

IGLC 28

BERKELEY, CA 6-12 JULY 2020

28th ANNUAL CONFERENCE OF THE
INTERNATIONAL GROUP FOR LEAN CONSTRUCTION

Use of complaint records of maintenance departments for continuous improvement



Jordana Bazzan

Ph.D. Candidate, Postgraduate Program in Civil Engineering (PPGCI).



Carlos Torres Formoso

Professor, Postgraduate Program in Construction and Infrastructure (PPGCI).



Márcia Echeveste

Professor, Postgraduate Program in Industrial Engineering (PPGEP).

Federal University of Rio Grande do Sul, Porto Alegre, Brazil.

INTRODUCTION

Research Problem

Quality management system are still **ineffective!!**

High number of costumer complaints in the housebuilding market, resulting in waste, high repair costs, and a negative impact on customer satisfaction.



Continuous Improvement

Improvement opportunities must be identified.
It is necessary to follow and assess product performance.

Customer complaints records

It is not enough explored by housebuilding companies;
Unstructured data collection;
Quality indicators rarely provide useful information.



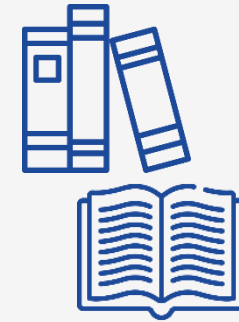


INTRODUCTION

Research Problem

Articles previously published at IGLC:

- Most studies aim to improve production and design management.
- Very few studies on quality evaluation from the perspective of customers.



Importance

- Eliminating defects and complaints is a typical target in Lean implementation programs. However, there are usually customer complaints that should be managed and provide feedback.
- Customer service can contribute to create positive relationships with customers and generate value



IGLC 28

BERKELEY, CA 6-12 JULY 2020

28th ANNUAL CONFERENCE OF THE
INTERNATIONAL GROUP FOR LEAN CONSTRUCTION

RESEARCH OBJECTIVE

This research investigates how
to use the complaints records as
a source of learning for
continuous improvement in
quality management systems of
construction companies





RESEARCH METHOD

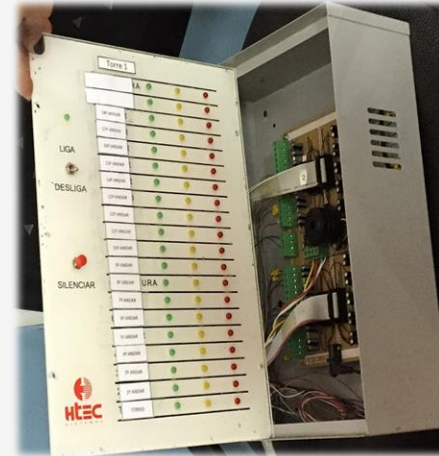
Large Brazilian Housebuilding Company

Leading company in the implementation of Lean Production practices in Brazil, including the Last Planner System, Visual Management, and material supply Kanban systems

Maintenance Department

Provides customer services to all projects that have been delivered
The company has the vision of increasing the engineering role of this department: provide effective feedback to quality management

Andon



Material kits



Visual Management



IGLC 28

BERKELEY, CA 6-12 JULY 2020

28th ANNUAL CONFERENCE OF THE
INTERNATIONAL GROUP FOR LEAN CONSTRUCTION

RESEARCH METHOD

Large Brazilian Housebuilding Company

Leading company in the implementation of Lean Production practices in Brazil, including the Last Planner System, Visual Management, and material supply Kanban systems

Maintenance Department

Provides customer services to all projects that have been delivered
The company has the vision of increasing the engineering role of this department: provide effective feedback to quality management



Dry Wall prototype



Supply at the workplace



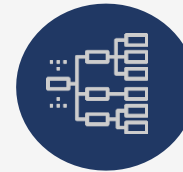
IGLC 28

BERKELEY, CA 6-12 JULY 2020

28th ANNUAL CONFERENCE OF THE
INTERNATIONAL GROUP FOR LEAN CONSTRUCTION

RESEARCH METHOD

**Maintenance department of
a Brazilian housebuilding
company.**



Categorization of defects



Analyse of 5.628 records of
complaints



Interviews and seminars to
discuss results

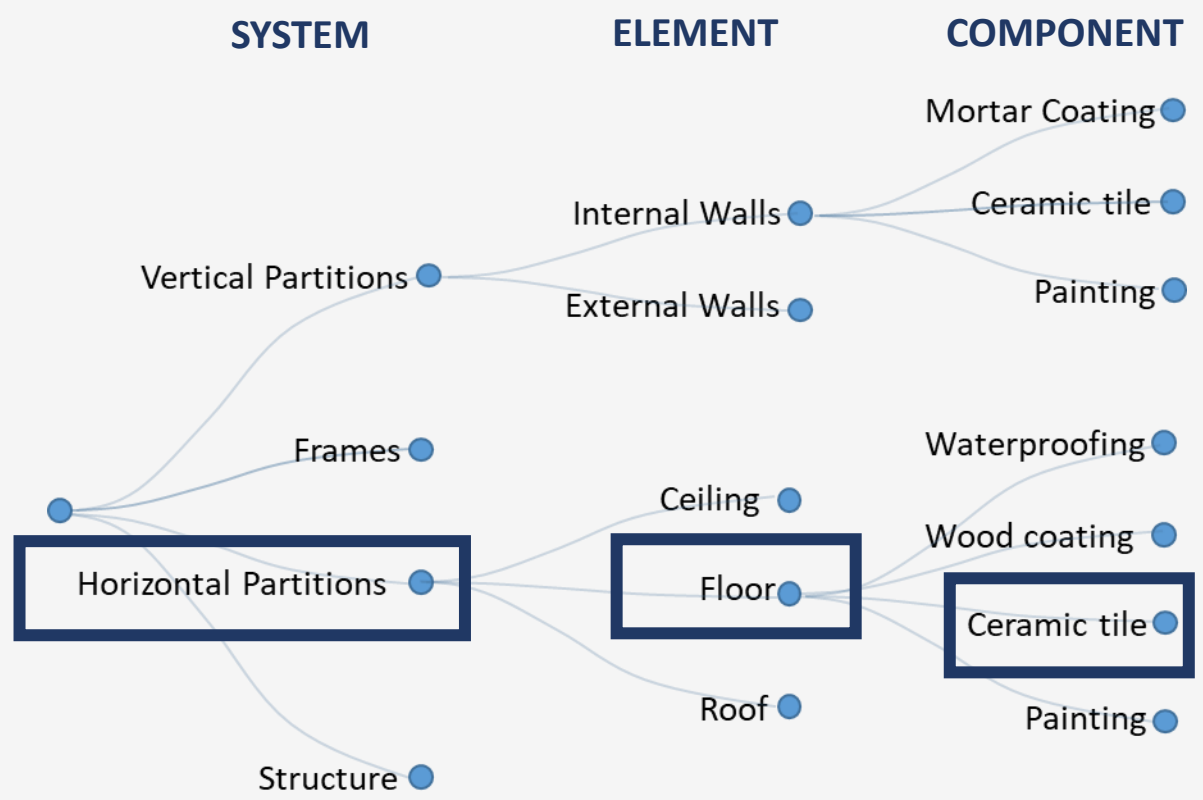
RESEARCH METHOD

Classification

Hierarchical classification structure.

Definitions of “component”, “elements” and “systems” made by NBR 15575 (ABNT, 2013).

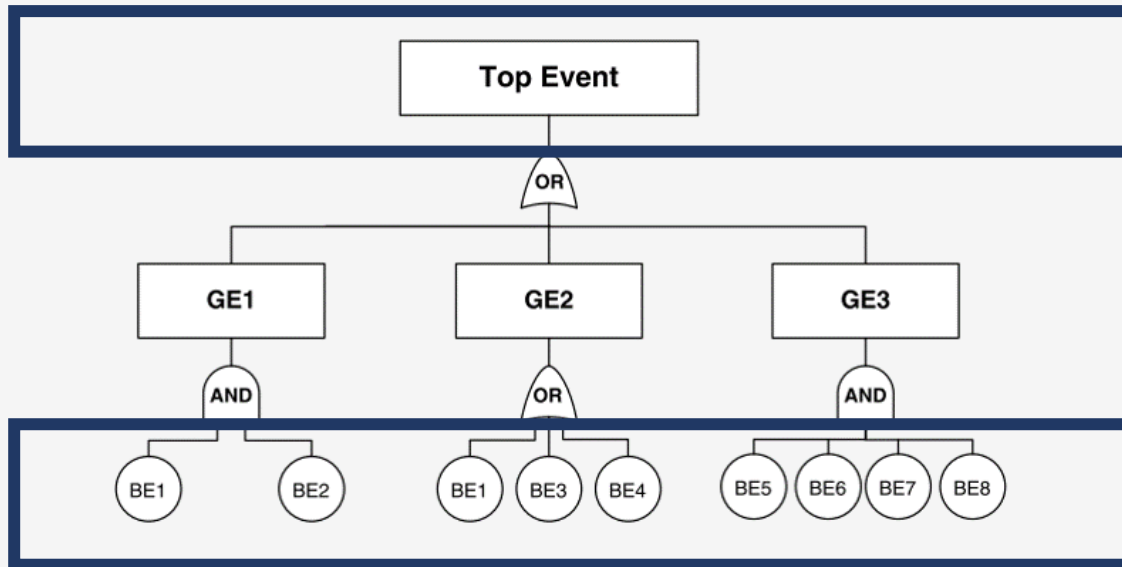
Classifications of defects found in previous studies.



RESEARCH METHOD

Analysis of defects

Fault Tree Analysis (FTA)



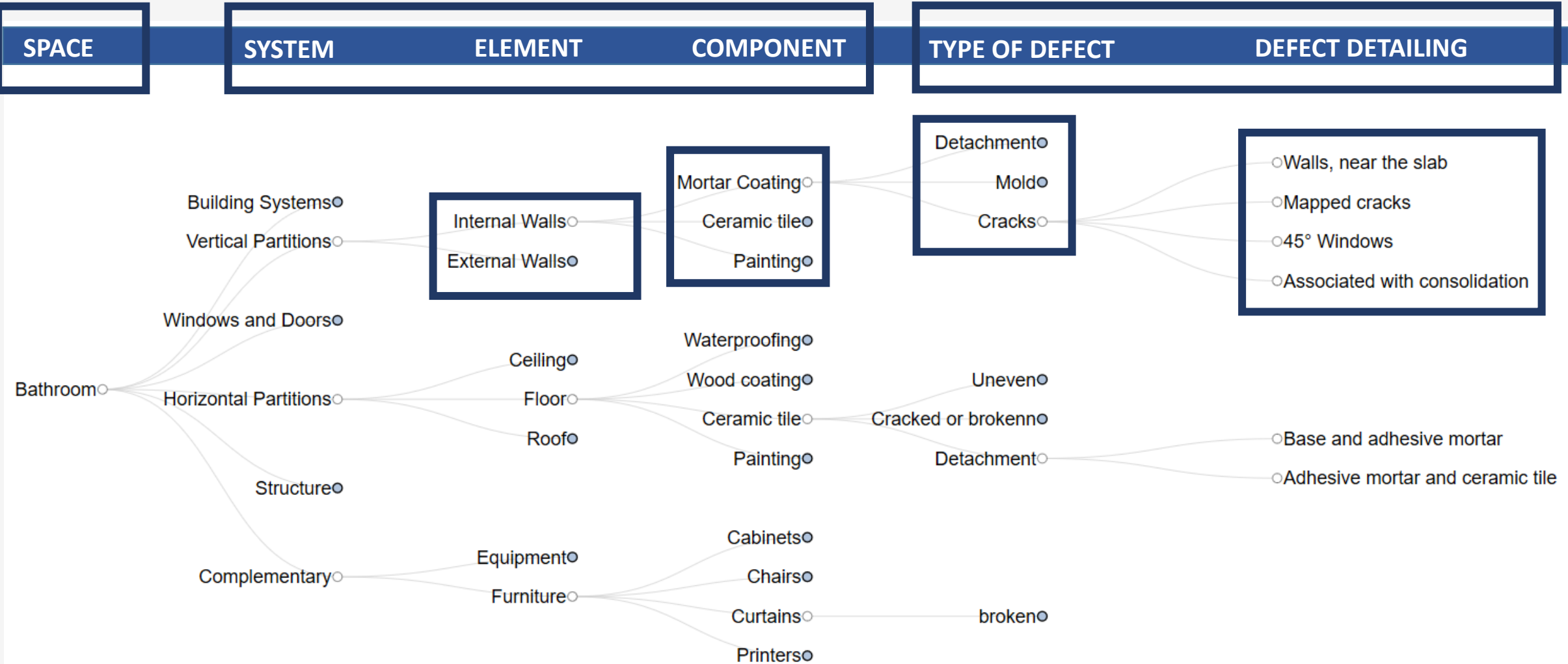
Occurrence Probability (OP)

$$OP = \frac{(\text{un})\text{favourable results}}{\text{Possible results}}$$

$$OP = \frac{\text{Number of defects}}{\text{Number of houses covered by warranty}}$$

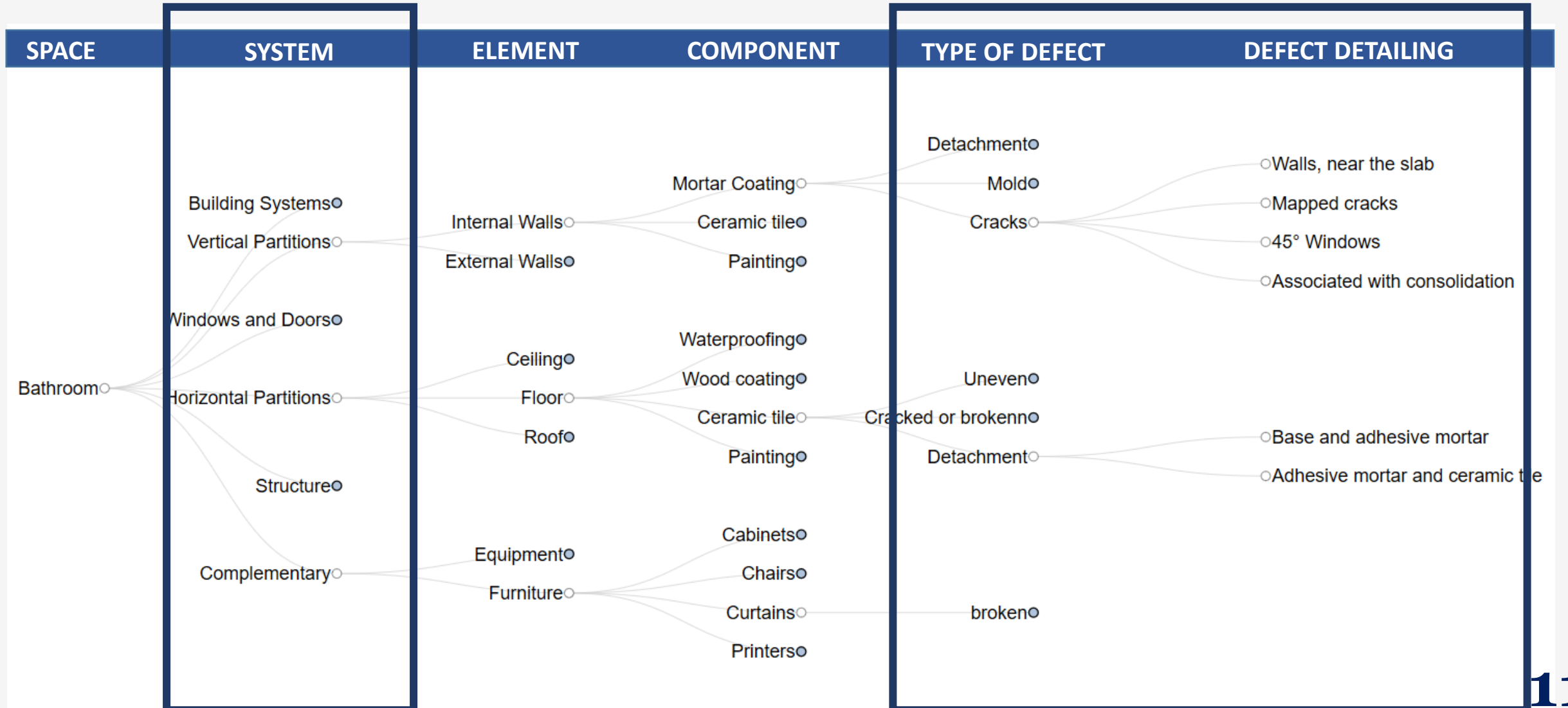
RESULTS

Classification Structure



RESULTS

Classification Structure

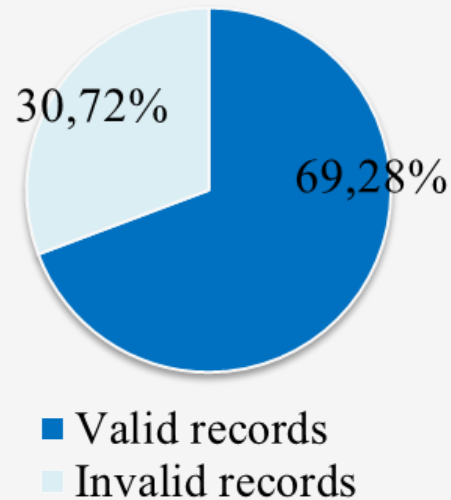


RESULTS

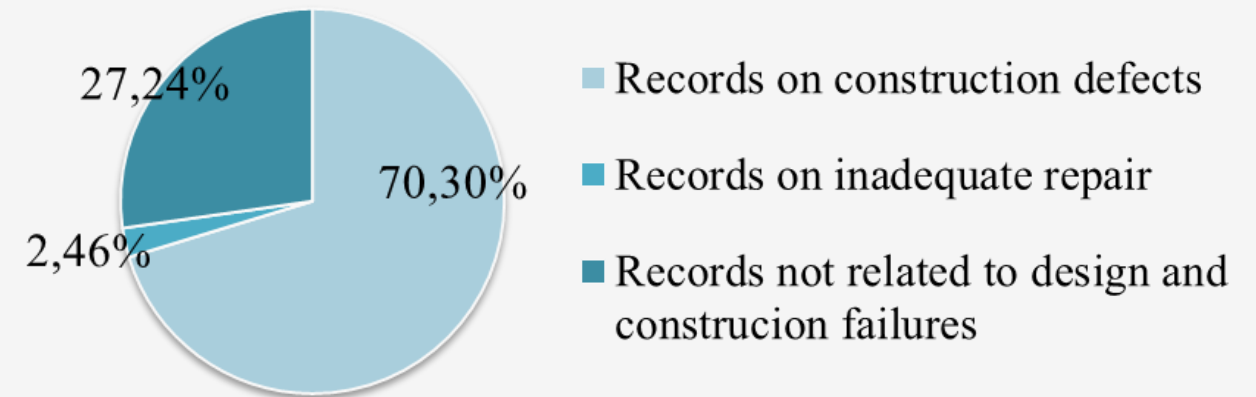
Sorting of complaint records

5.628 records

Records analysed

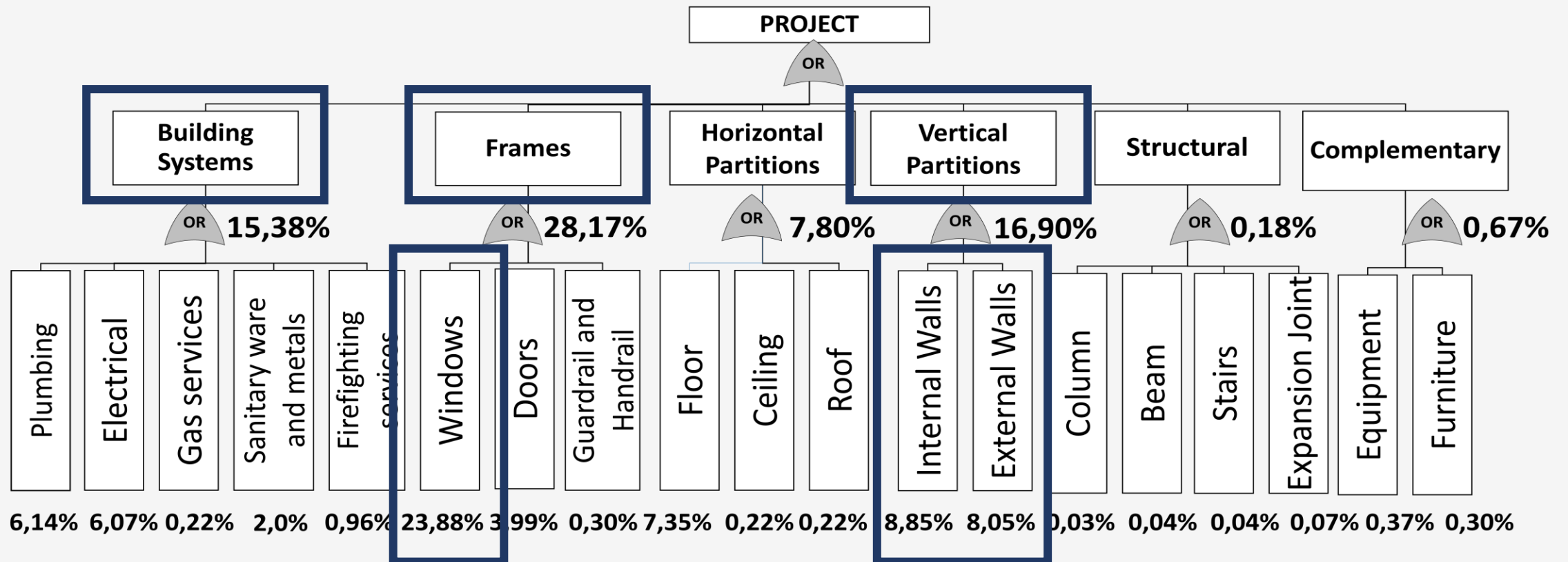


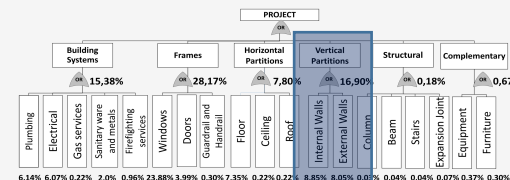
Nature of valid records



RESULTS

Fault Tree Analysis (FTA)










RESULTS

Other indicators

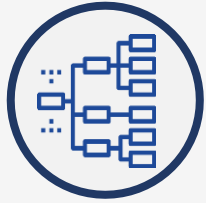
Vertical Partitions

Type of defect		PO 	Severity 		Costs 	
External walls	Infiltration or leakage	7.25%	1.50	Severe	1.50	High
	Cracks, clenches or disruptions	0.71%	0.50	Light	1.50	High
	Detachment or displacement	0.08%	2.00	Critical	1.50	High
Internal walls	Detachment or displacement	7.43%	2.00	Critical	1.50	High
	Chipped, cracked or broken	1.12%	1.00	Medium	0.50	Low
	Cracks, clenches or disruptions	0.22%	0.50	Light	0.50	Low
	Peeling paint	0.07%	0.50	Light	0.50	Low



CONCLUSIONS

Theoretical and practical contributions



Data collection

Classification Structure:
organized, complete and detailed
data collection



Data Analysis

Indicators and Statistical
methods: identify the most
critical systems, elements and
types of defects in the projects
delivered.

Previous studies that have attempted to use data mining for analyzing complaints have not been successful in producing knowledge due to deficiencies in data collection. Therefore, it is necessary to improve data collection and analysis methods

FURTHER STUDIES

- Full implementation of the proposed classification structure;
- Further developing quality indicators and adapting statistical methods;
- Integrating of complaints database to BIM models;
- Developing of information systems for mobile computing to support data collection in customer service





IGLC 28

BERKELEY, CA 6-12 JULY 2020

28th ANNUAL CONFERENCE OF THE
INTERNATIONAL GROUP FOR LEAN CONSTRUCTION



Jordana Bazzan



Carlos Torres Formoso



Márcia Echeveste

Use of complaint records of
maintenance departments for
continuous improvement

Thank you for your attention!!