

# IMPROVING COMMUNICATION PROCESS ON CONSTRUCTION SITES USING MOBILE TECHNOLOGIES AND CLOUD COMPUTING

Presented by Daniel Forgues, PhD.

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## AUTHORS

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GEN-346



# RESEARCH SCOPE AND GOALS

## MAIN OBJECTIVE

Define how **MOBILES TECHNOLOGIES** and **CLOUD COMPUTING** can improve communication process on the construction sites through a context of **ADMINISTRATION AND PROJECT MANAGEMENT**.



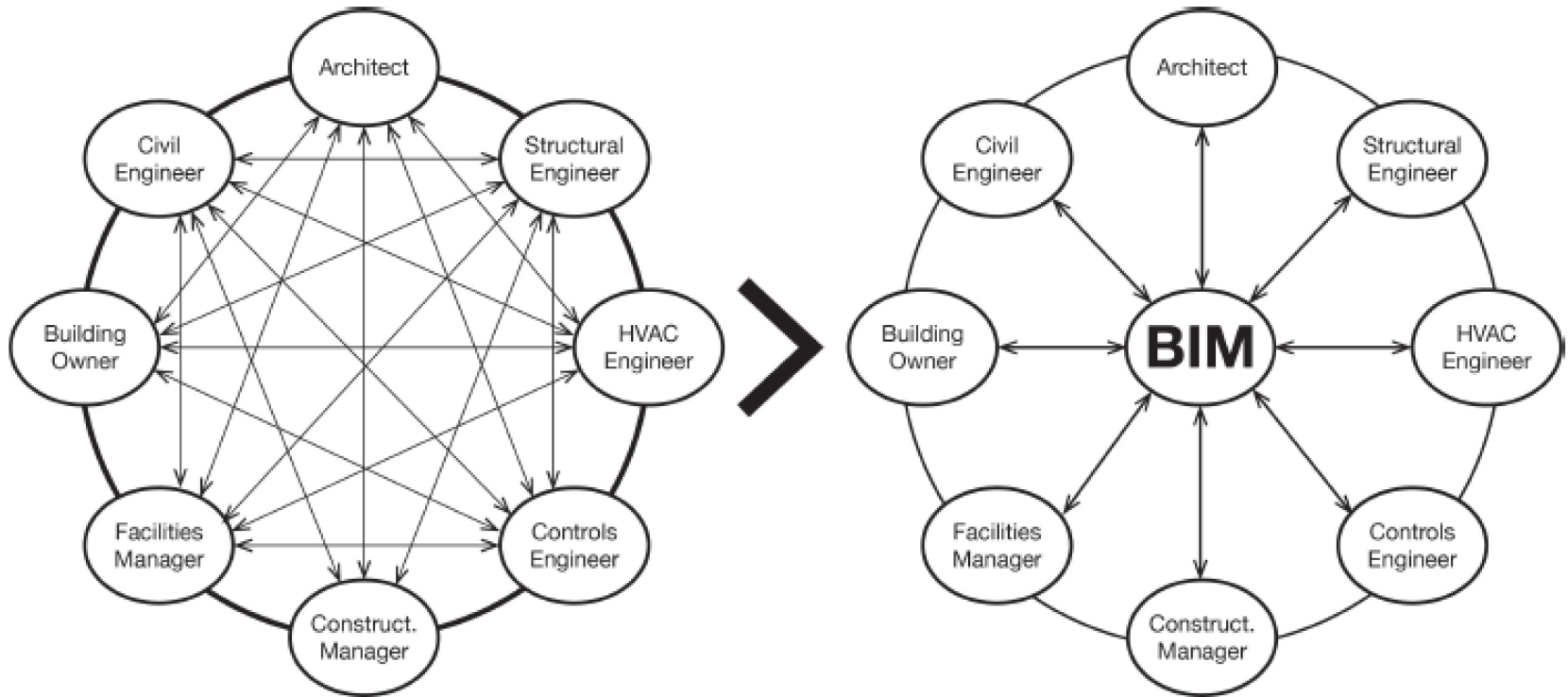
BEFORE



AFTER



# CONTEXT



# CONTEXT

## PARADOX

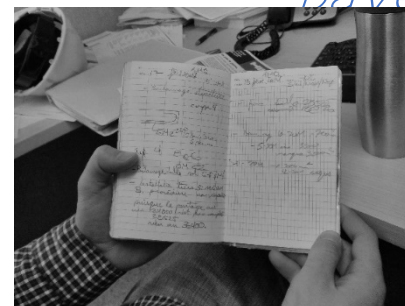
The **MAJORITY OF INFORMATION** is exchanged during the construction phase to track the progress, the quality and the construction cost, but this step is **THE LESS COMPUTERIZED**.

Tam, 1999

## WHY?

This phase is oriented on **TRADITIONAL PAPER-BASED PROCESSES** to collect data and **INEFFICIENT MEANS** of communication.


Dave et al 2010



And it was quickly validated ...

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# What is mobility?



**Mobility is a generic term used to refer to tools that allow people to access data or information regardless of where they are.**

*Source : Utilisation de la mobilité en gestion de projet, Olivier Laquinte et Éric Dupont, janvier 2013*

## Potential of mobile technologies

- Improve **information sharing**
- Centralizing **project information**
- **Bring stakeholders together** in a single database
- Reduce **wasted time**
- Reduce **duplication of information**
- Reduce the **use of paper**

# METHODOLOGY – PHASES



## PRELIMINARY PHASE Pilot Project

EXPERIMENT the use of  
Mobile technologies on  
site

IDENTIFICATION OF  
INDICATORS OF IMPROVEMENT

## PHASE 1 Provincial Survey

Develop an EVALUATION  
FRAMEWORK mobile  
applications

ASSESSMENT MATURITY

## PHASE 2 Case Studies

Develop a CONCEPT OF  
OPERATION to improve  
the use of Mobile  
technologies and Cloud  
Computing

ASSESSMENT OF *IN SITU*  
BENEFITS

# METHODOLOGY – PHASES

2013

2014



PRELIMINARY PHASE  
Pilot Project

EXPERIMENT the use of  
Mobile technologies on  
site

IDENTIFICATION OF  
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PHASE 1  
Provincial Survey

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ASSESSMENT MATURITY

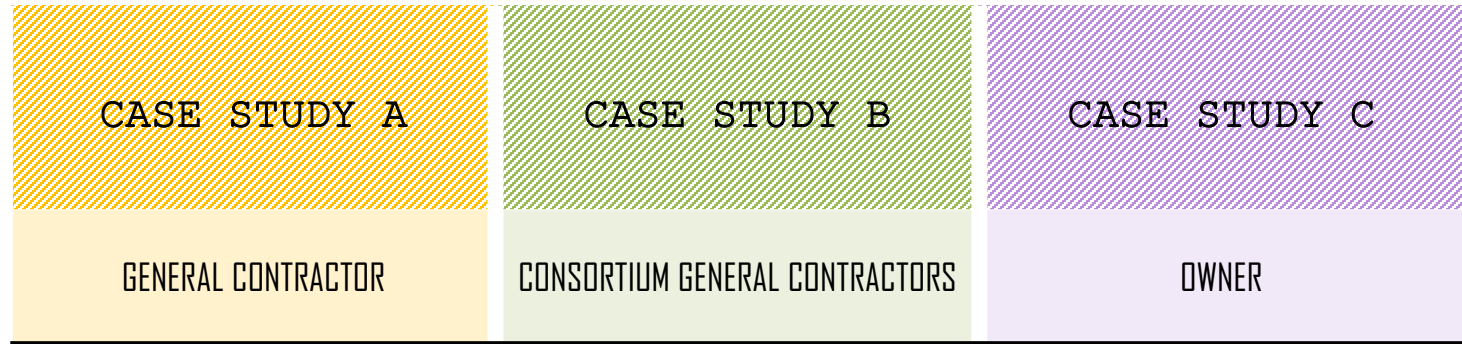
PHASE 2  
Case Studies

Develop a CONCEPT OF  
OPERATION to improve  
the use of Mobile  
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Computing

ASSESSMENT OF *IN SITU*  
BENEFITS



# METHODOLOGY – CASE STUDIES



## BUILDING CATEGORIES

Commercial Buildings

Institutional  
Buildings

Large public  
utilities

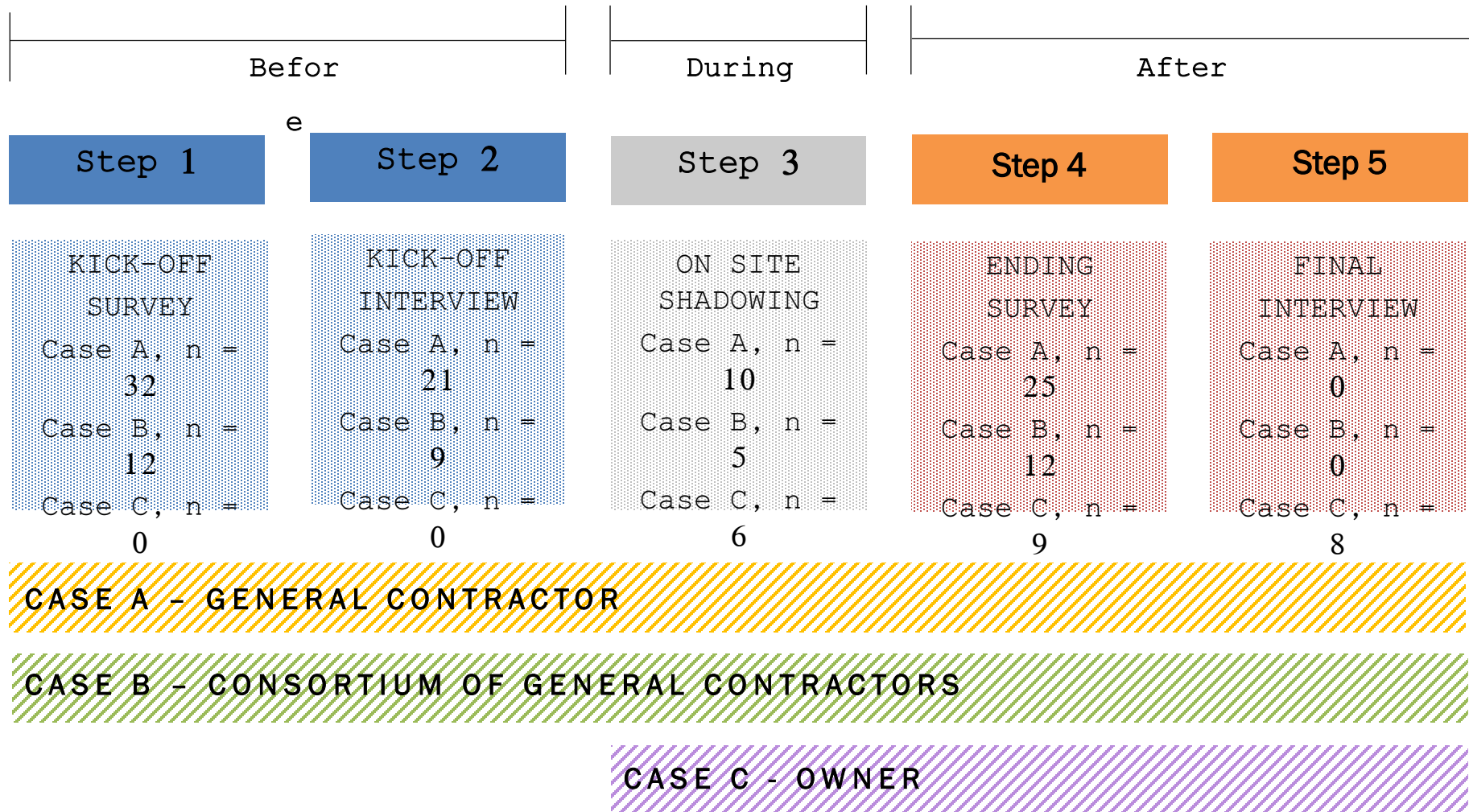
## STAKEHOLDERS INVOLVED IN THE STUDY

- Superintendent
- Foreman
- Manager

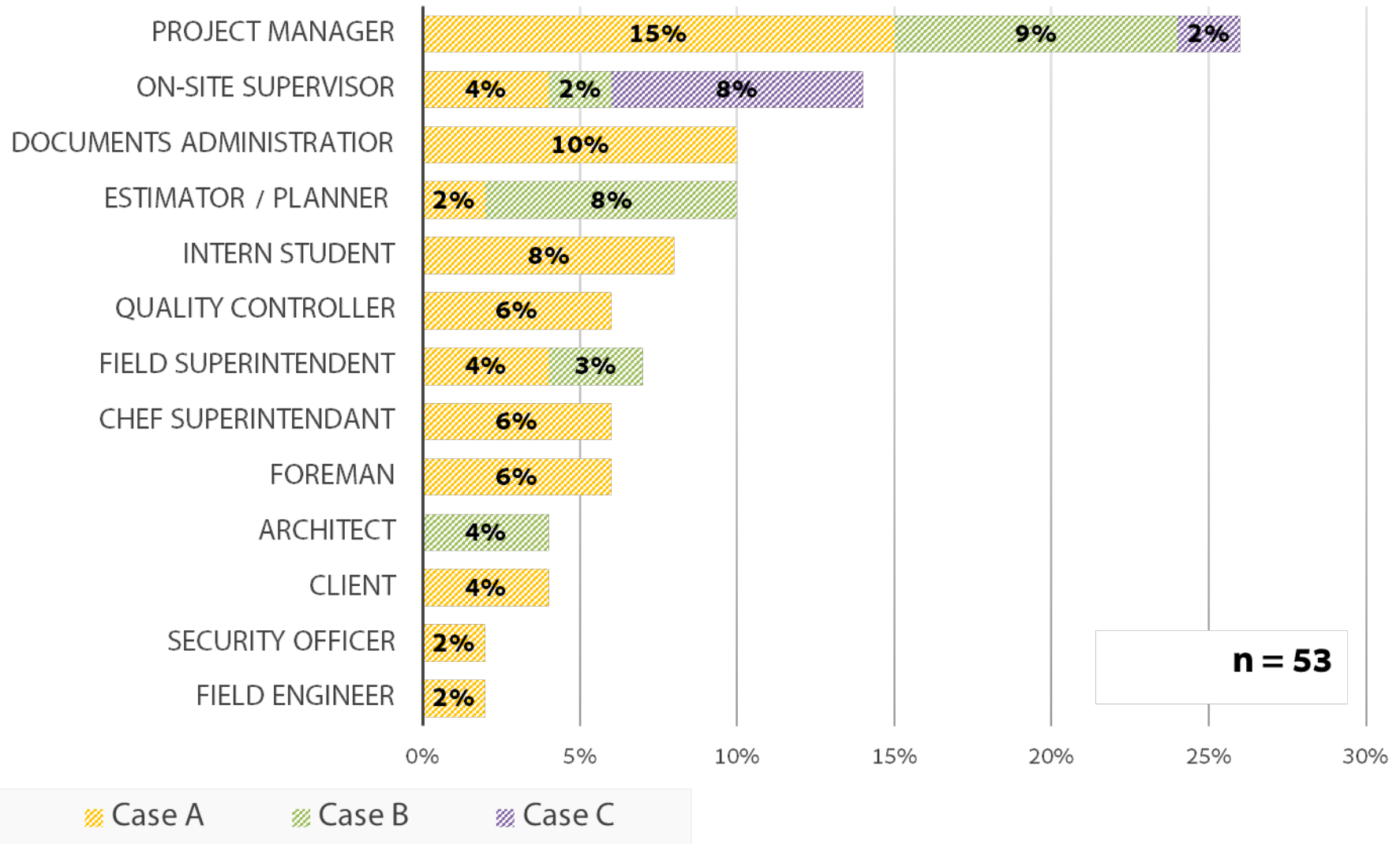
- Quality Monitoring Team
- Construction Team

- Field Inspector
- Project Planner
- Cost Controller

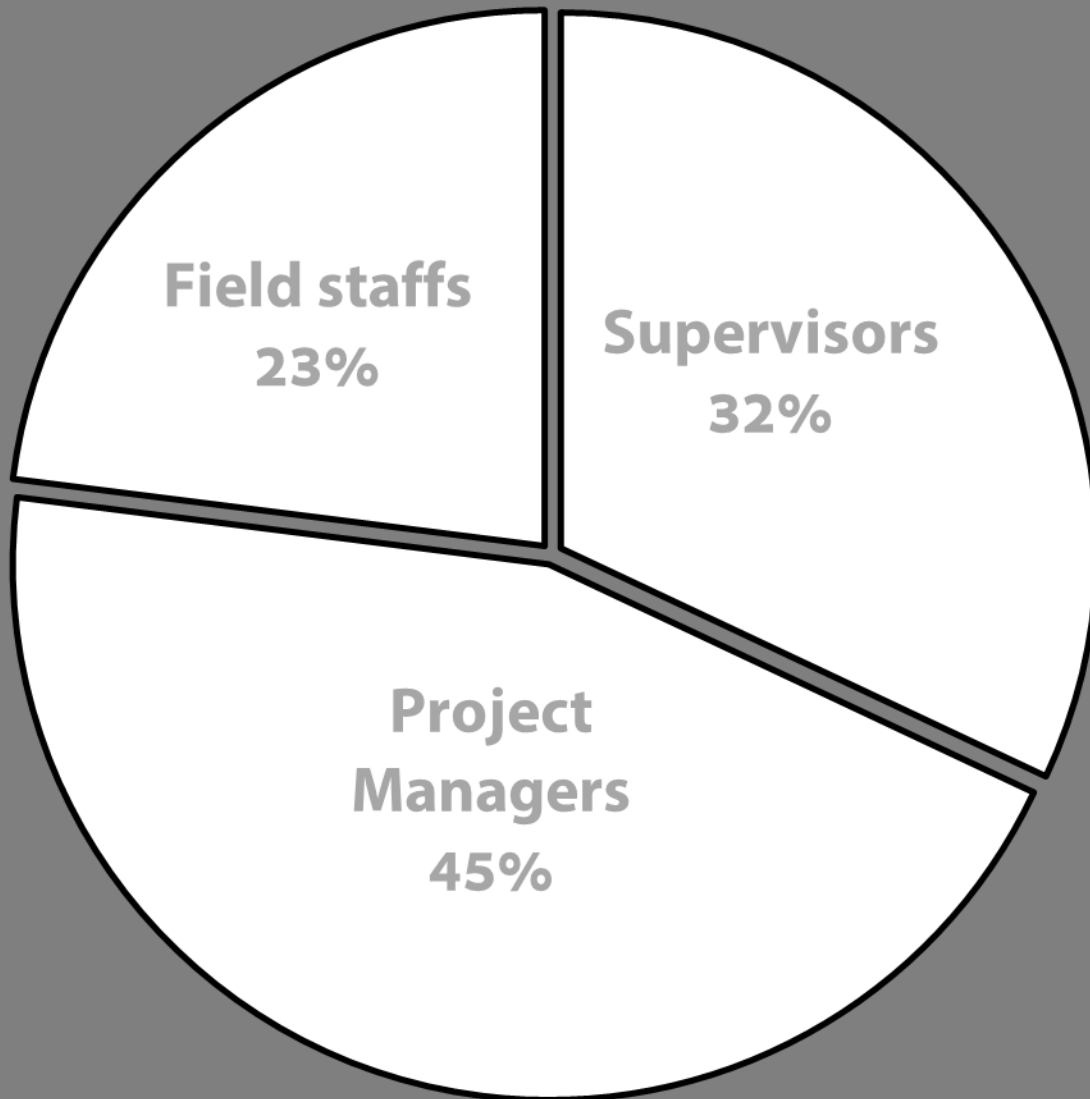
# METHODOLOGY – PROCESS



# METHODOLOGY – SAMPLE



# SAMPLE PROFILE



# PREVIOUSLY

PRELIMINARY PHASE  
2013 – 2014

# ANALYSIS AND TOOLS

## FRAMEWORK DEVELOPED AFTER THE PRELIMINARY PHASE

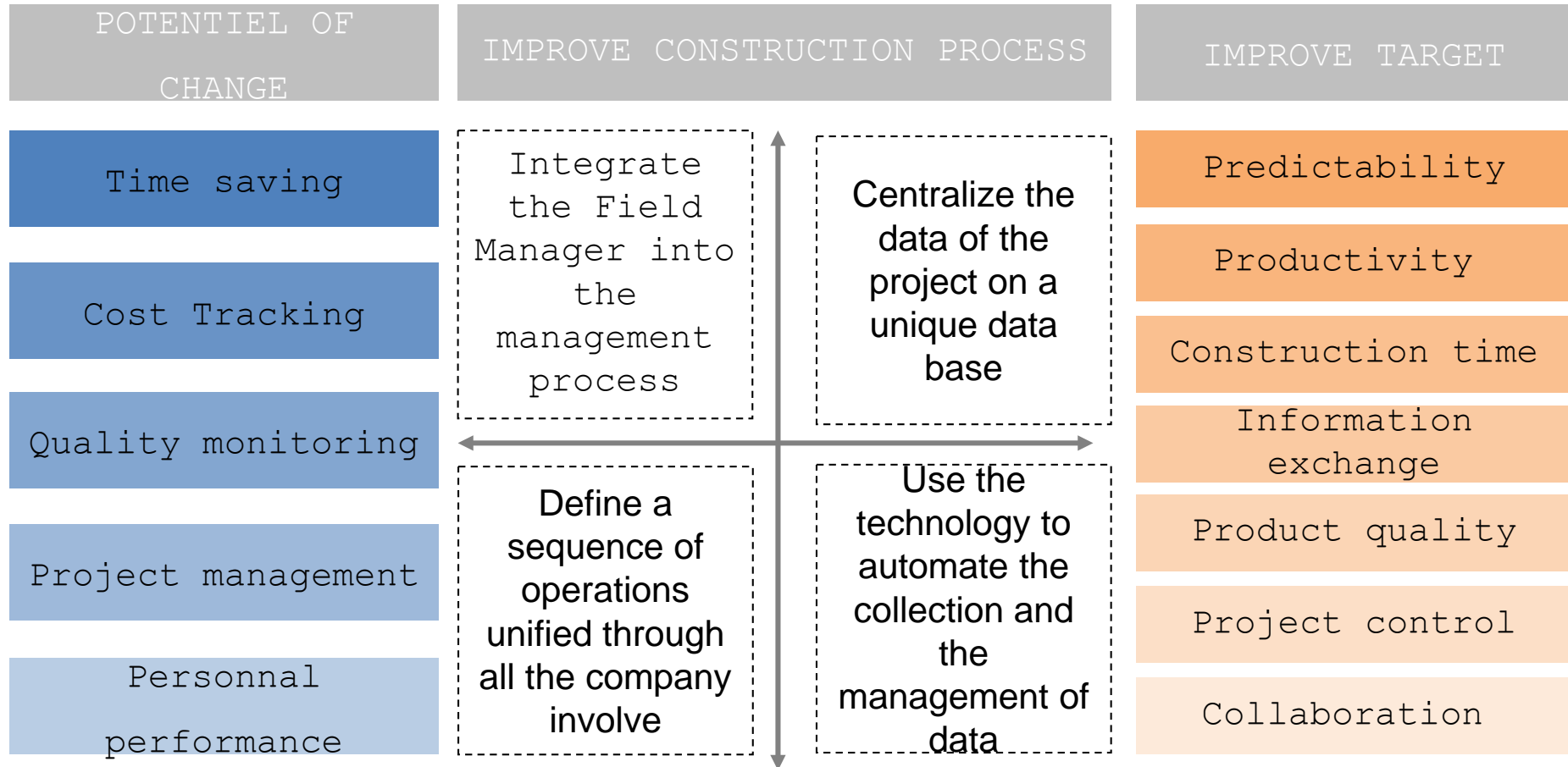


Figure adapted from [Egan\(2002\)](#). The potential of changes defined are aligned with the work of [Bowden \(2005\)](#), [Rivard \(2000\)](#) and [Ruwanpura \(2008\)](#).

# ANALYSIS AND TOOLS

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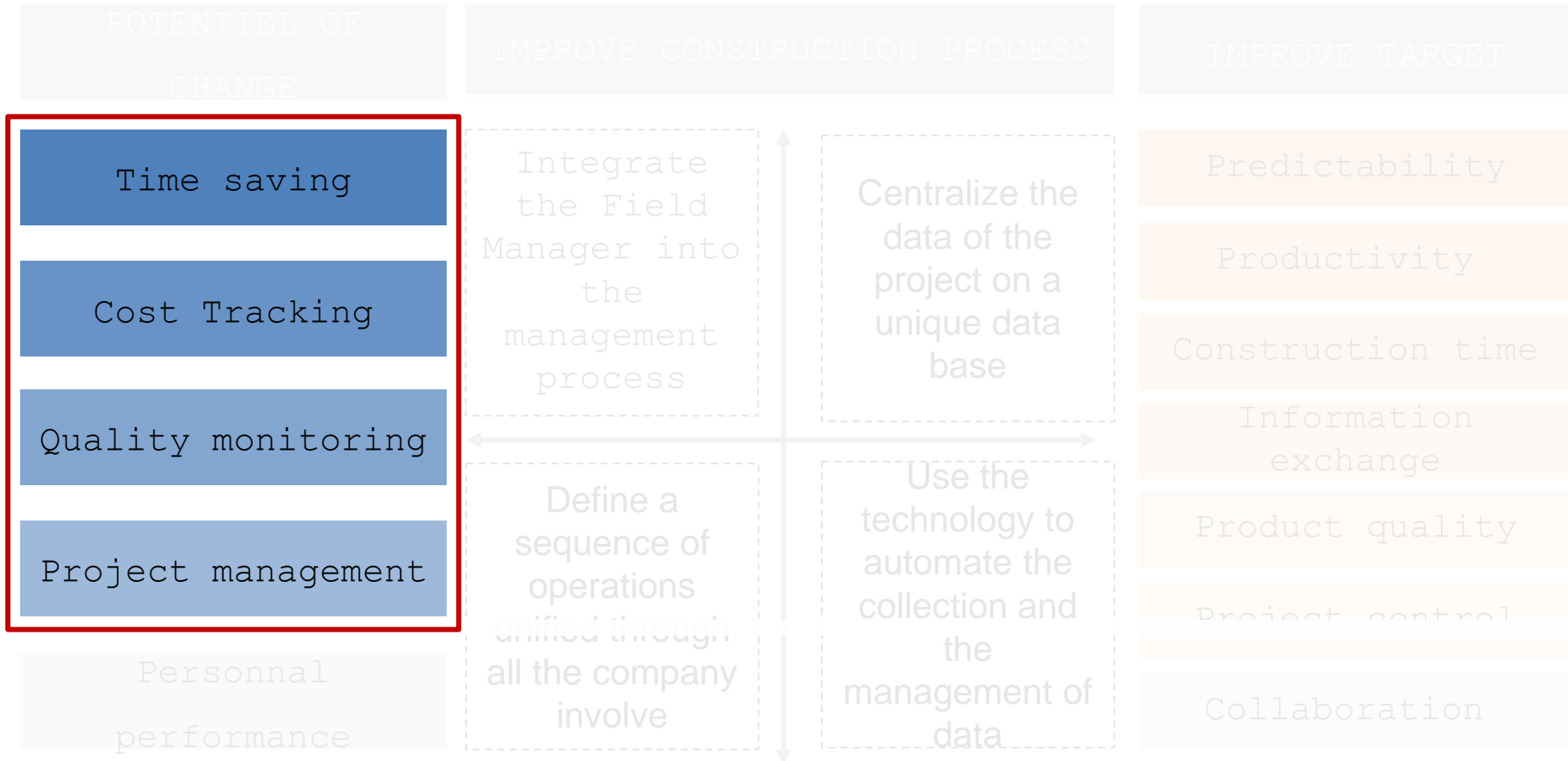


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# ANALYSIS AND TOOLS

FRAMEWORK DEVELOPED AFTER THE PRELIMINARY PHASE

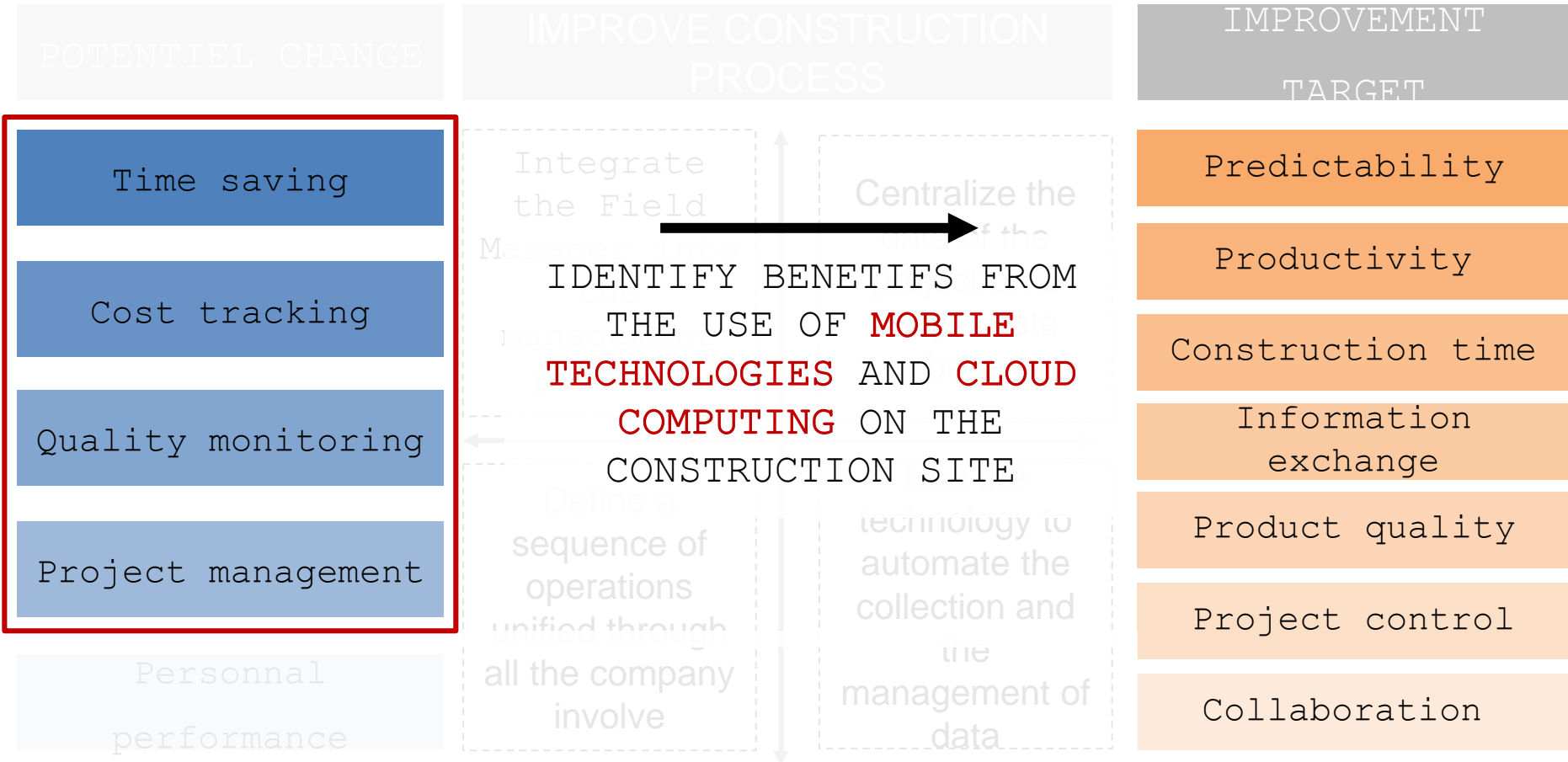


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# PREVIOUSLY

## PHASE 1 – EVALUATE MATURITY 2014

# ANALYSIS AND TOOLS

## Uses of mobile technologies

Survey sample (700 responses)



**39%**

Access to e-mail



**29%**

Access to agenda



**15%**

Updating To do list



**9%**

Weather report



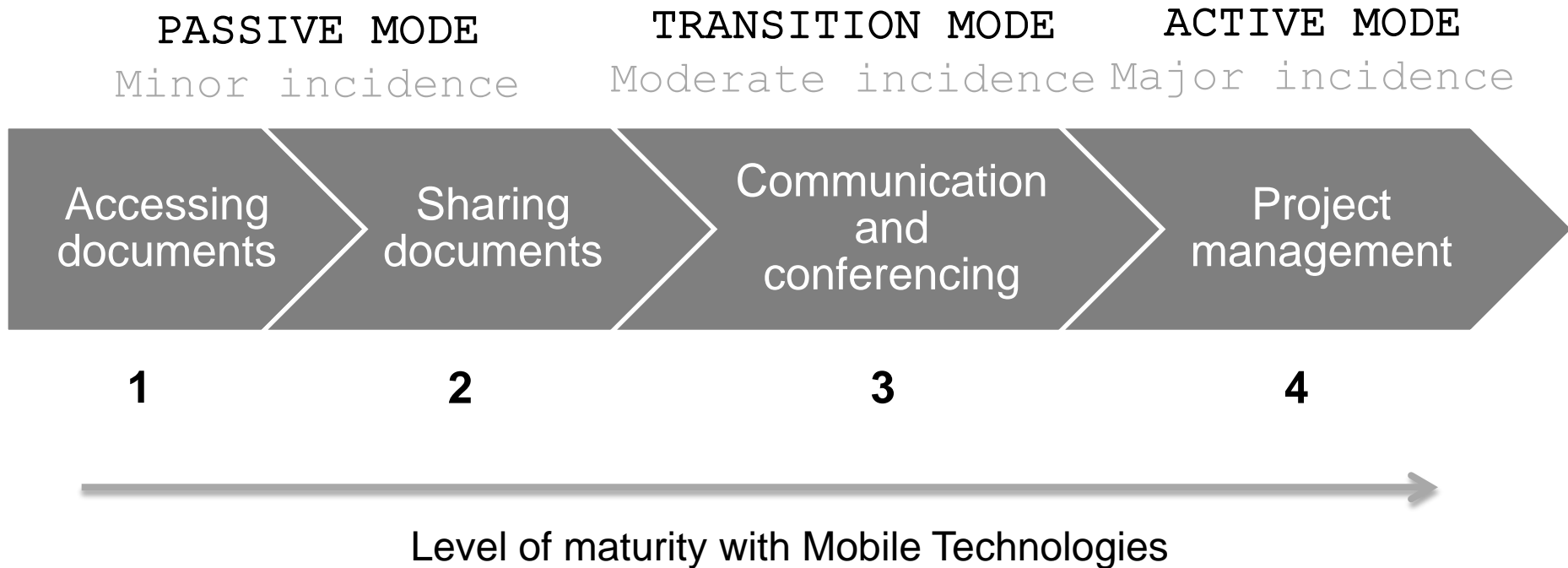
**8%**

Notes, photos, etc.

# ANALYSIS AND TOOLS

## FRAMEWORK DEVELOPED AFTER THE PHASE 1 – 2014

How to assess the maturity level of companies using mobile IT?

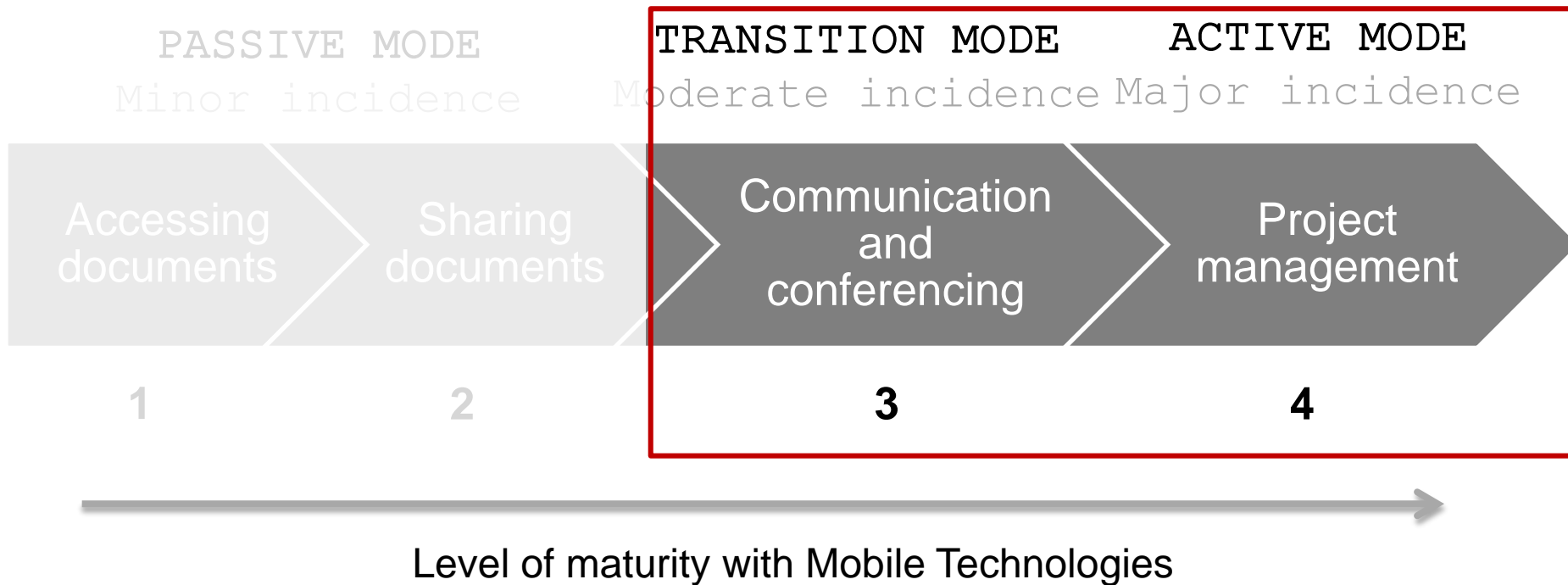


*Source : Paper 142 – CSCE 2014. Frenette et al. (2014) – Les technologies mobiles, une révolution dans la communication et la coordination de projets de construction.*

# ANALYSIS AND TOOLS

## FRAMEWORK DEVELOPED AFTER THE PHASE 1 - 2014

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# ANALYSIS AND TOOLS

## PHASE 2 – TECHNOLOGIES USED IN THE CASE STUDIES

**CASE STUDY A**  
General Contractor

Smart-Use

Level of maturity  
3

Communication and  
conferencing

### MAIN FUNCTIONS

Annotation layer per user  
and Overlay Plans

**CASE STUDY B**  
Consortium  
General Contractors

L A T Í S T A

Level of maturity  
4

Project Management

### MAIN FUNCTIONS

Set up workflow  
between  
entreprises  
involved

**CASE STUDY C**  
Owner

RÉTROACTION DE  
CHANTIER  
*In house technology*

Level of maturity  
4

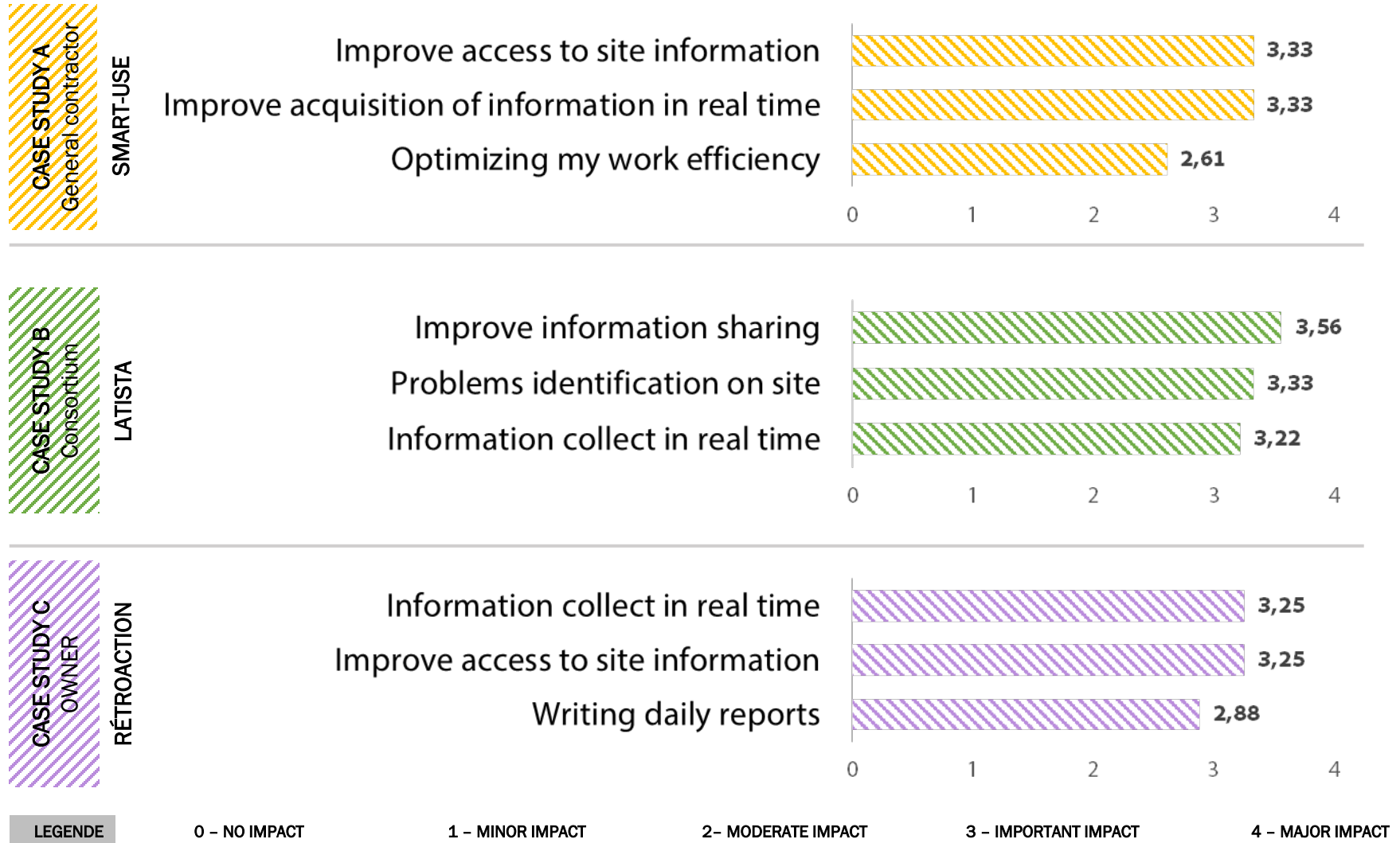
Project Management

### MAIN FUNCTIONS

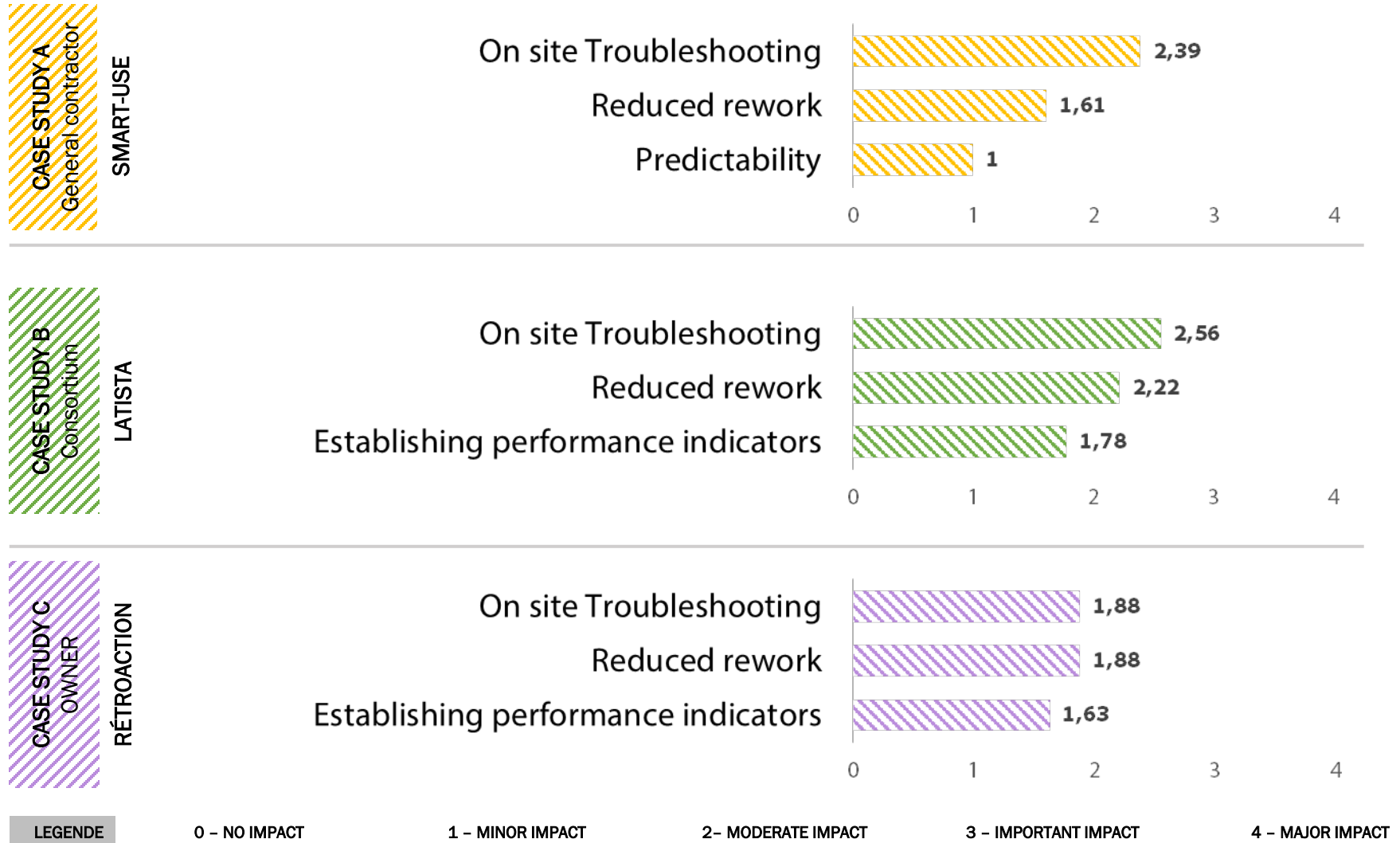
Automatisation of  
daily reports

*Important: The list of features presented above is not exhaustive.*

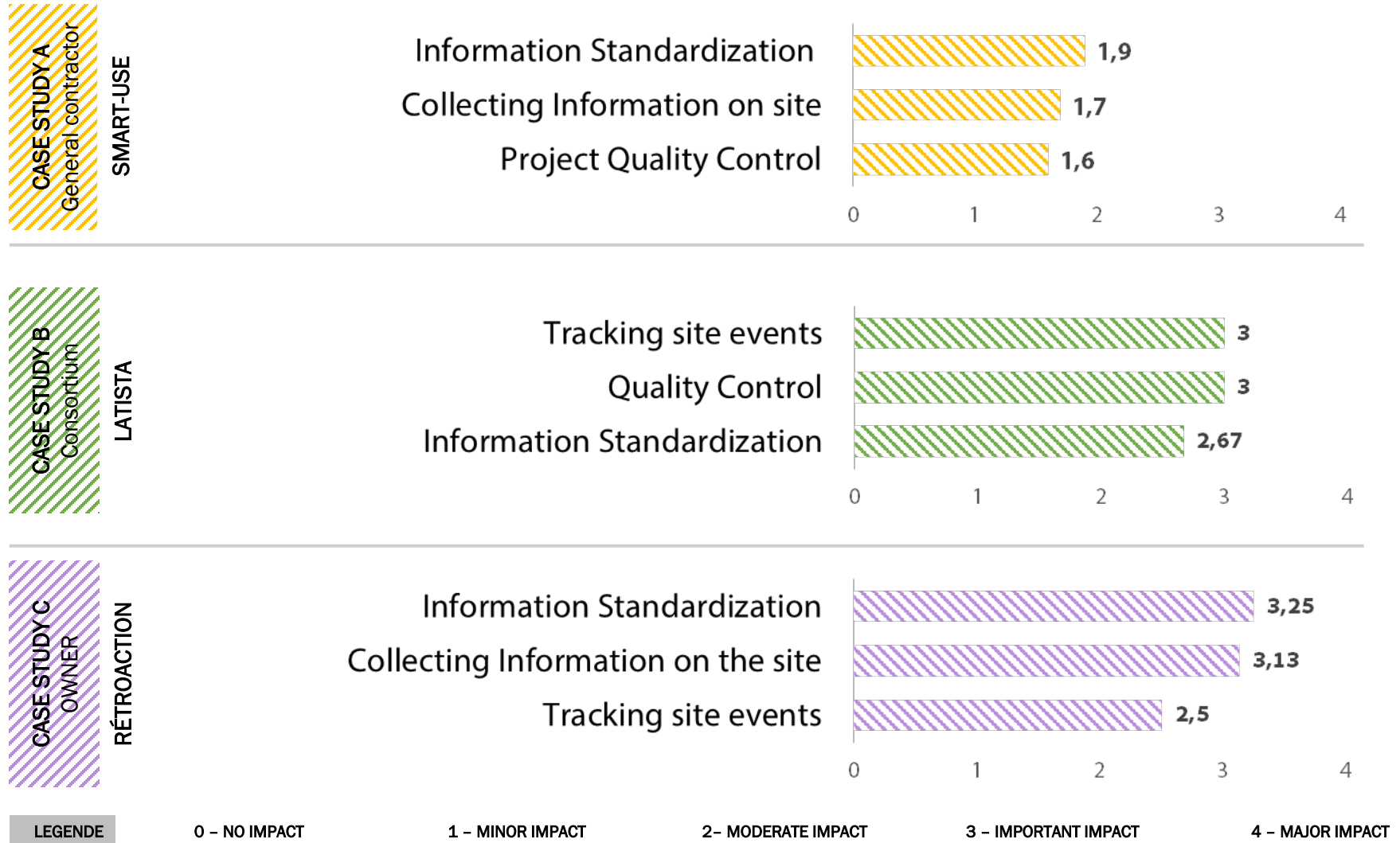
# RESULTS – TIME SAVING



# RESULTS – COST TRACKING

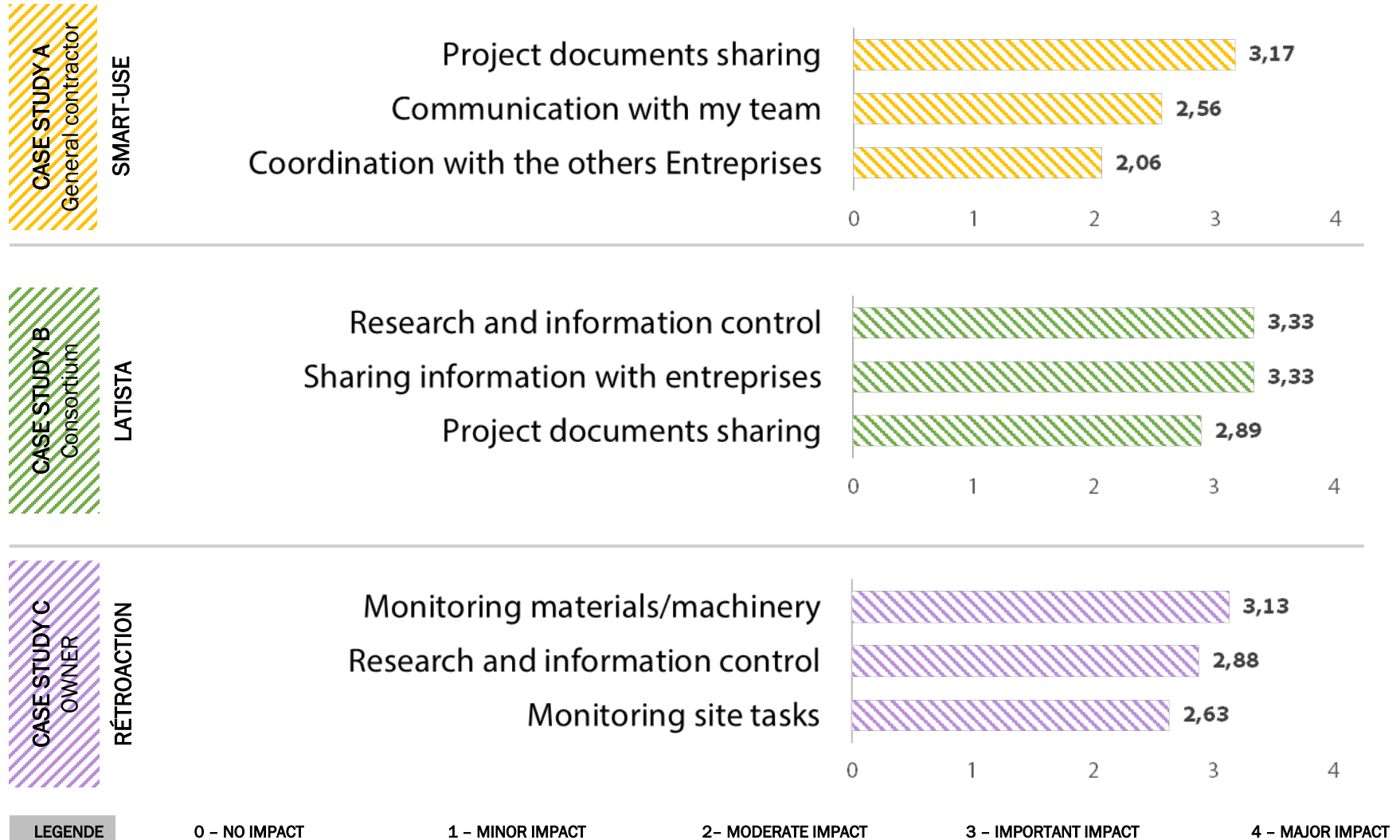


# RESULTS – QUALITY MONITORING





# RESULTS – PROJECT MANAGEMENT

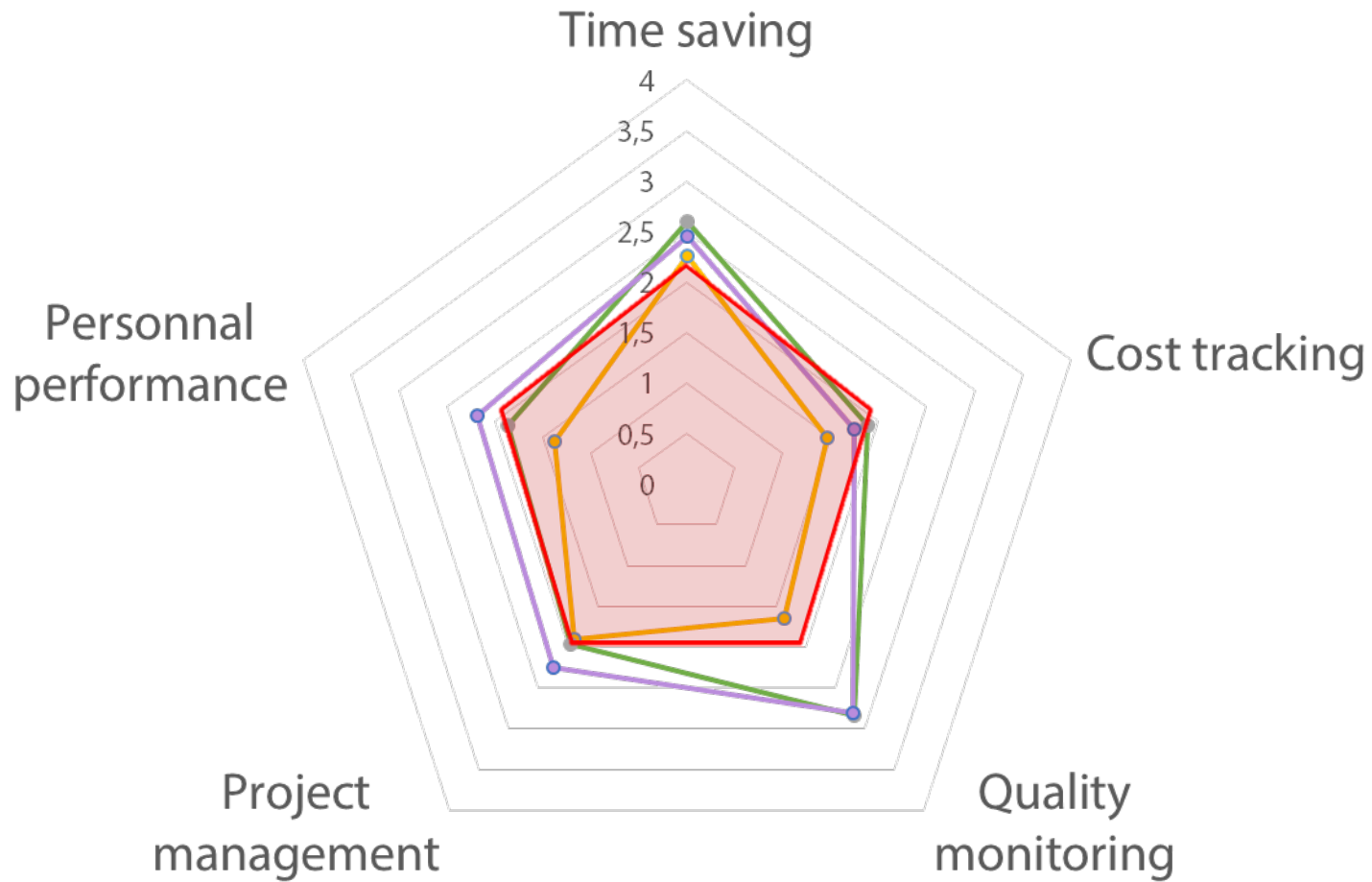


# ANALYSIS RESULTS

CASE STUDY A  
General contractor

CASE STUDY B  
Consortium

CASE STUDY C  
OWNER



LEGENDE

0 - NO IMPACT

1 - MINOR IMPACT

2 - MODERATE IMPACT

3 - IMPORTANT IMPACT

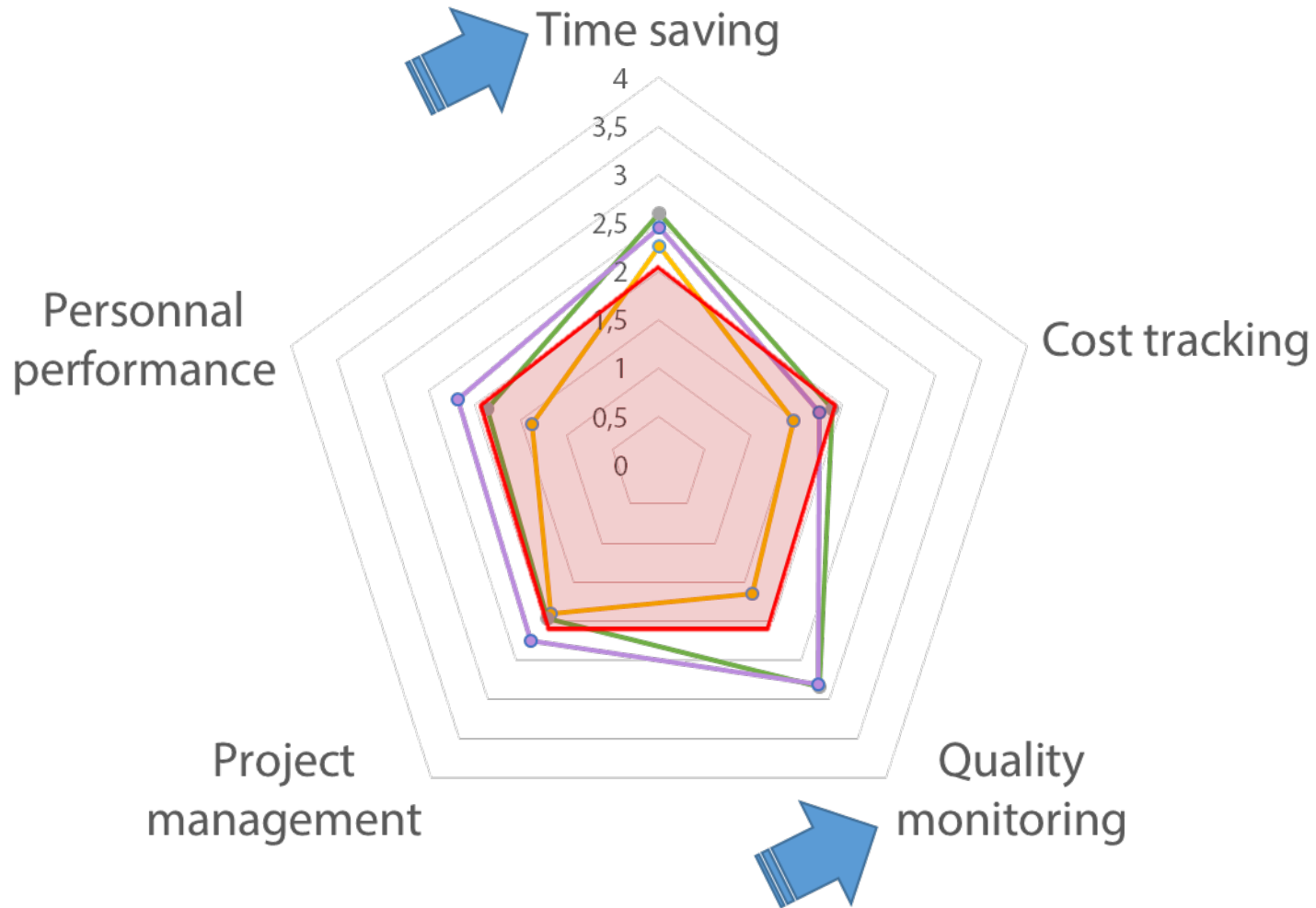
4 - MAJOR IMPACT

# ANALYSIS RESULTS

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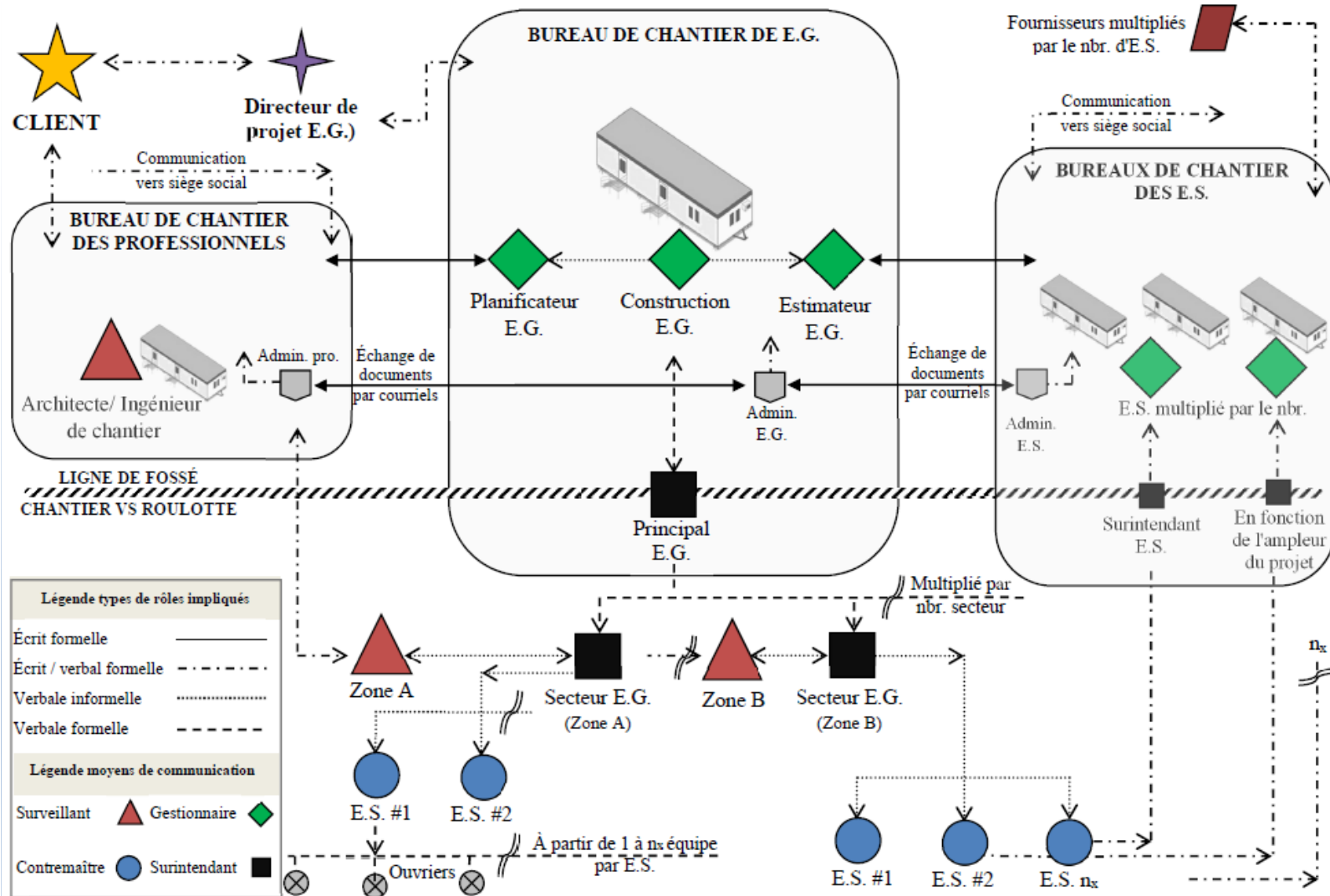
4 - MAJOR IMPACT

PREVIOUSLY

**BEFORE**

THE USE OF MOBILE  
TECHNOLOGIES  
AND CLOUD COMPUTING

# ANALYSIS RESULTS



# ANALYSIS RESULTS

**QUALITY  
MANAGER**

**MANAGER**

SPLIT BETWEEN

FIELD & MANAGEMENT TEAM

**QUALITY  
CONTROLLER**

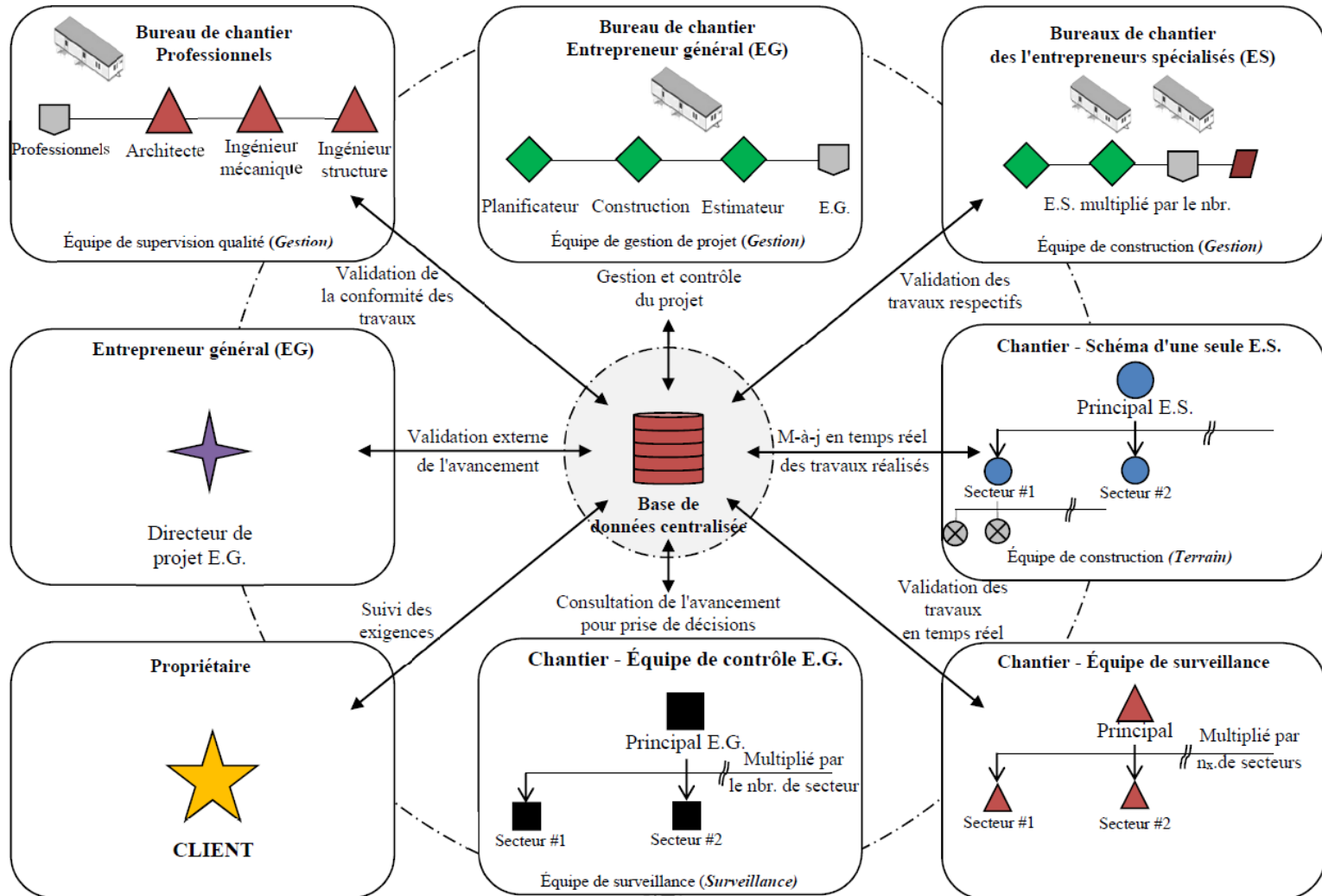
**FIELD STAFF**

# ANALYSIS RESULTS

**AFTER**

PROPOSITION FOR THE USE OF  
MOBILE TECHNOLOGIES  
AND CLOUD COMPUTING

# ANALYSIS RESULTS





# CONCLUSION

## THE MAJOR POTENTIALS

- TIME SAVING
- QUALITY MONITORING

## THE KEY BENEFITS FROM THE USERS

- The information sharing is **FASTER**
- The information **SHARING** between site stakeholders are **IMPROVED**
- The **IDENTIFICATION** of problems on site is **FASTER** and **ACCURATE**
- The data acquisition is in **REAL TIME**



# Thank You - Merci



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# Thank You - Merci



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