



# VALUE STREAM MACRO MAPPING – A CASE STUDY OF ALUMINUM WINDOWS FOR CONSTRUCTION SUPPLY CHAIN

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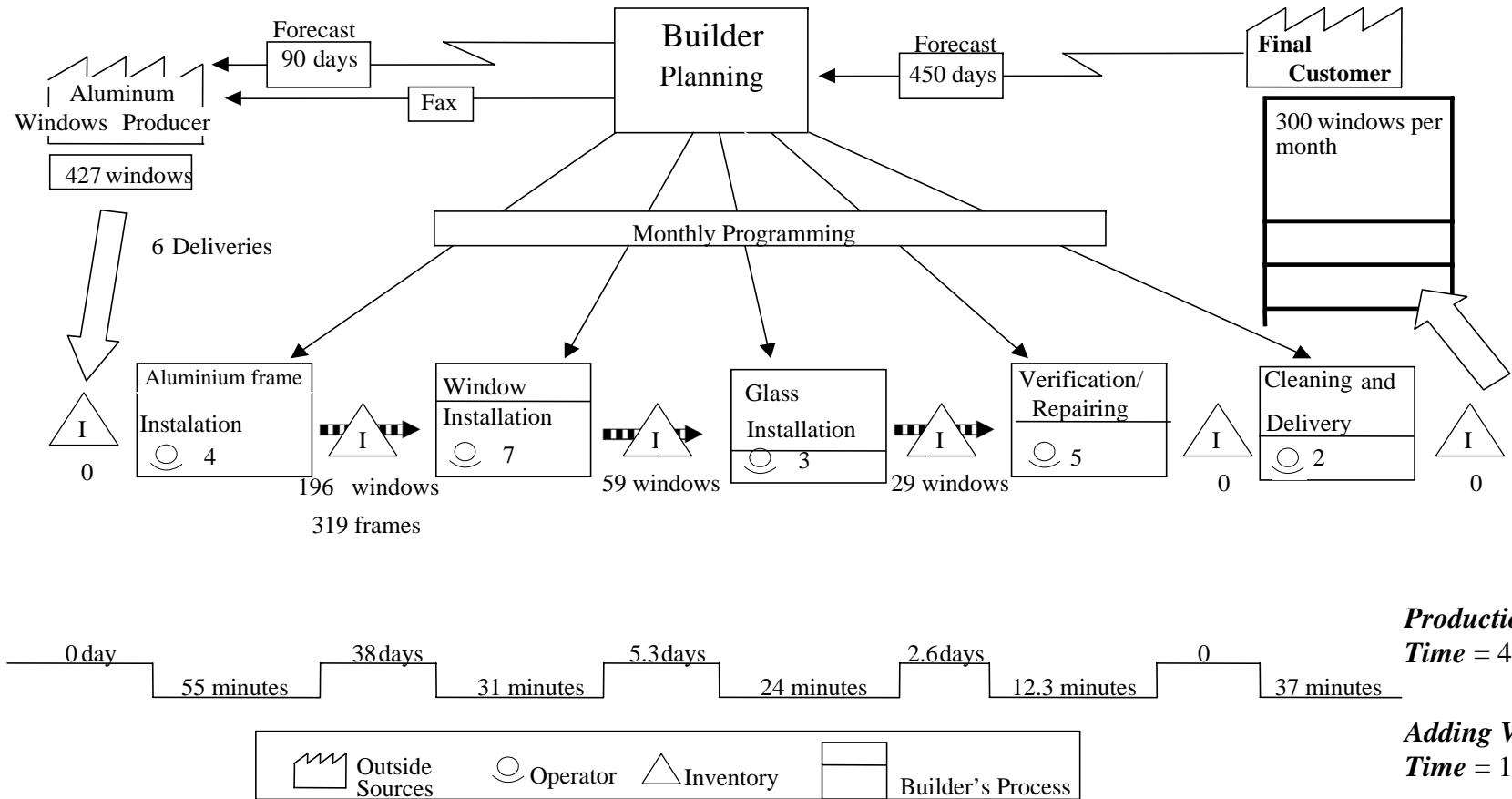
# Objective and Methodology

- **Objective:** to analyze the **potential of VSMM** application to waste identification in construction supply flows;
- **Method:** **literature review** and exploratory application of Value Stream Macro Mapping (VSMM) on a **case study:** aluminum component supply chain;
  - **Agents identification** from job site to raw material
  - **Data collection** on sites – observation and semi-structured interviews
  - **Maps drawn:** **current states** for each agent and macro; **proposed future states** for each agent and macro
  - **Discussion** of potential results

# Case Study: agents

- Concima S.A. - a medium company that acts in development and construction of residential and commercial buildings;
- Lumibox Company - a small aluminum components producer responsible for manufacturing, supplying and installing aluminum components;
- Dealer – aluminum bars supply
- Alcoa Company (Worldwide lean implementation)
  - Poços de Caldas Plant: bauxite extraction and primary aluminum producing
  - Sorocaba Plant: bars extrusion

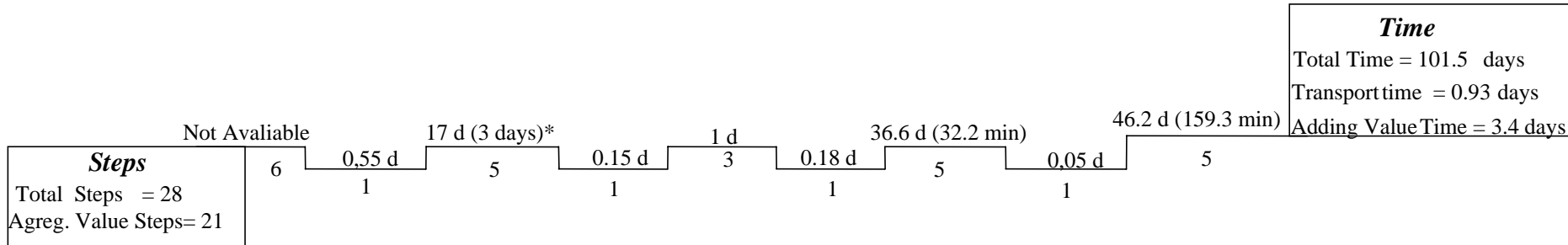
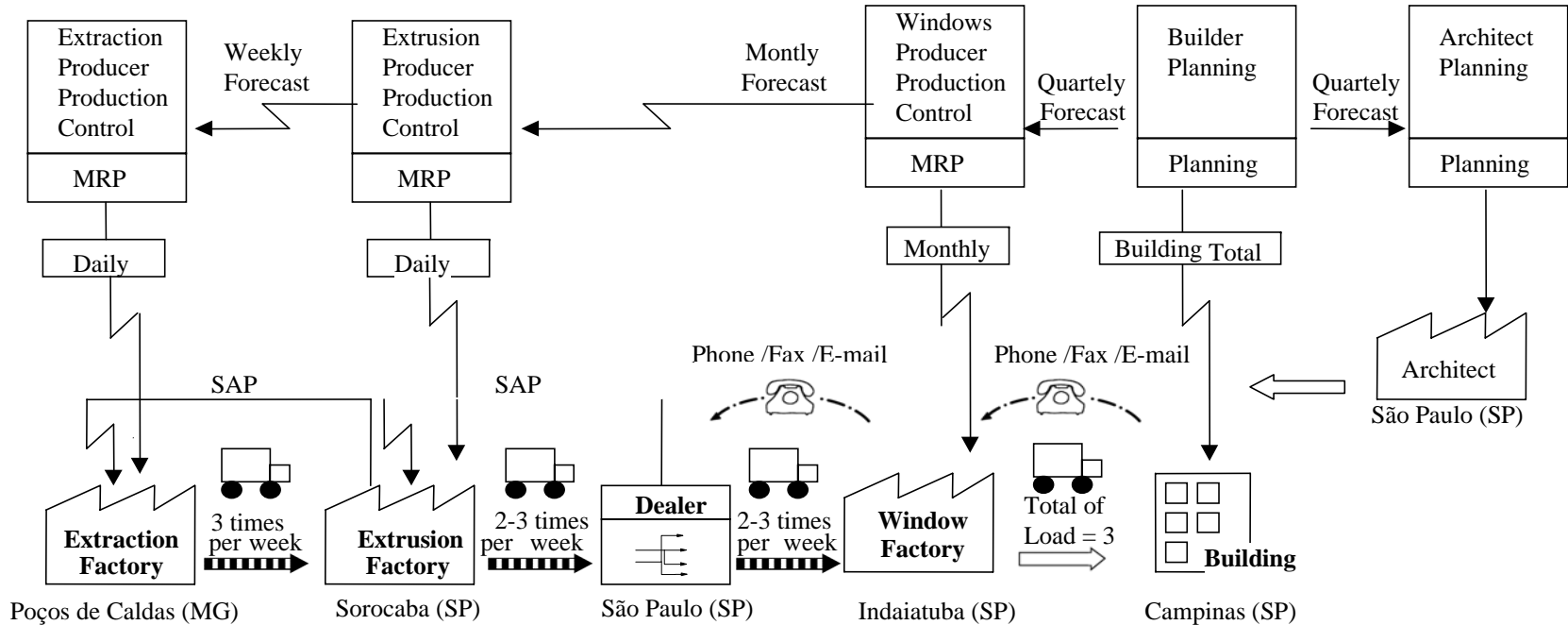
# Builder Value Stream Mapping Current State



**Production Lead Time = 46.2 days**

**Adding Value Time = 159.3 min**

# Value Stream Mapping Current State

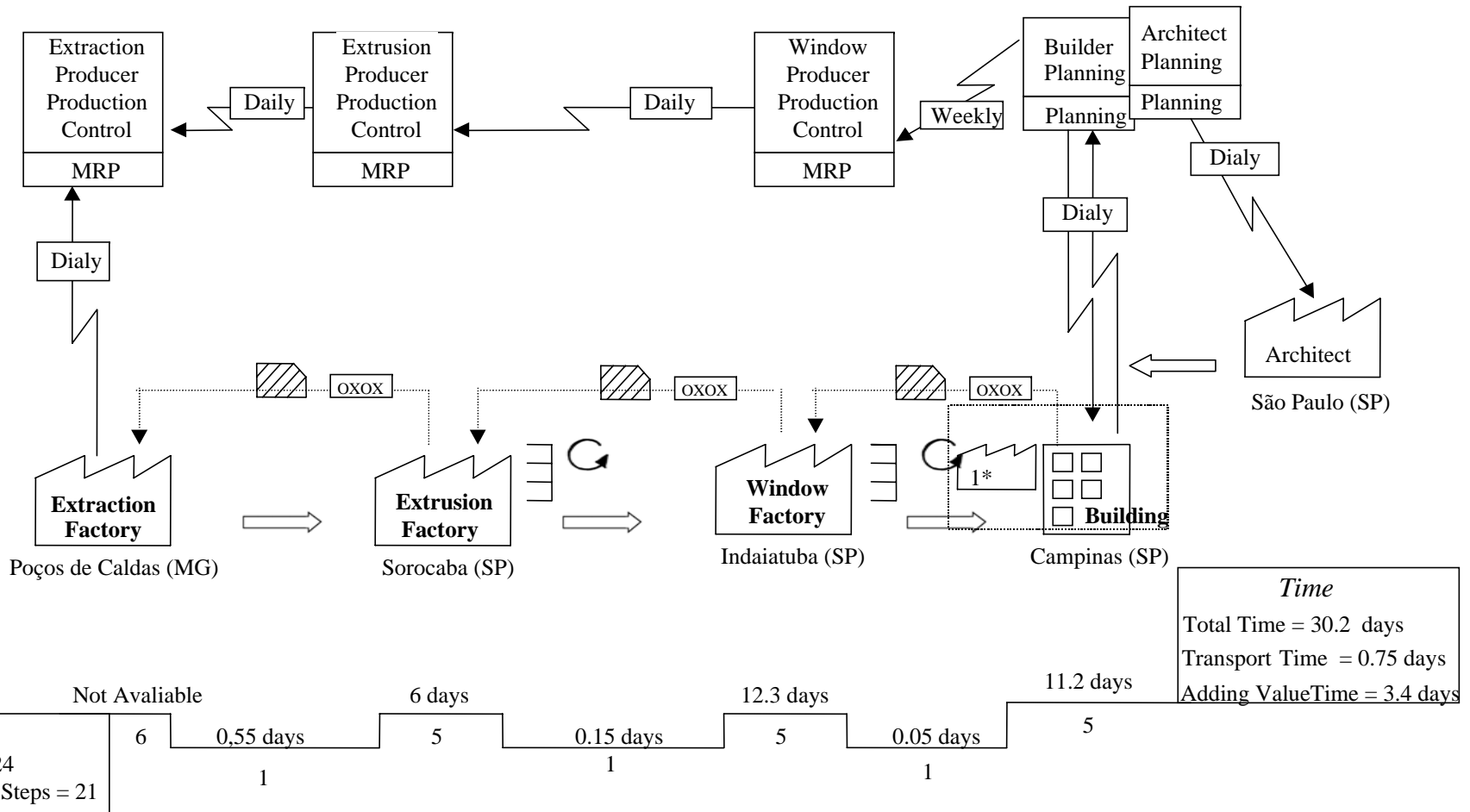


\* Adding Value Time of Value Stream Mapping door to door

# Proposed Actions for the Future State of the VSMM

- Inside factories:
  - Adoption of flow and pull systems (resulting in inventory and lead time reduction)
- In job site:
  - Creation of a aluminum window assembly, production pulled by installation
  - Reduction of waiting time between frame and window installation
  - Balanced workers teams with standardized work
- Dealer: elimination (in implementation by ALCOA)
- Among agents
  - smaller lots delivery and pull system
  - Integrated information system

# Value Stream Mapping Future State



# Potential results

Wastes are evident when comparing Total Time:

## Value Stream Macro Mapping Current State

### Time

Total Time = 101.5 d

Transport Time = 0.93 d

Adding Value Time = 3.4 d

## Value Stream Macro Mapping Future State

### Time

Total Time = **30.2 d**

Transport Time = **0.75 d**

Adding Value Time = 3.4 d

Reduction of  
60%

**Consequences: inventory reduction, market responsiveness, quality, productivity, cost, etc**

# Conclusions

- Construction has complex supply chains with weak coordination
- VSMM helps to identify wastes along the chain
- VSMM future state analysis directs lean concepts and tools application
- As in manufacturing, results sharing is a major issue



## *Challenges and Future Studies*

- VSMM application in other construction supply chains
- agents negotiation for future state design and implementation

*Thank you for your attention*