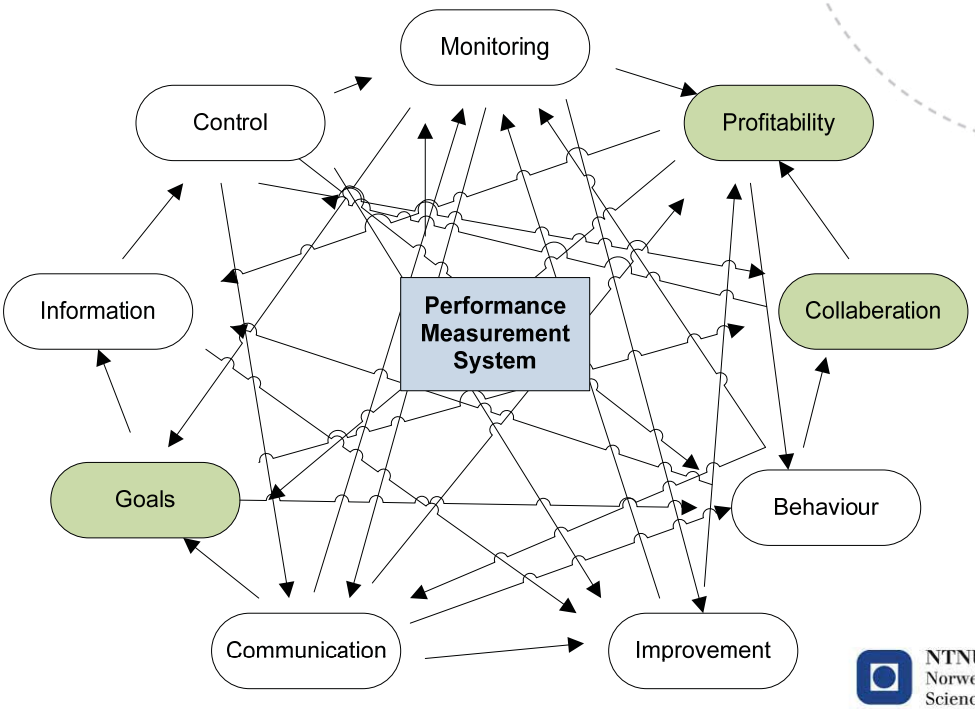
Multiple factor analysis, late stages



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Results

Significant findings on:

- Performance measurements influence in engineering projects change and vary over time
- Improvement and feedback mechanisms less influenced by performance measurements
- Performance measurement facilitate goal achievement through behavior and multidiscipline collaboration
- Behavior less influenced at late stages, and replaced with monitoring activities and focus on efficiency and productivity

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Conclusion I

- Research is contradictory
- "They all are suitable, depending on purpose and approach, and could act as "means of surveillance, motivation, monitoring performance, stimulate learning and control"
- Our exploratory survey indicates that this may not be the case in engineering projects:
  - Engineering are fragmented, performance measurement systems are less suited as basis and no universal remedy to improvement
  - Confirms and indicates the need on non-financial metrics

Thank you for your attention.

"Not everything that can be counted counts, and not everything that counts can be counted. "

Albert Einstein