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Assessing Product Development Efficiency at Volvo Powertrain

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BACKGROUND

Assessing Product Development Efficiency

PEOPLE PROJECT

PRODUCT PROCESS

Efficiency
Lead-Time
Innovation
Satisfaction
Product Quality

Case: New Type of Assessment

- Idea:
  - Use smart statistics to gain more diagnostics from PD
  - Involve employees to get their perspective and commitment
- Hypothesis:
  - Employee surveys and PLS analyses can boost PD assessments by finding improvement areas with high impact on performance
- Purpose:
  - Supporting companies in prioritizing improvement areas that matter, i.e. provide “more bang for the buck”

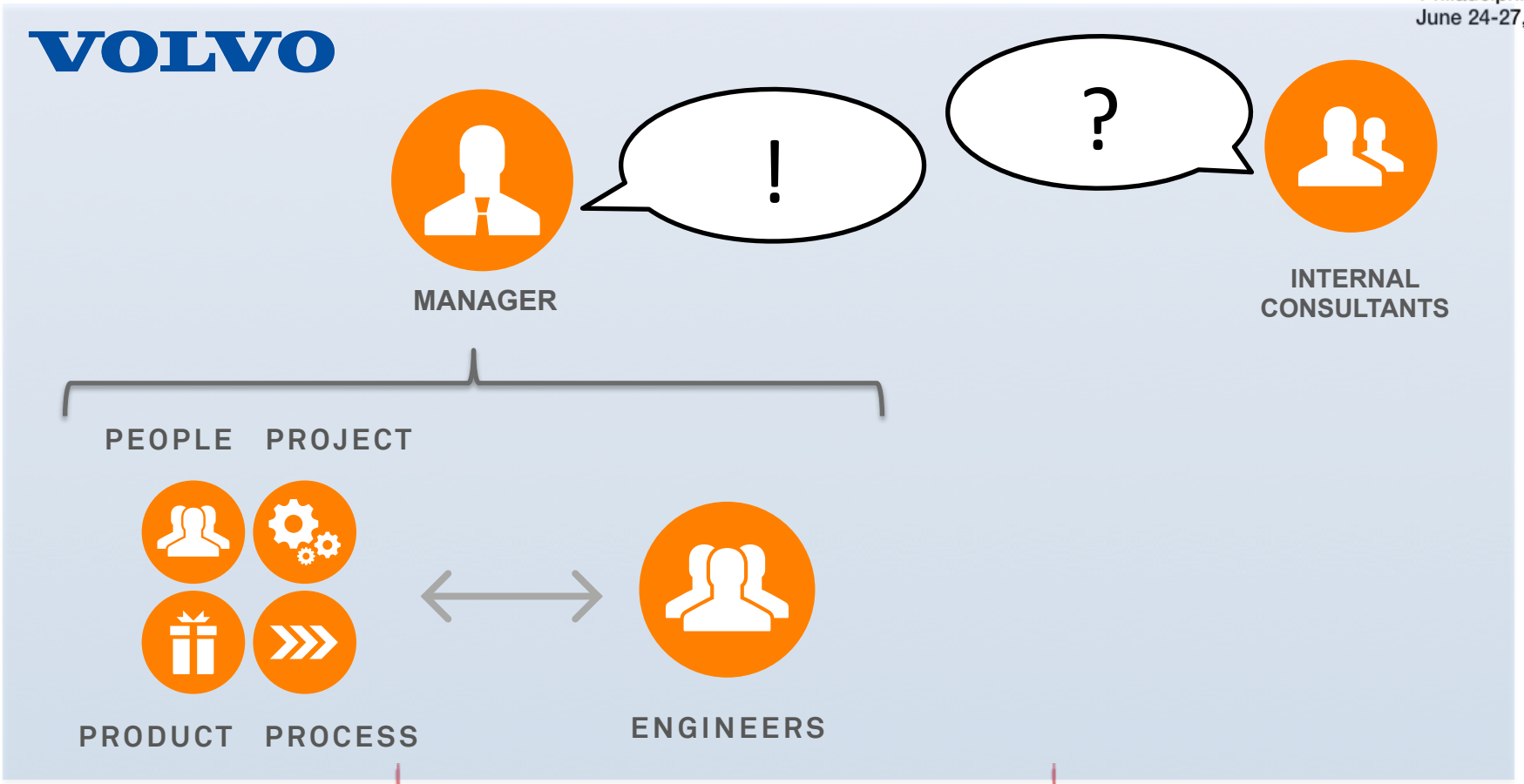
Case Company: Volvo Powertrain

- Part of Volvo Group
- R&D and Manufacturing
- Make automotive drivetrains
- Multiple sites with 1000 engineers

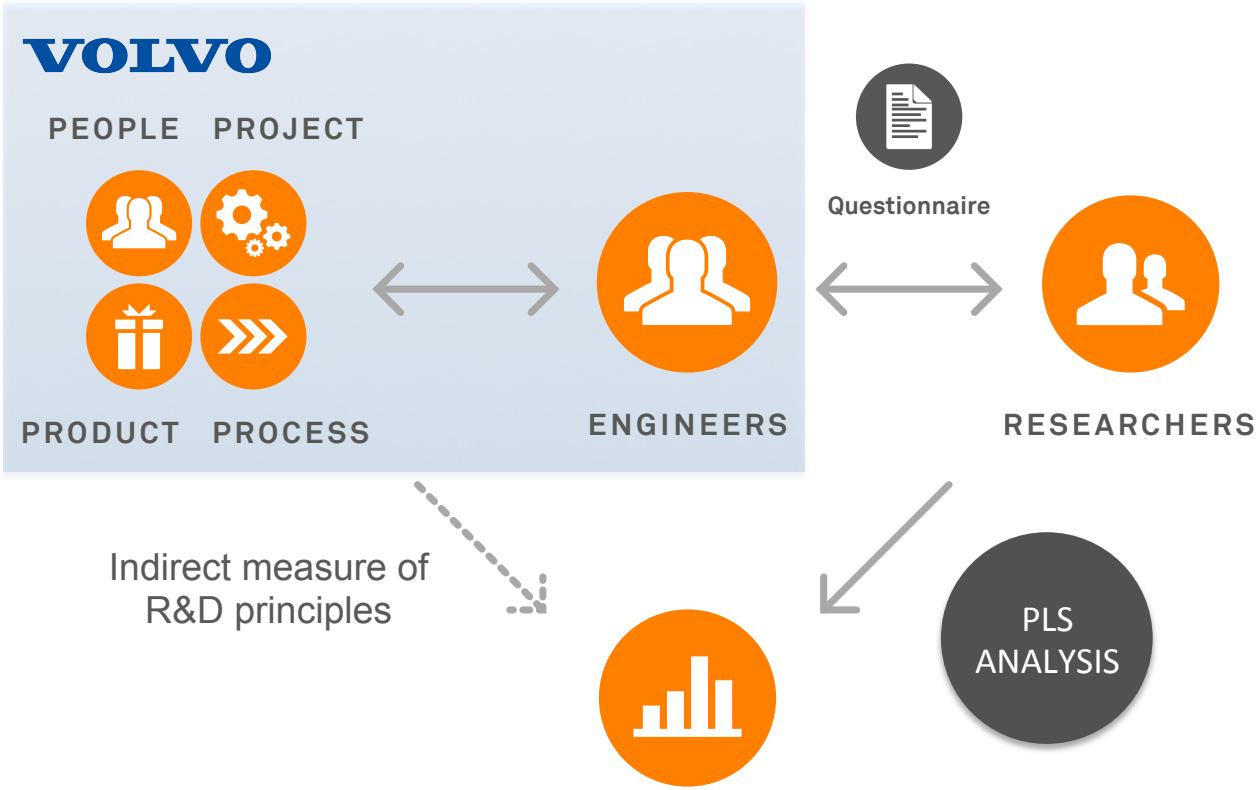
Process Improvements at VPT

- Continuous improvements and large process updates
- Have principles for effective R&D
- Use assessment by internal consultants:
  - Based on interviews with managers
  - Works well, but:
    - Costly
    - Only management perspective
    - Subjective analysis and prioritization of actions

Interview-Based Assessments



Case: Survey-Based Assessments



x2 Sites

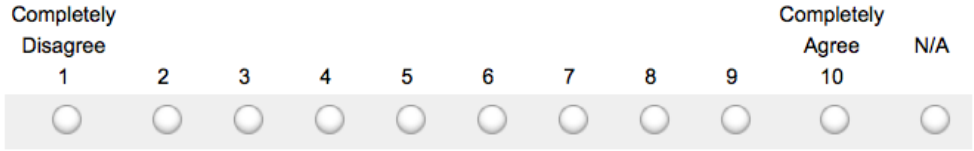
Survey – Meaurement Model

Measured Principles:

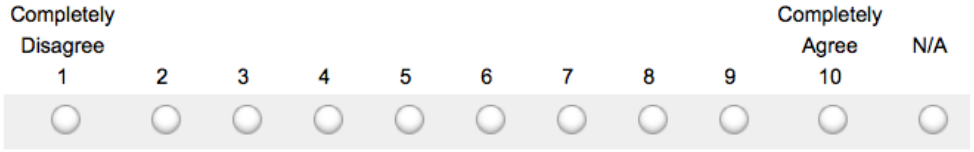
[GOT]	Goal Oriented Team	**[CE]**	Concurrent Engineering
[CFW]	Cross-Functional Work	**[ProjAP]**	Project Assurance Practices
[ORGD]	Organizational Design	**[PS]**	Pull Systems
[V&C]	Visualization and Communication	**[RF]**	Resource Flexibility
[QC]	Quality Culture	**[PPM]**	Project Portfolio Management
[ProdAP]	Product Assurance Practices	**[SWOW]**	Standard Way of Working
[ASOP]	Assured Start of Production	**[PS]**	Process Simplicity
[EVC]	Extended Value Chain	**[PS&M]**	Product Standardization and Modularization
[FLPD]	Front-Loaded Product Development	**[CM]**	Competence Management

Sample Questions

Q12: There are well described and structured guidelines to accomplish routine tasks.



Q22: We identify and manage product deviations early and effectively.



(74 in total)

What is the Impact on Performance?

Principles	
[GOT]	Goal Oriented Team
[CFW]	Cross-Functional Work
[ORGD]	Organizational Design
[V&C]	Visualization and Communication
[QC]	Quality Culture
[ProdAP]	Product Assurance Practices
[ASOP]	Assured Start of Production
[EVC]	Extended Value Chain
[FLPD]	Front-Loaded Product Development
[CE]	Concurrent Engineering
[ProjAP]	Project Assurance Practices
[PS]	Pull Systems
[RF]	Resource Flexibility
[PPM]	Project Portfolio Management
[SWOW]	Standard Way of Working
[PS]	Process Simplicity
[PS&M]	Product Standardization
[CM]	Competence Management

?

Performance

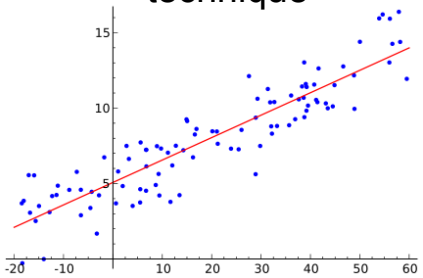
- Efficiency/Effectiveness
- Lead-Time
- Innovation
- Satisfaction
- Product Quality

ABOUT THE PLS ANALYSIS

Analysis Using SEM-PLS

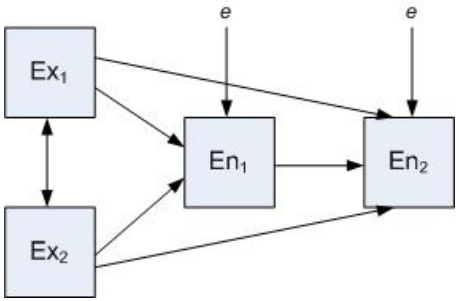
- SEM: Structural Equation Modelling
  - Analyzes multiple variables simultaneously
  - Second-generation statistical method

First-generation technique



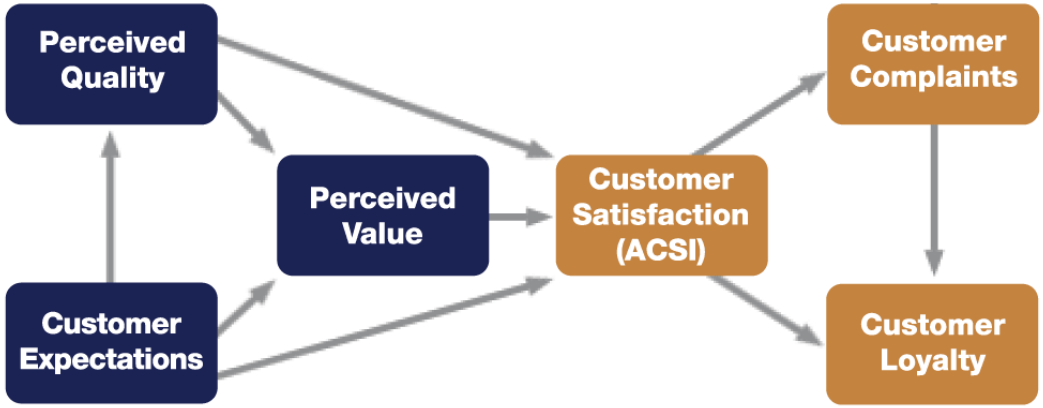
- PLS: Partial Least Squares
  - Exploratory SEM, finds relationships
  - Robust despite small samples
  - Robust to assumed structural model

Second-generation technique



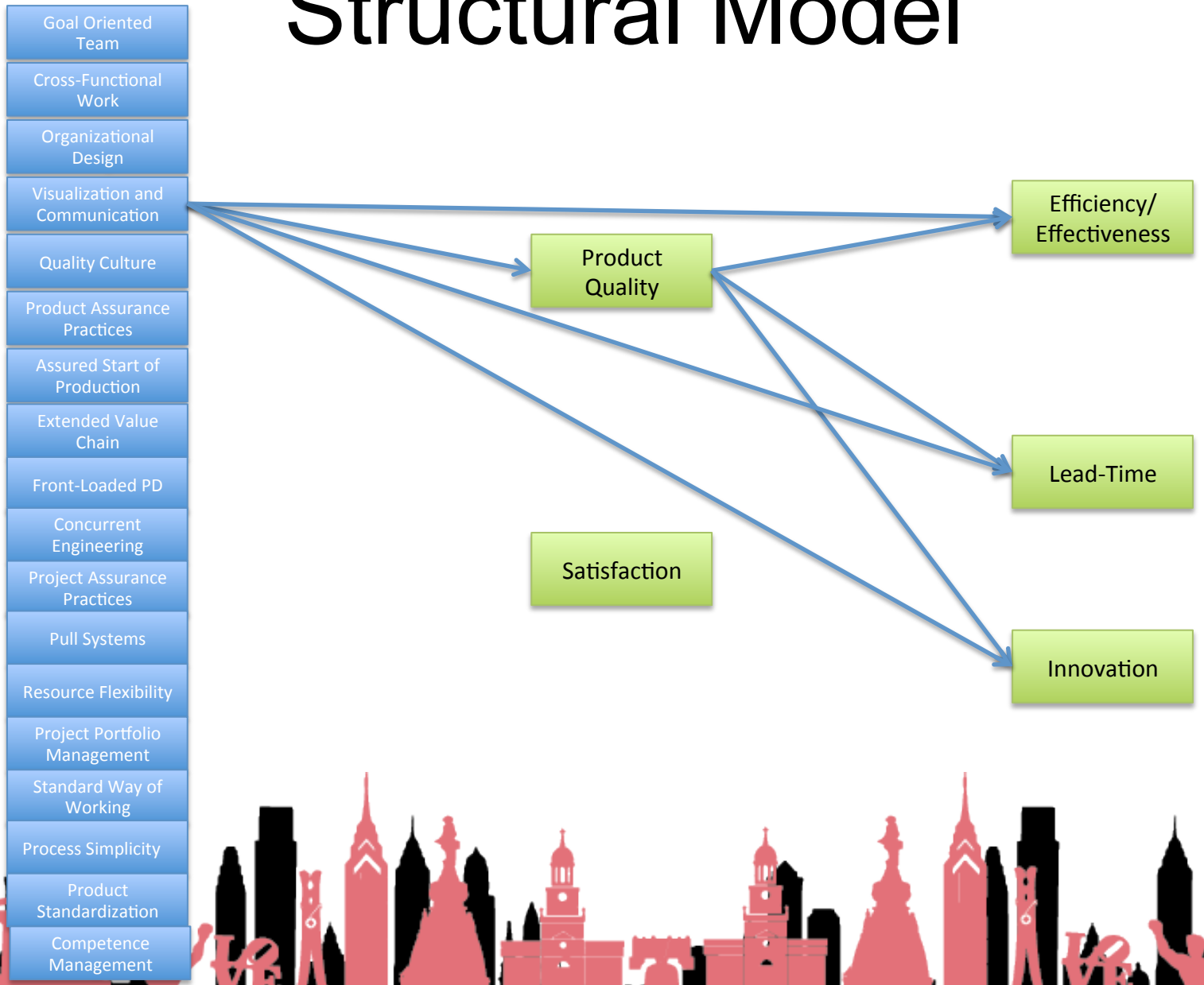
Structural Model

- Commonly used for Customer Satisfaction Assessments:



http://www.theacsi.org/images/stories/images/about/model_lg.gif

Structural Model



RESULTS

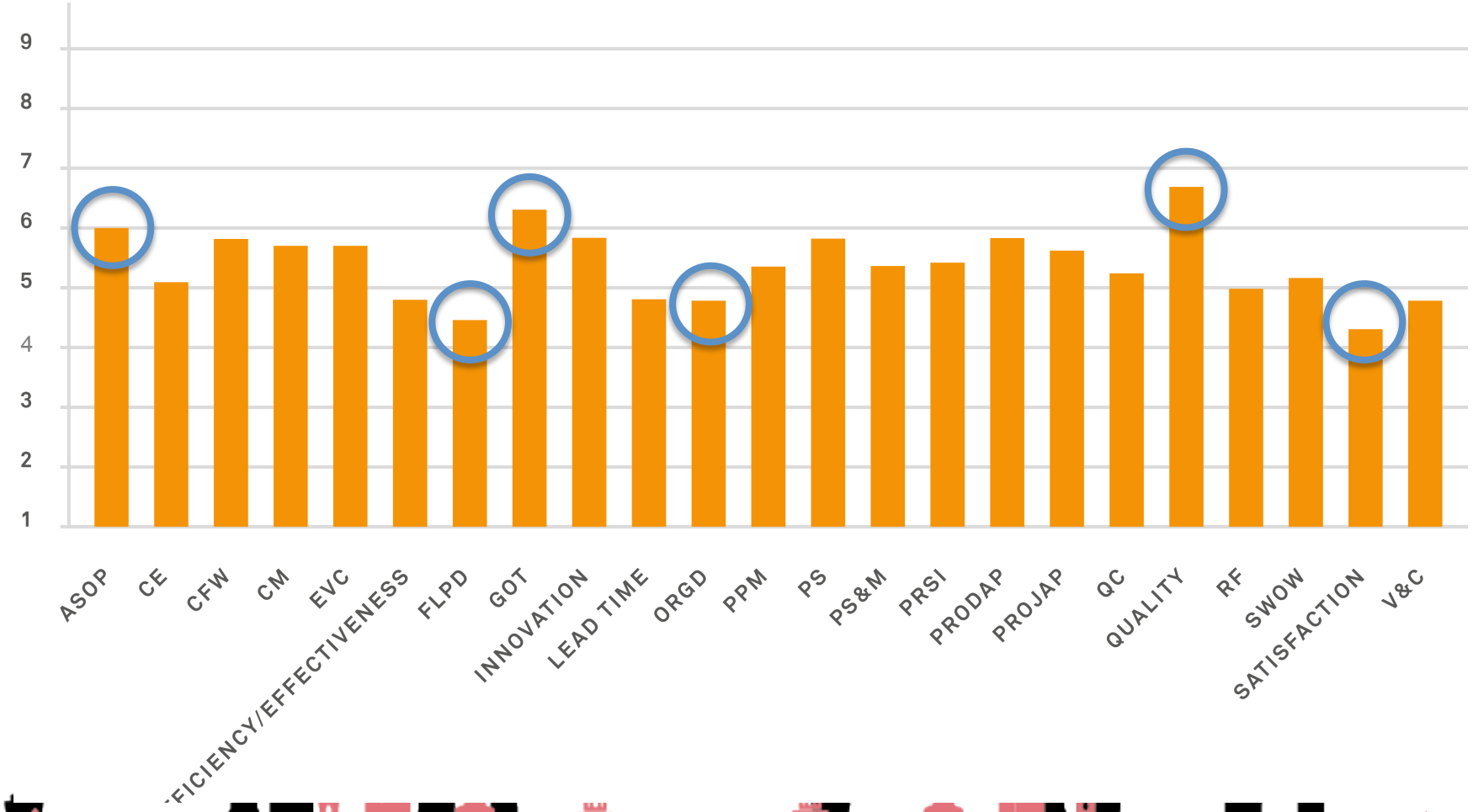
Index Values
Impact Analysis
Improvement Potential

Results

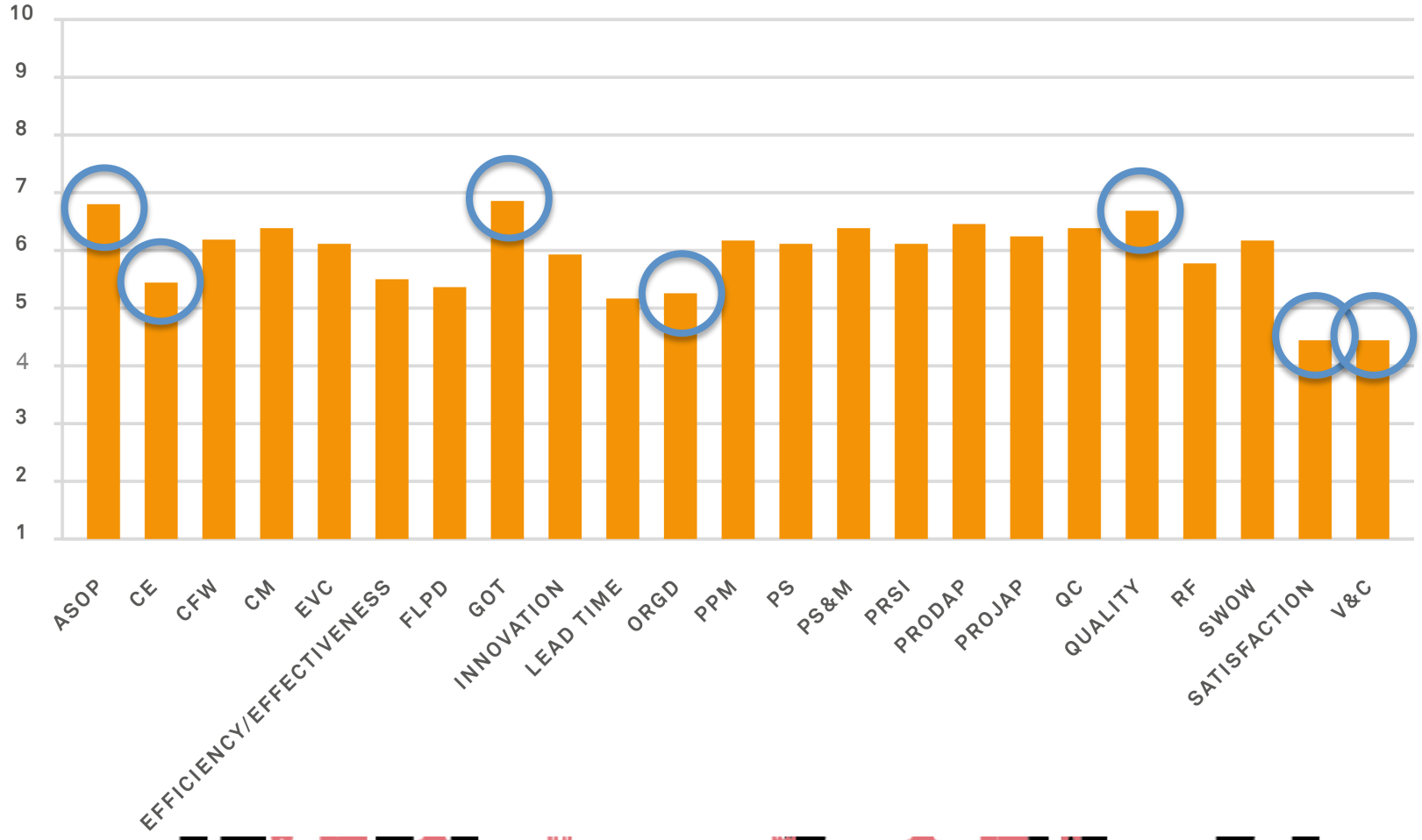
- Response rates:
  - Site 1: 43% 477/1090
  - Site 2: 66% 133/200

INDEX VALUES

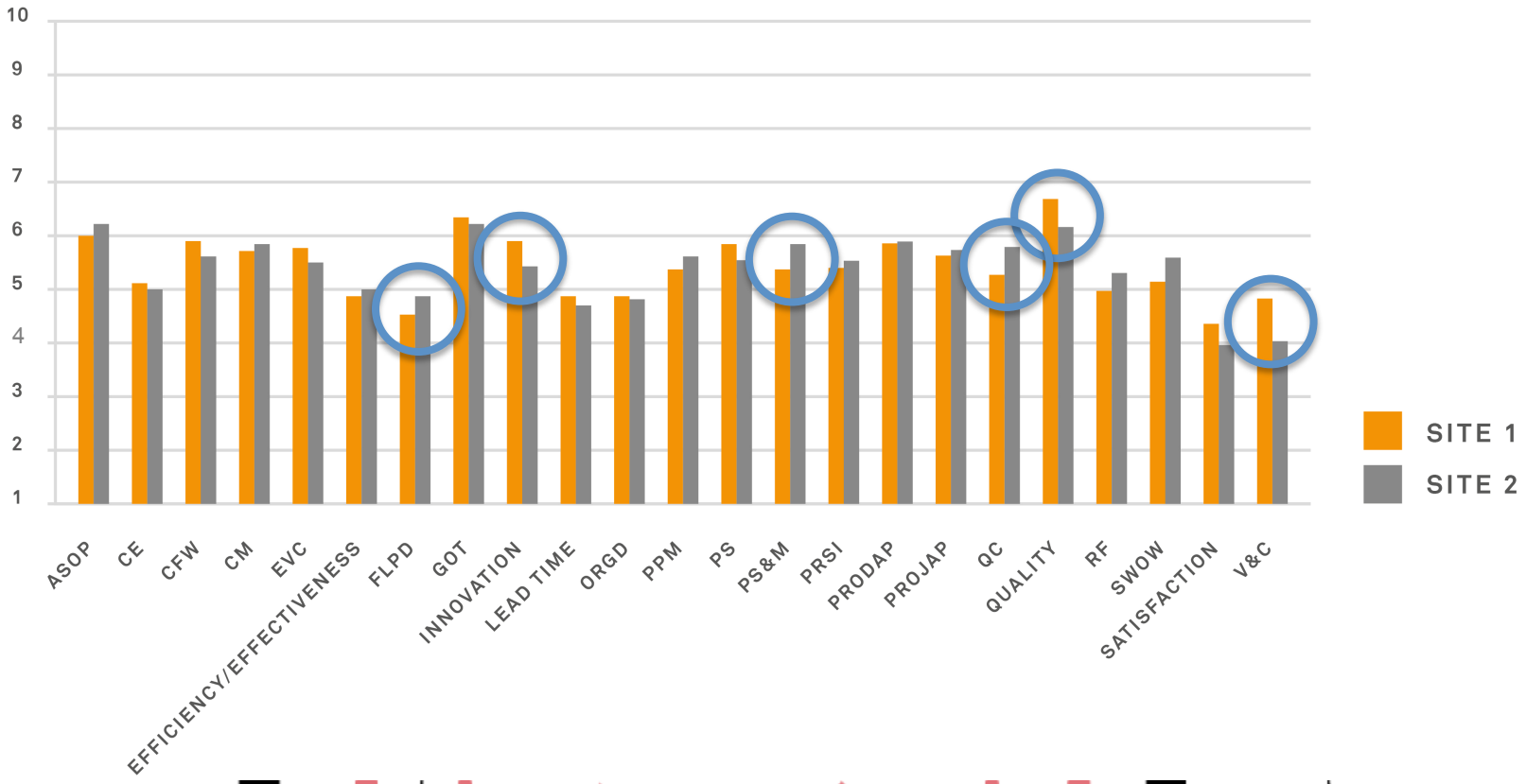
Results - Index Values



Results - Index Values



Results - Index Values



Preliminary Conclusion

Site 1 needs to improve:

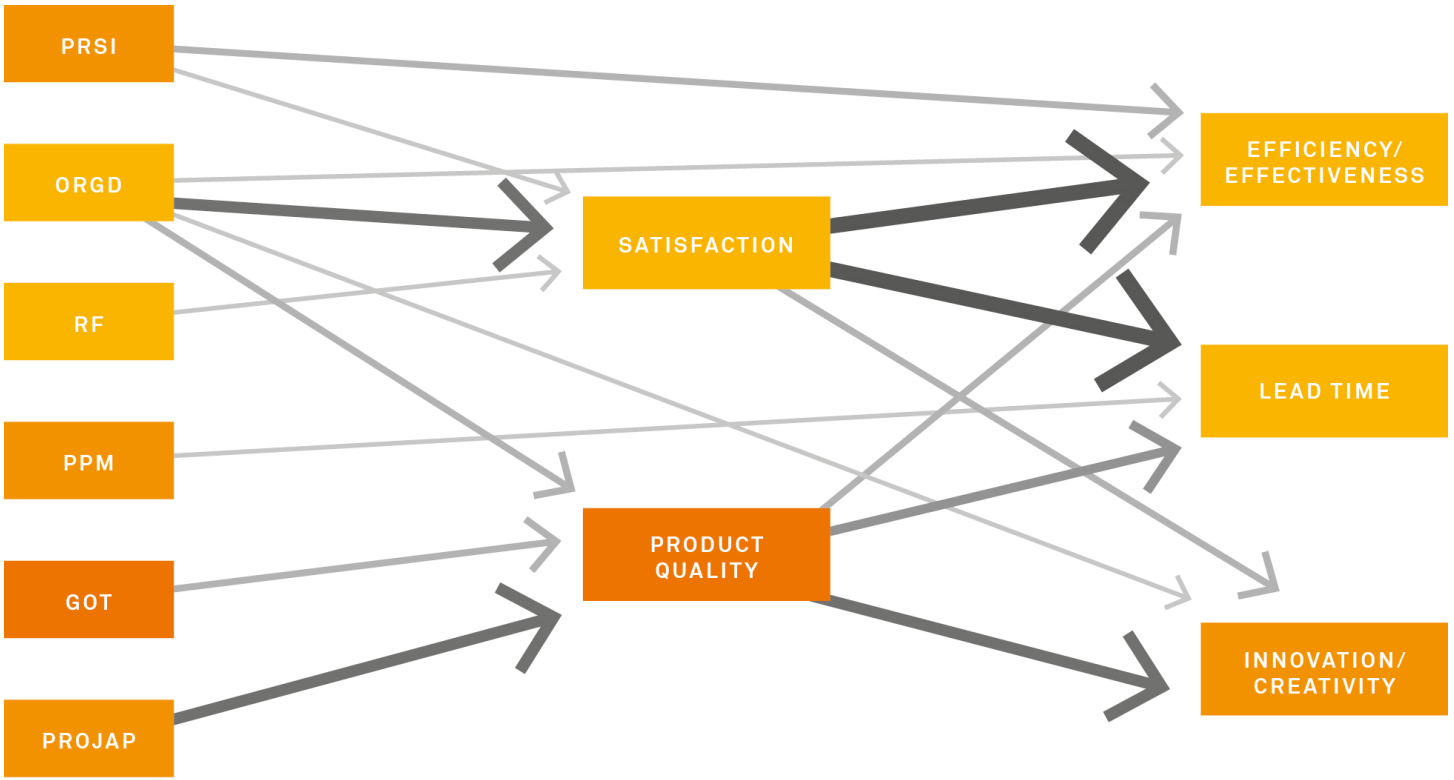
1. Front-loaded PD
2. Organizational Design
3. Visualization and Communication

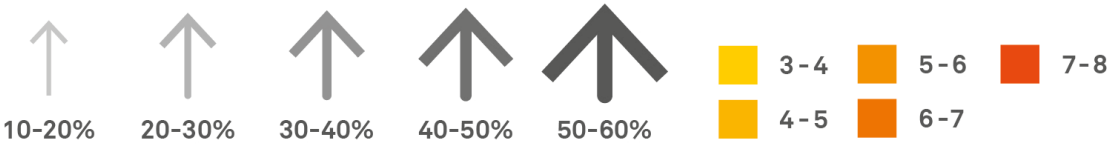
Site 2 needs to improve:

1. Visualization and Communication
2. Organizational Design
3. Concurrent Engineering

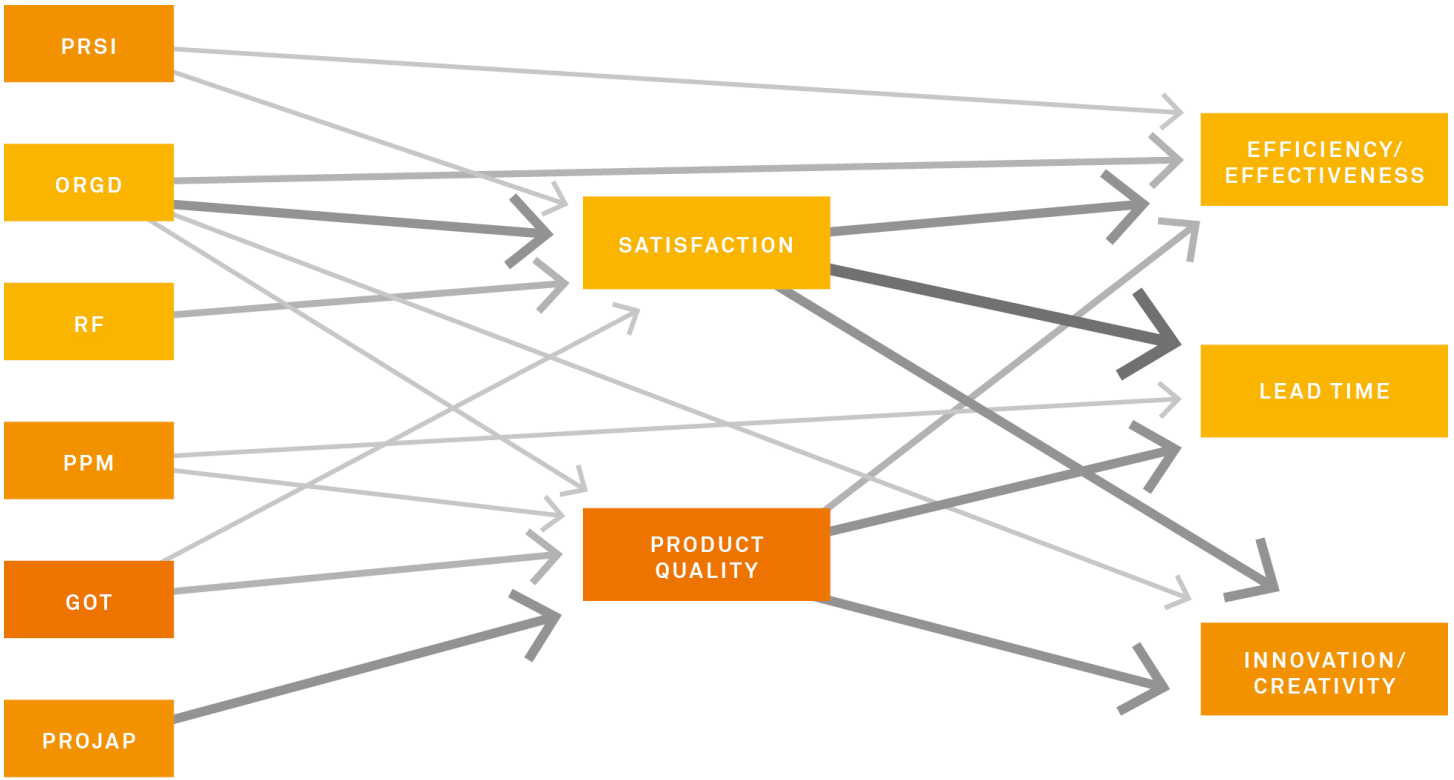
IMPACT ANALYSIS

Impact Analysis – Site 1



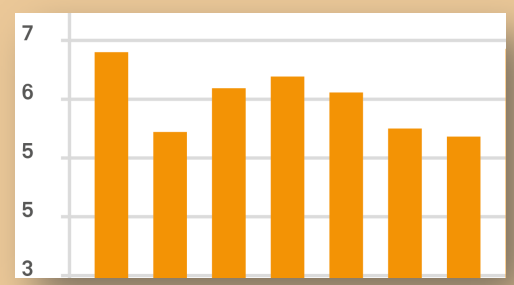


Impact Analysis – Site 2



Preliminary Conclusion 2

	From Index Values	From Impact Analysis
Site 1	1. Front-loaded PD 2. Organizational Design 3. Visualization & Communication	1. Organizational Design 2. Project Assurance Practices 3. Process Simplicity
Site 2	1. Visualization & Communication 2. Organizational Design 3. Concurrent Engineering	1. Organizational Design 2. Goal-Oriented Team 3. Project Assurance Practices

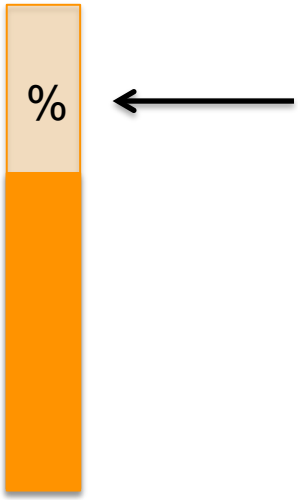


IMPROVEMENT POTENTIAL

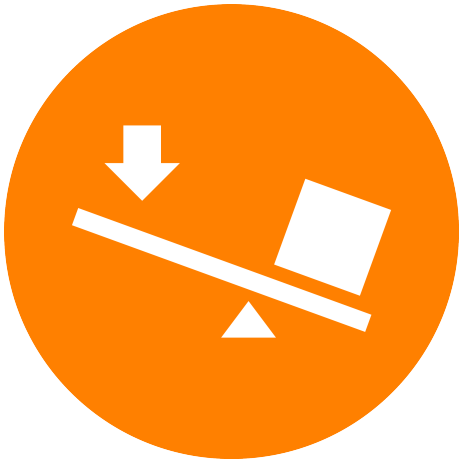
Results - Improvement Potential

- Combination of Index and Improvement:

$IP_i = (10\text{-}index_i) / 10 \quad * \quad impact_i$



x



Improvement Potential Site 1

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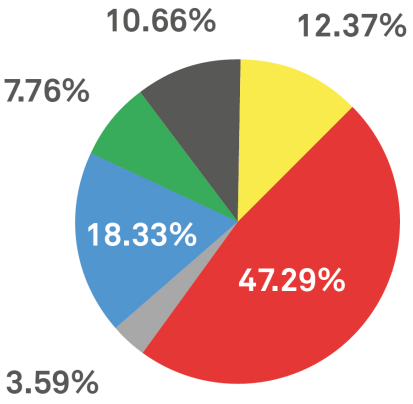
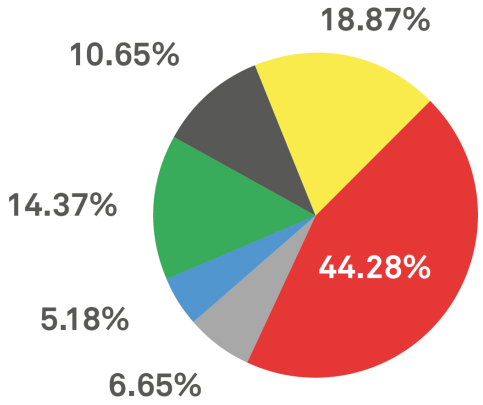
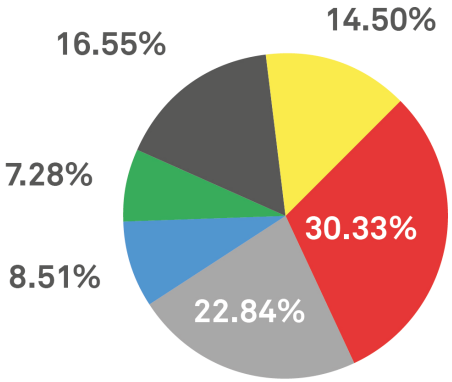
EFFICIENCY



INNOVATION



LEADTIME



GOT PPM PROJAP
ORGD PRSI RF

Improvement Potential Site 2

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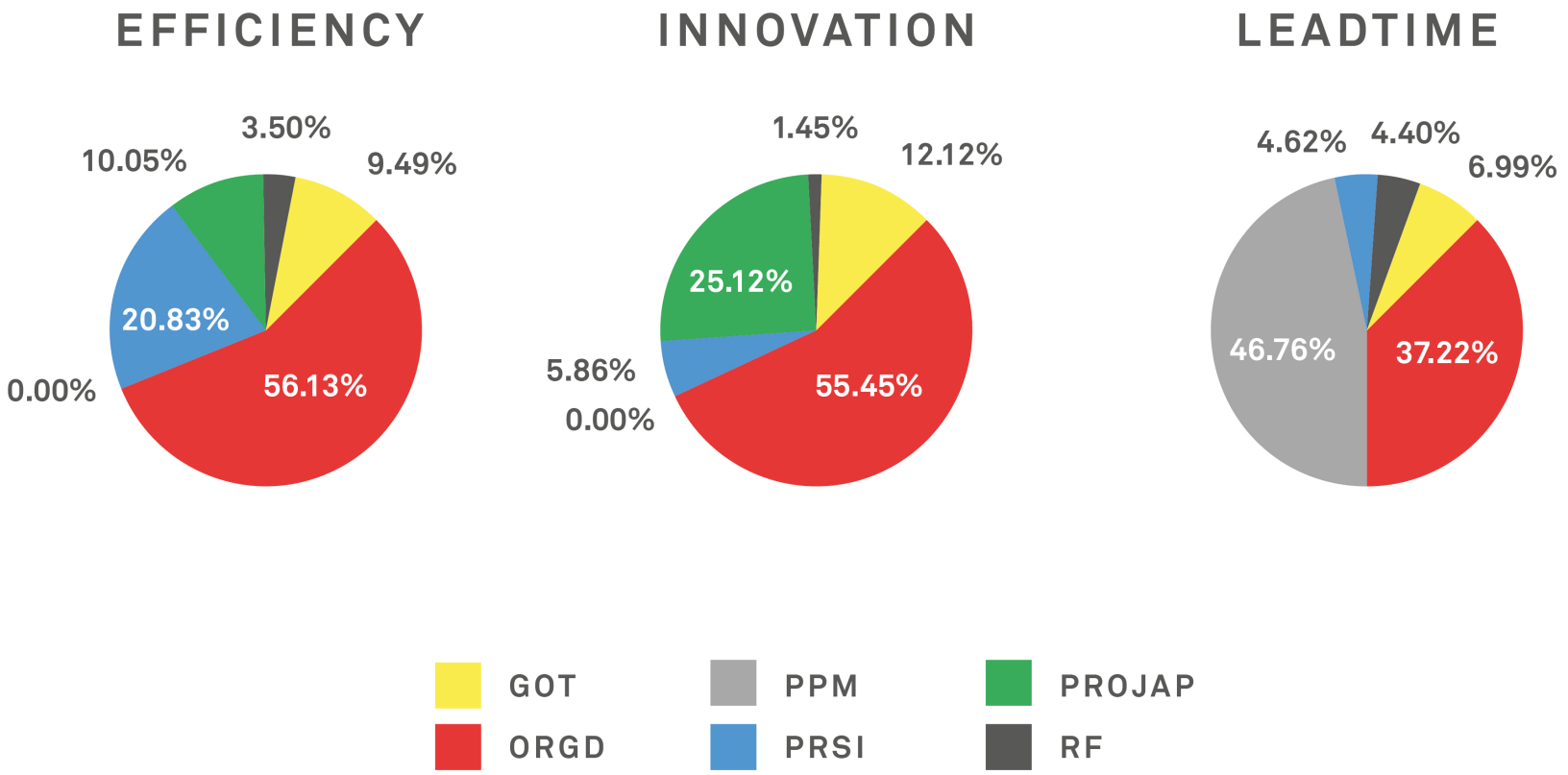

CONCLUSION

Evaluation of the survey/PLS methodology

Conclusions from the assessment

Conclusions

Conclusion

- The analyses provide different perspectives:
  - Index:
    Strengths & weaknesses
  - Impact:
    Relationships between principles and performance outcomes
  - Improvement potential:
    Easy targets to reach specific goals

Index, Impact & Improvement

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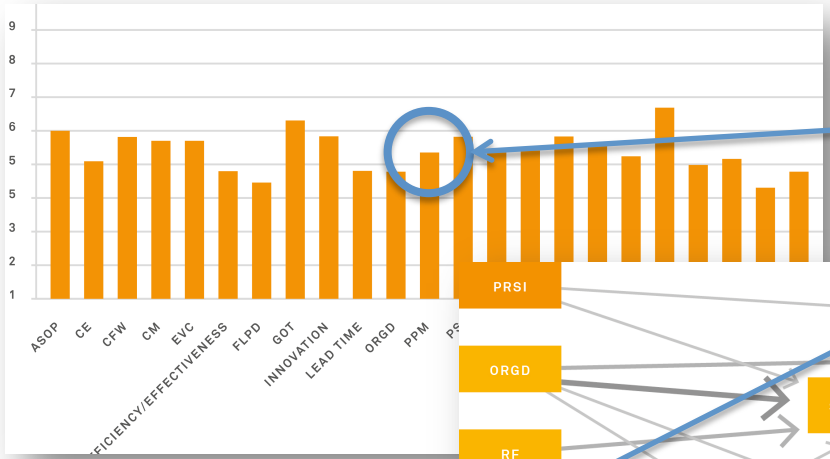
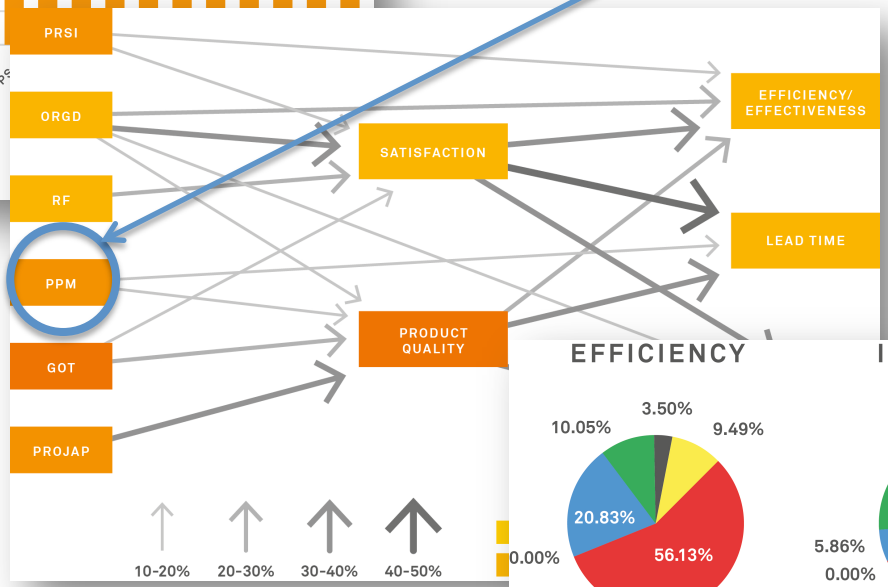
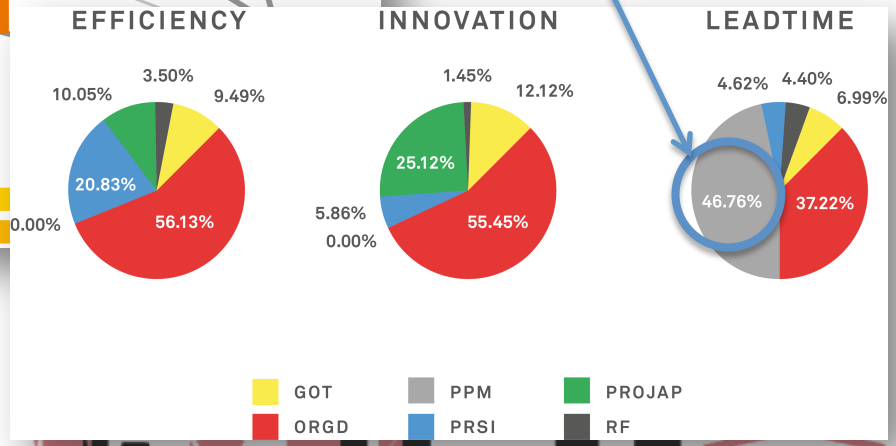
Example: Project Portfolio Mgmt at Site 2







Conclusion (cont'd)

- Results seem realistic:
  - Project Portfolio Mgmt → Leadtime
  - Organizational Design → Everything
  - Process Simplicity → Efficiency
  - Proj. Assurance Pract. → Innovation
  - Goal Oriented Teams → Everything
  - Resource Flexibility → Leadtime

Conclusion for Volvo

Site 1 - Focus on:

1. Organizational Design
2. Goal-Oriented Teams
3. Resource Flexibility

Site 2 - Focus on:

1. Organizational Design
2. Project Portfolio Management
3. Process Simplicity

Future Work

- Seed funding in order to offer a commercial version
- Reworked model for quick-assessment
- PDi3-booth next to the dining area (A1)
  - Look for orange…

THANK YOU!