



ACCELERATING  
INNOVATION!

# The Smart Digital Sawmill

Hans Holmberg

Research Institutes of Sweden

Bioeconomy



# IoT Wood

The Smart Digital sawmill  
Or the wood industry's Internet of Things

Moelven, RemaSawco, Schneider Electric, RISE  
2 years, ended November 2018  
Totalt 1 M€ whereof Vinnova 0.4 M€

Project goals

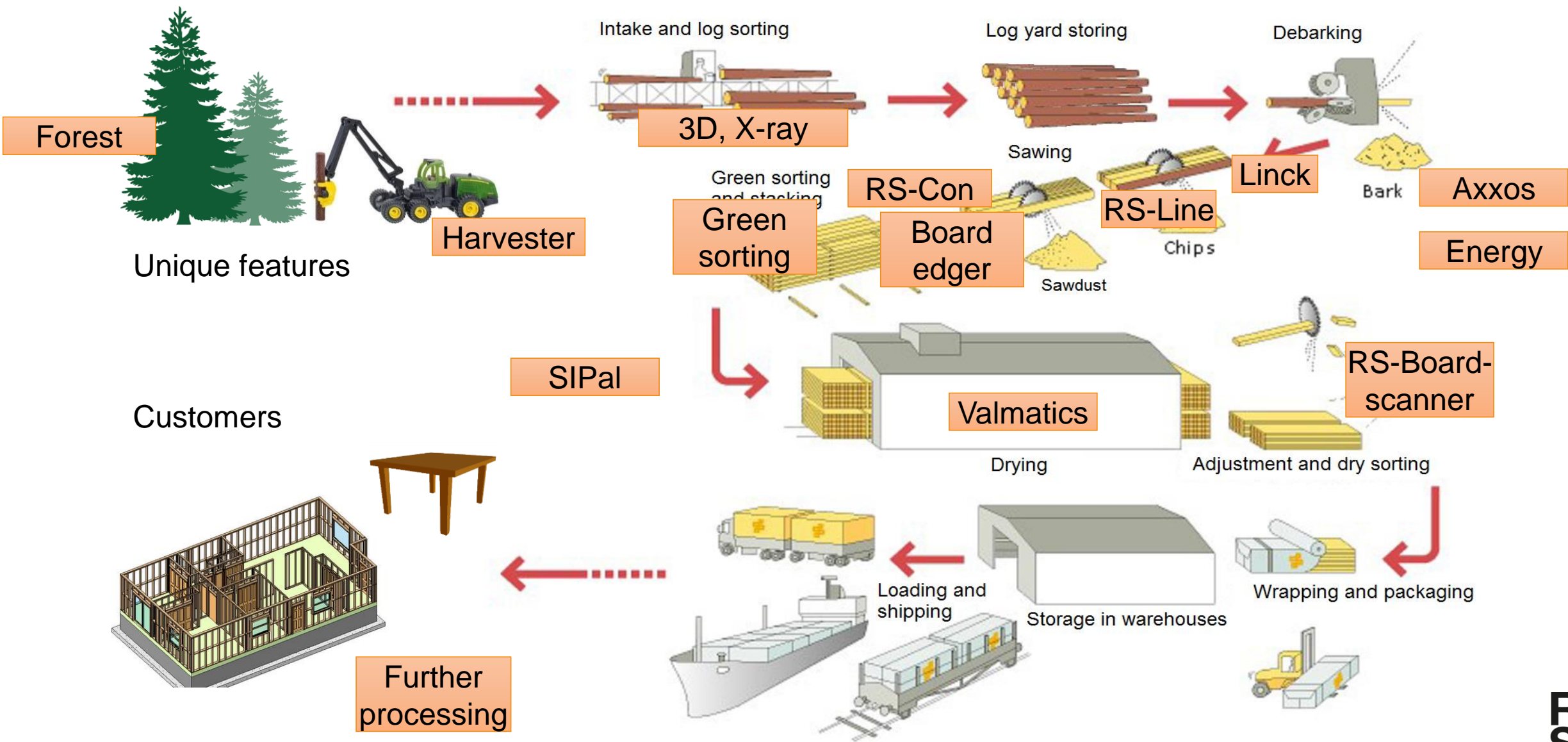
- Increase **process effectivity** with 15%
- Increase **product value** with 10%
- Reduce **energy consumption with** 10%.



This project is  
supported by  
Vinnova

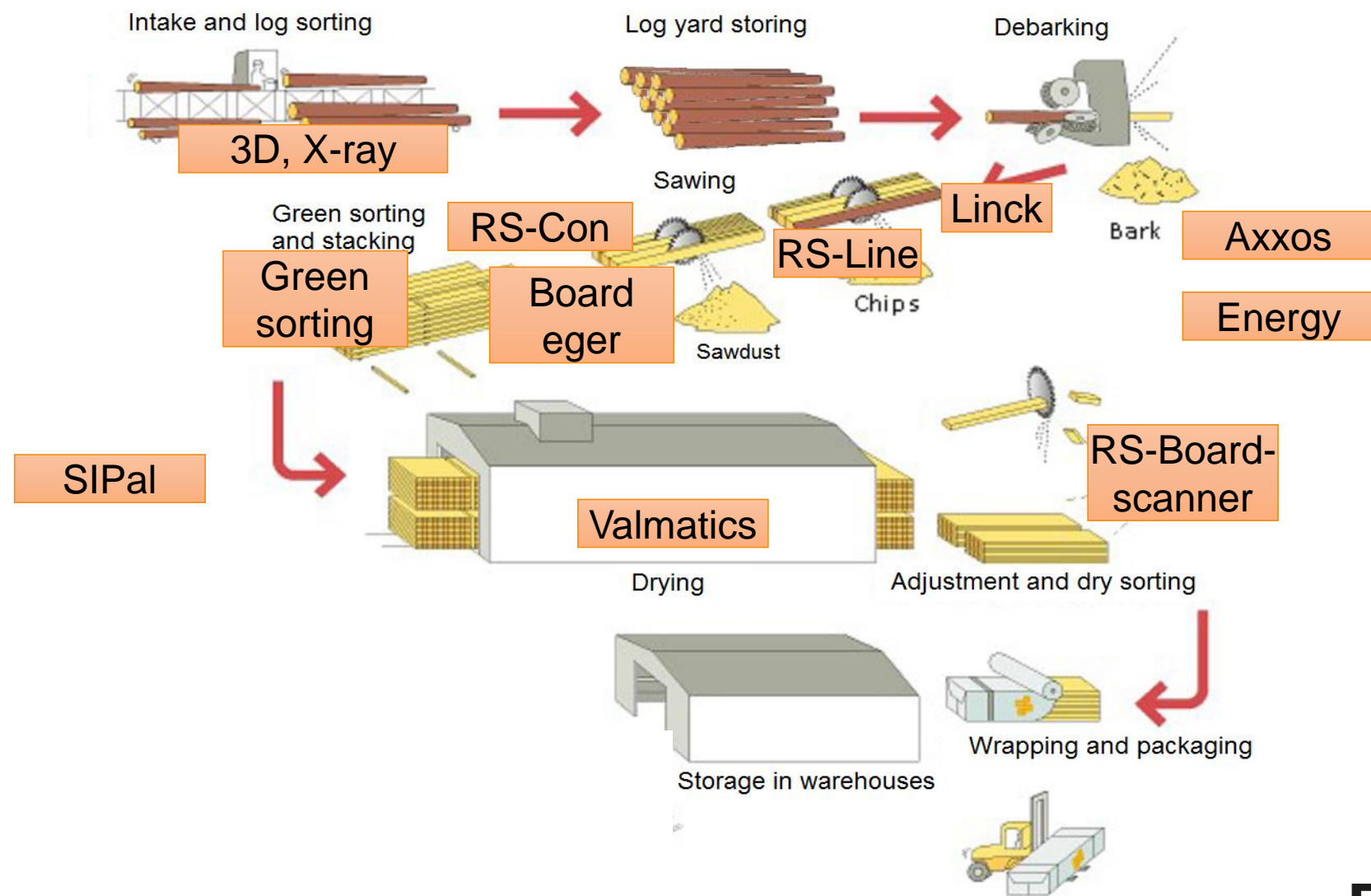


# Data and information is generated in many places



Based on an image by Swedish forest industries federation

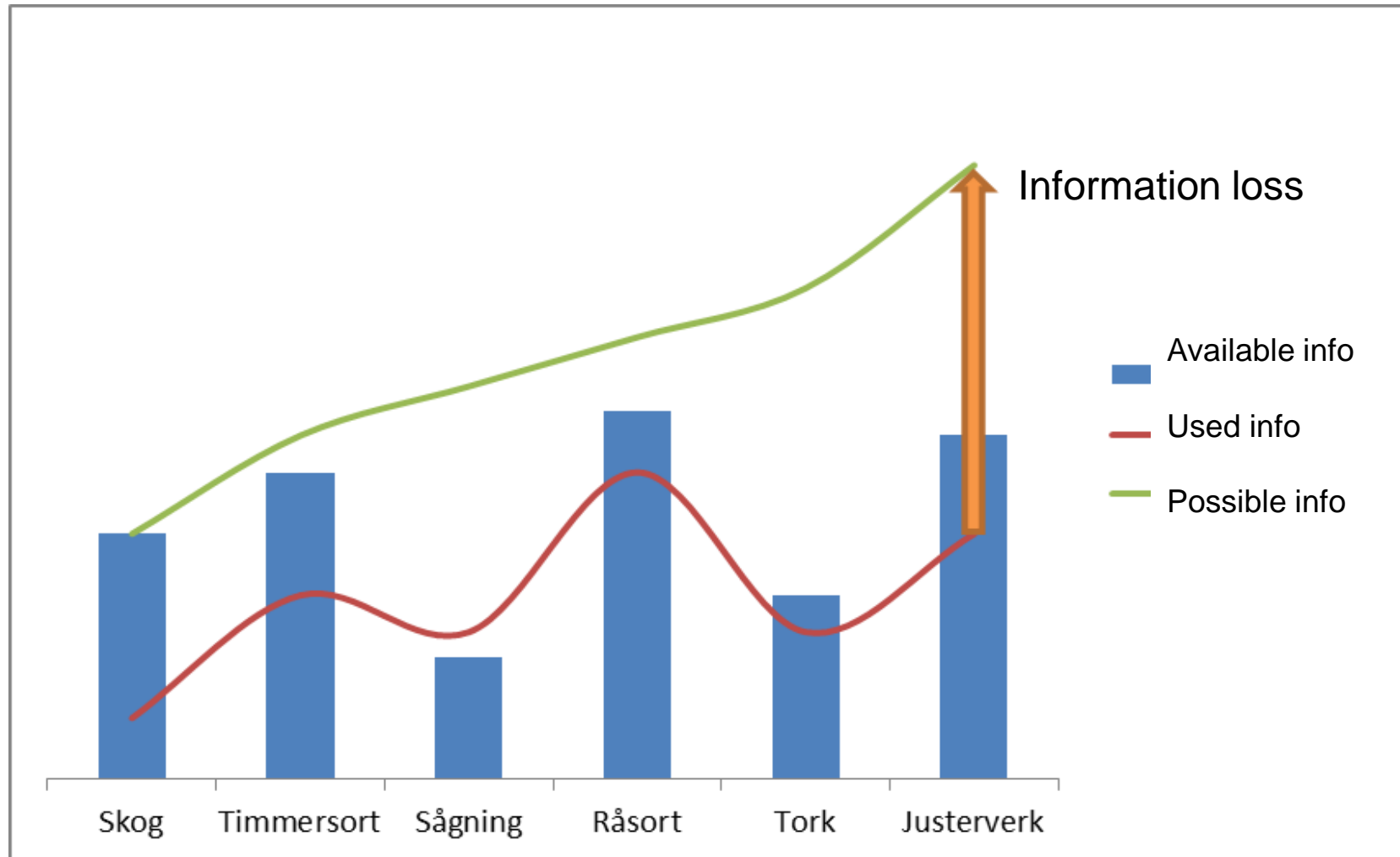
# We limit ourselves to the sawmill



Based on an image by Swedish forest industries federation

# Information loss

Instead of throwing away metrics: pair, store and **use** them





# The smart digital sawmill, Moelven Valåsen



Operational Data calendar year  
Sales 750 MSEK  
Staff 107 Employees  
Operating time 3400 hours

3 562 000 logs  
18 450 000 Sawn bits  
375 000 m<sup>3</sup> sawn timber

22 GW Electric Energy  
110 GW Thermal Energy  
630 000 m<sup>2</sup> industrial area



# Potential

## Find

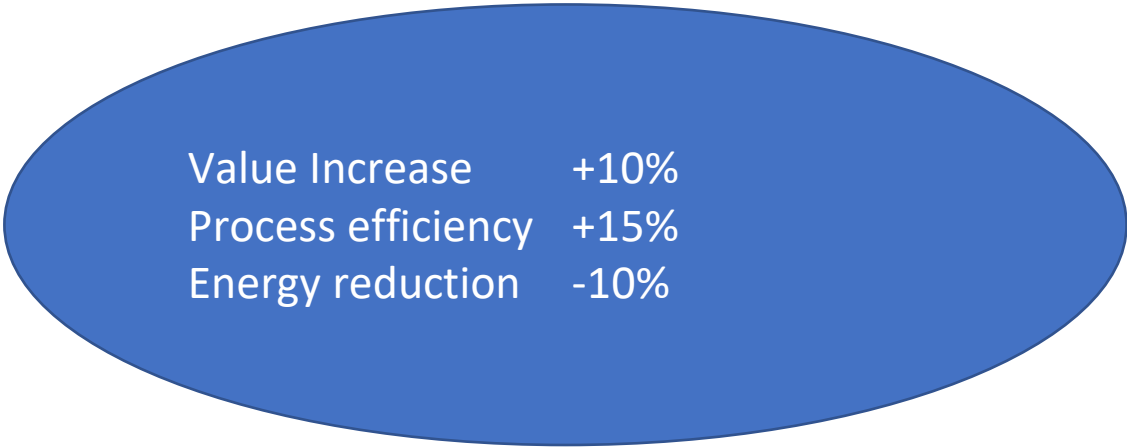
- Bottlenecks
- Losses (time, energy)
- Quality improvements
- Tracking
- Pattern in outcome
- Predictive analysis for maintenance needs
- Production planning
- Increased production efficiency etc.





# The needs of target groups based on a uniform image of target

1. Financial flow
2. Information flow
3. Physical process Flow

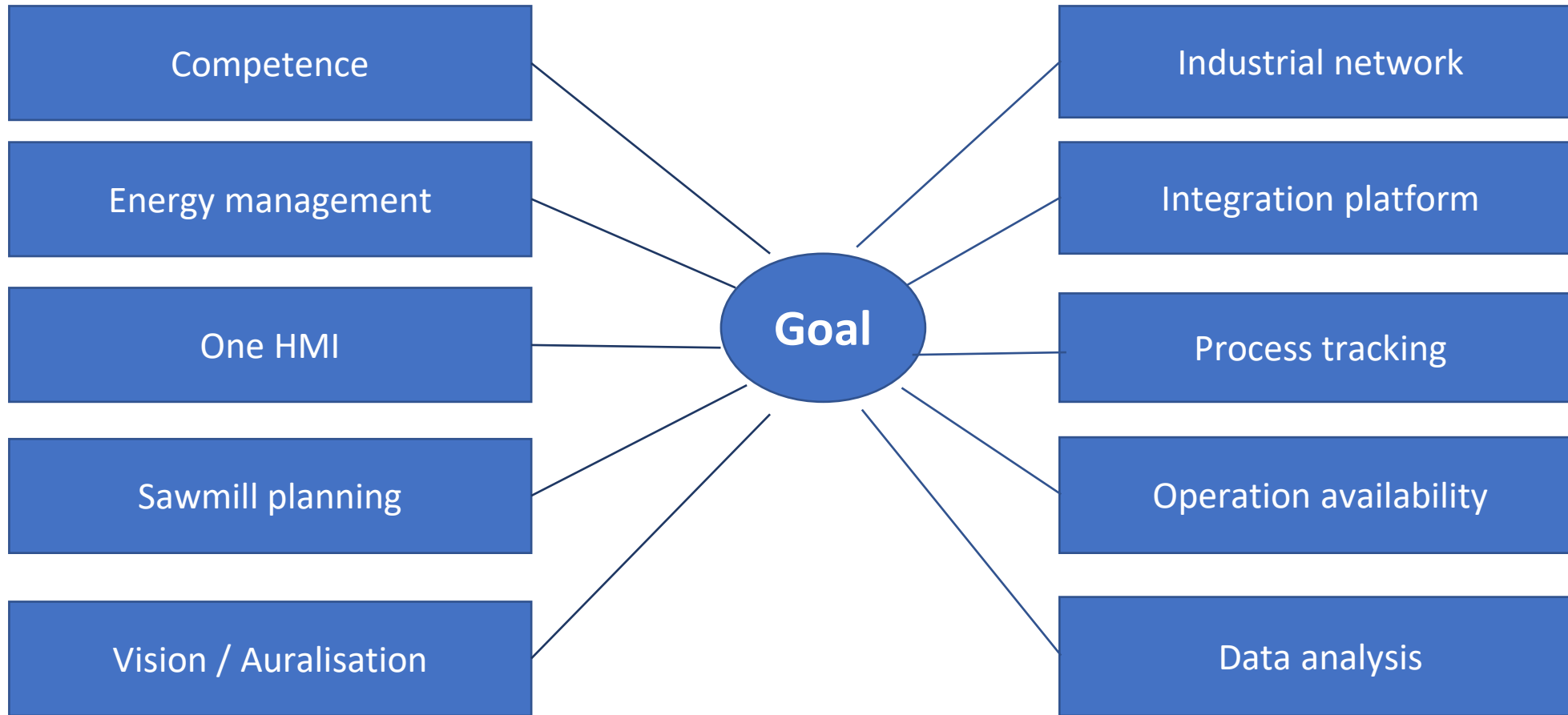


Value Increase	+10%
Process efficiency	+15%
Energy reduction	-10%

- In order to agree on a target, the following should be taken into account.
- Digitalization means seeing and understanding similarities and differences
- Define which activities and objectives are crucial for a successful factory



# Organising a project with creative persons





Collect all relevant data from the production systems

Collect them in a Cloud solution for Big Data Analytics

Find answers to questions we didn't know we should/could ask





Step 1: Information gathering, need-driven

Instead of retrieving ALL the data, we chose based on needs

Gradually we gather almost everything, but started small

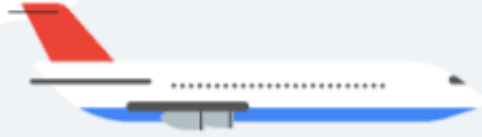


Step 2: Set up middleware to structure the data capture

Apache NiFi reads and orchestrates data from a number of sources

Sends it unified and structured to a cloud solution

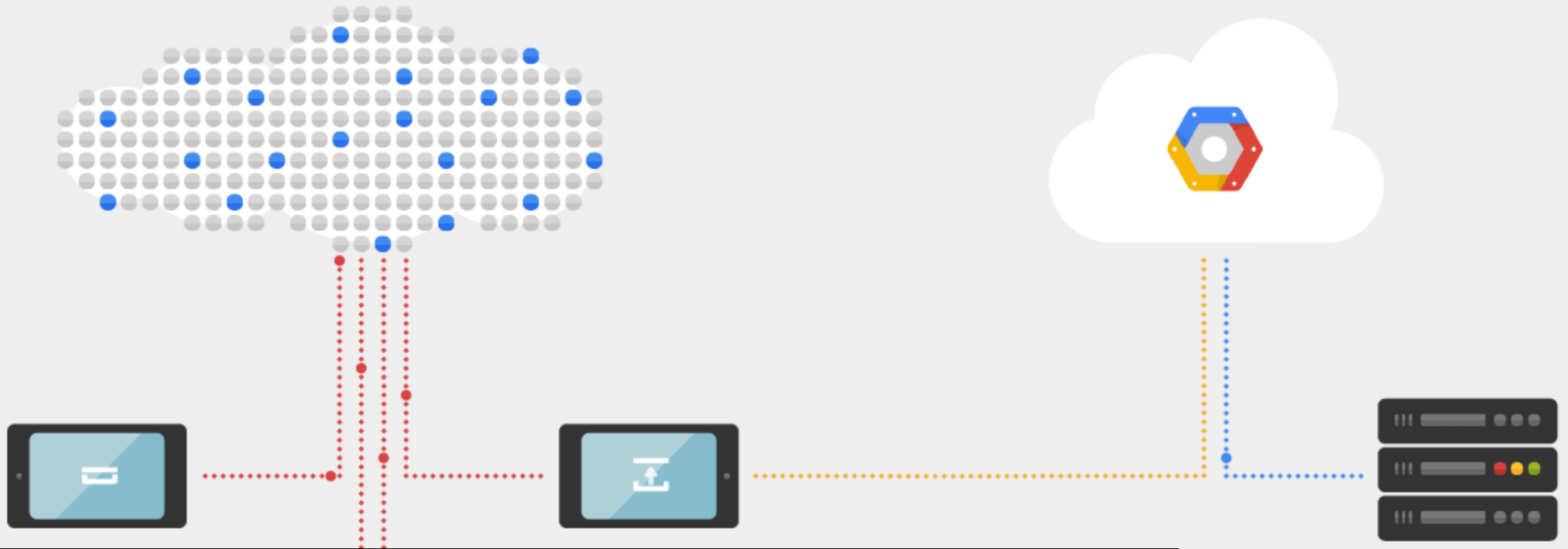




### Step 3: Platform selection

IBM Watson, Amazon, Microsoft Azure, Google Cloud Services

Relatively similar, but found that GCP worked best for us

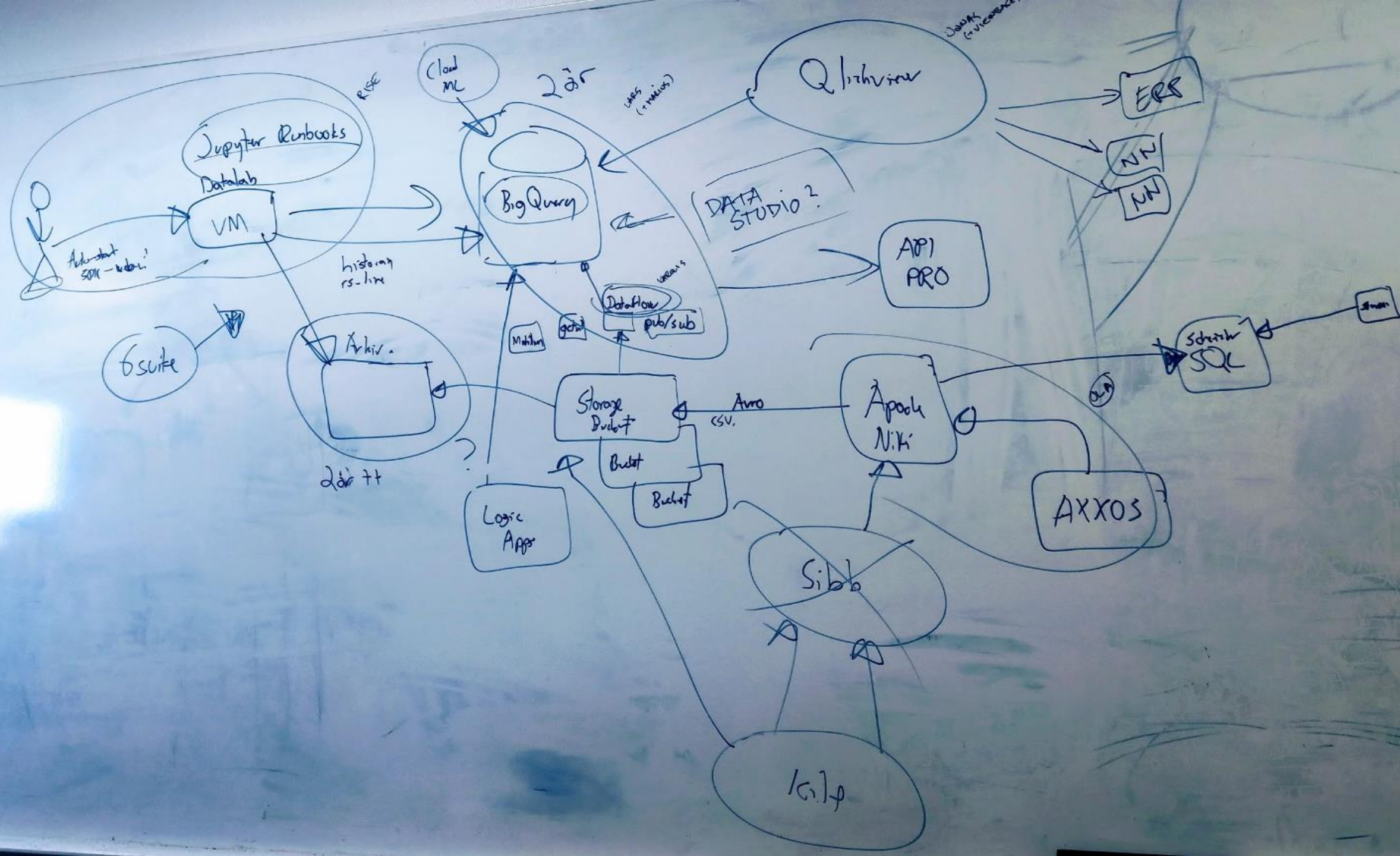


Step 4: Different tools for different problems

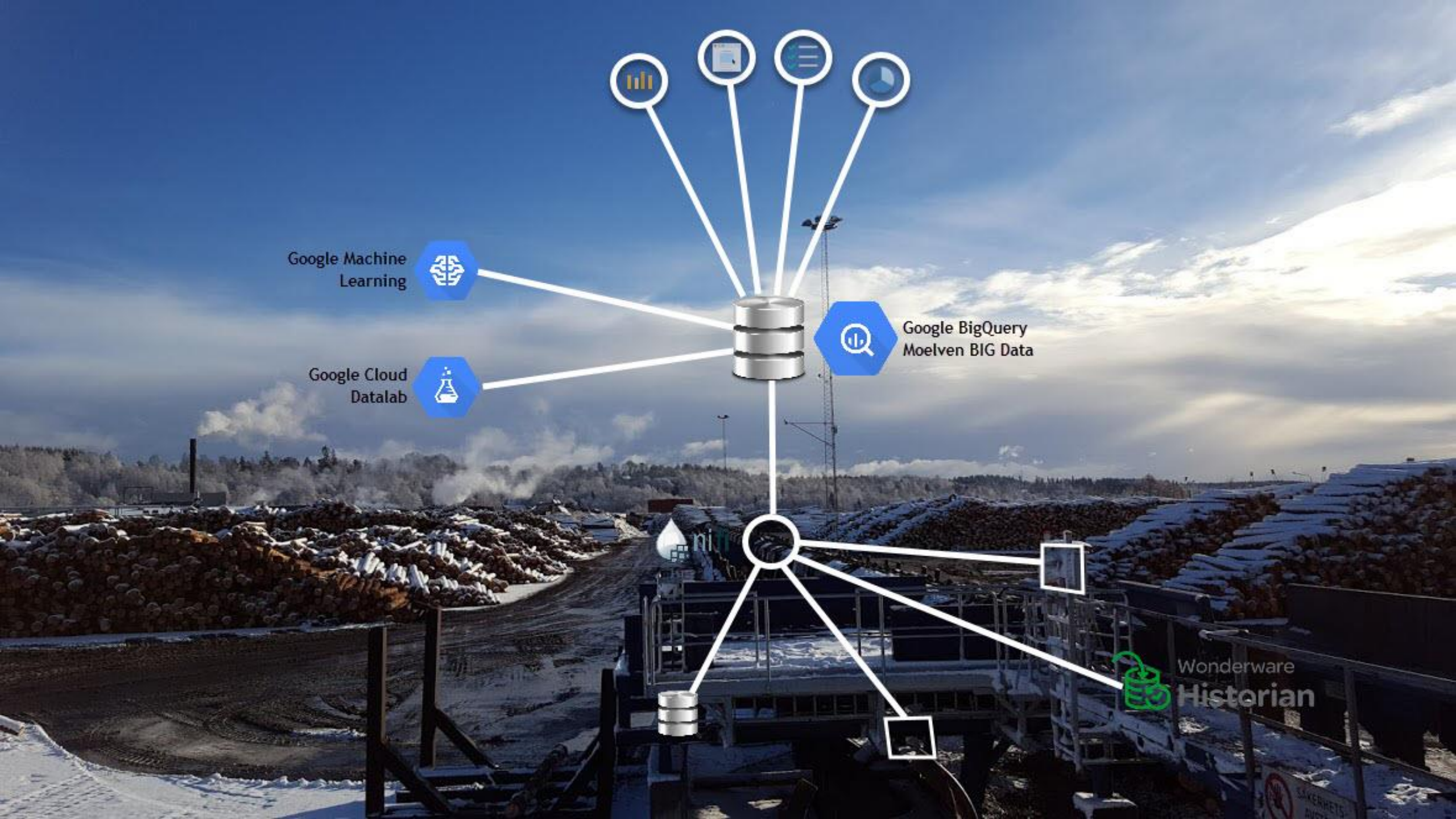
What are you going to use the data for? Who will use it?

Hard Realtime-Smartglance, Soft Realtime-Google Data Studio









Google Machine Learning



Google Cloud Datalab



Google BigQuery  
Moelven BIG Data



Wonderware  
Historian



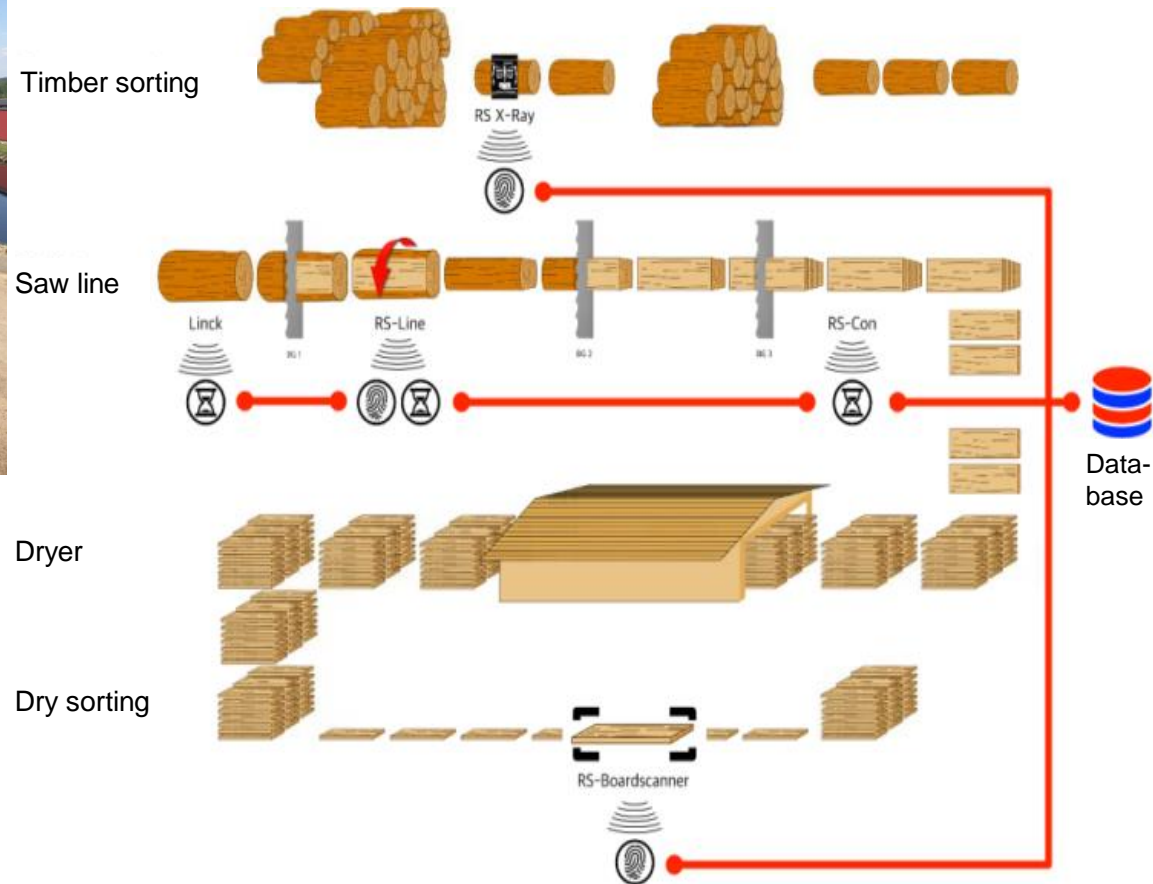
# Analysis

- Much could be done in isolation already before
- Now we can see correlations and relationships
- Prejudice can be confirmed or dismissed



# Tracking of produktion data

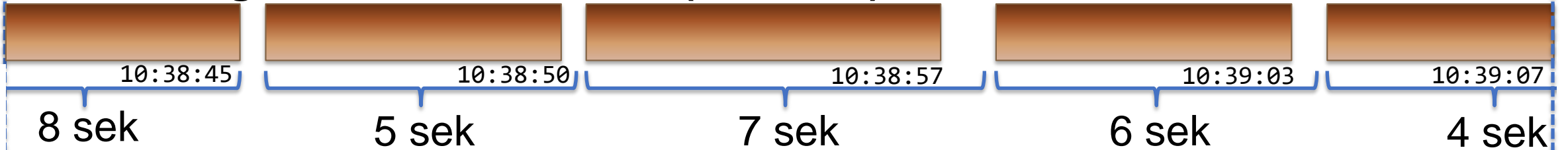
*"Easy to draw,  
hard to do"*



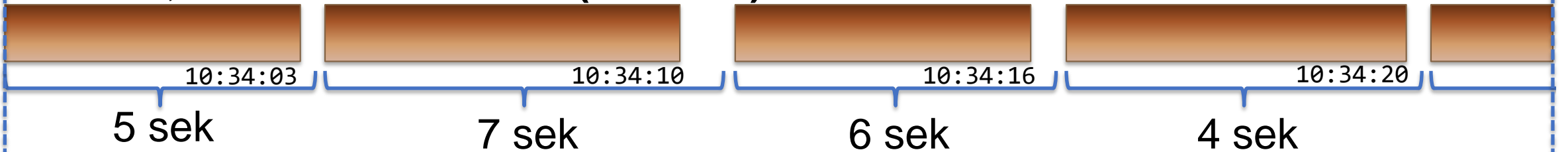


# Tracking by production patterns: DeltaTime

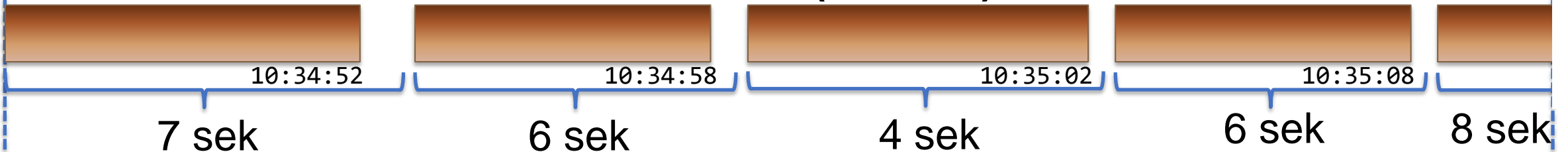
## Meter 1, log measurement frame (Microtec)



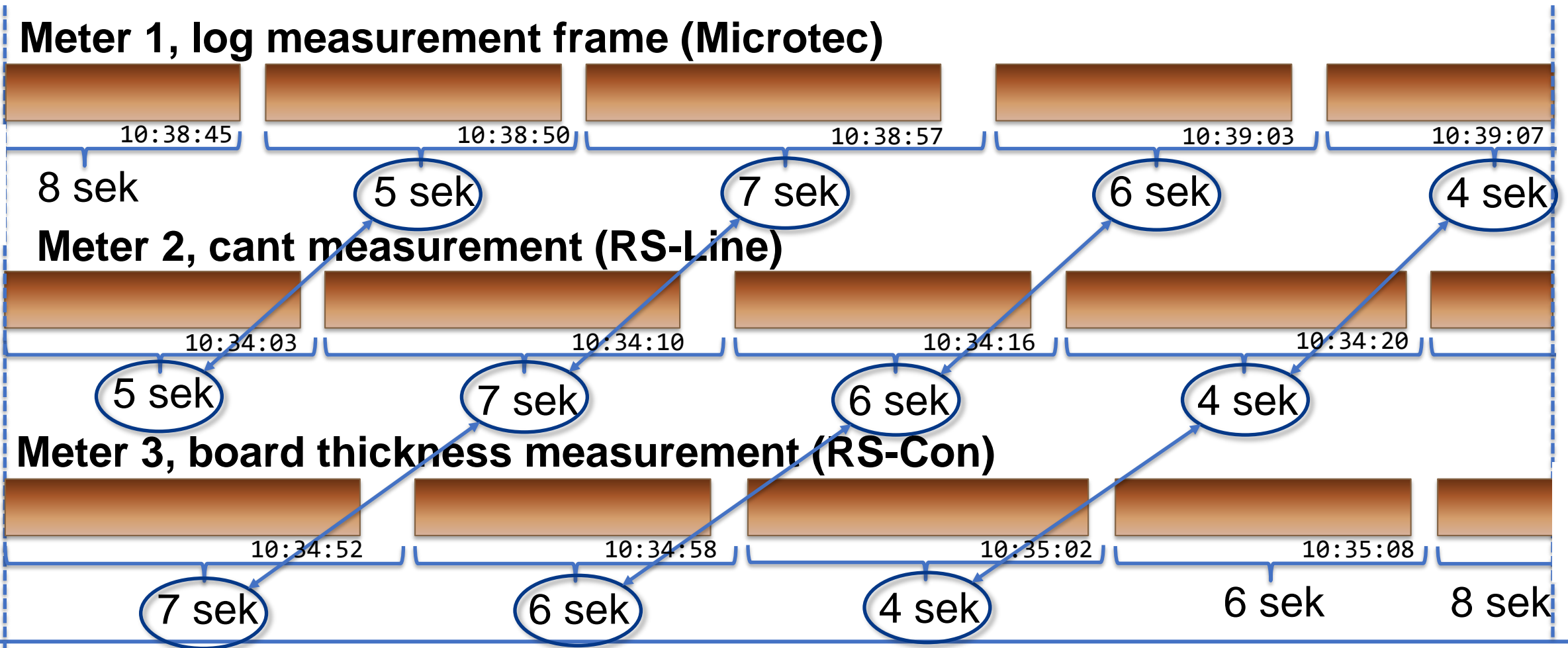
## Meter 2, cant measurement (RS-Line)



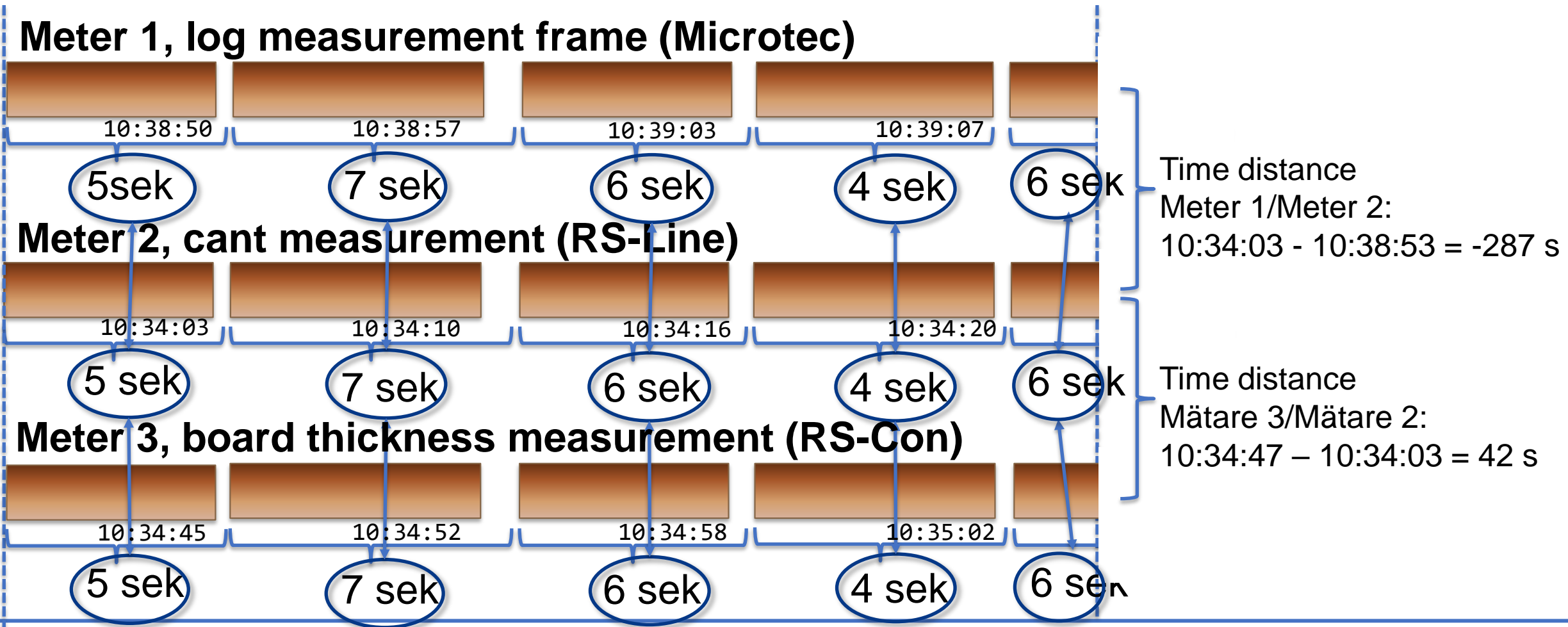
## Meter 3, board thickness measurement (RS-Con)



# Tracking by production patterns: DeltaTime



# Tracking by production patterns: DeltaTime





# Analysis

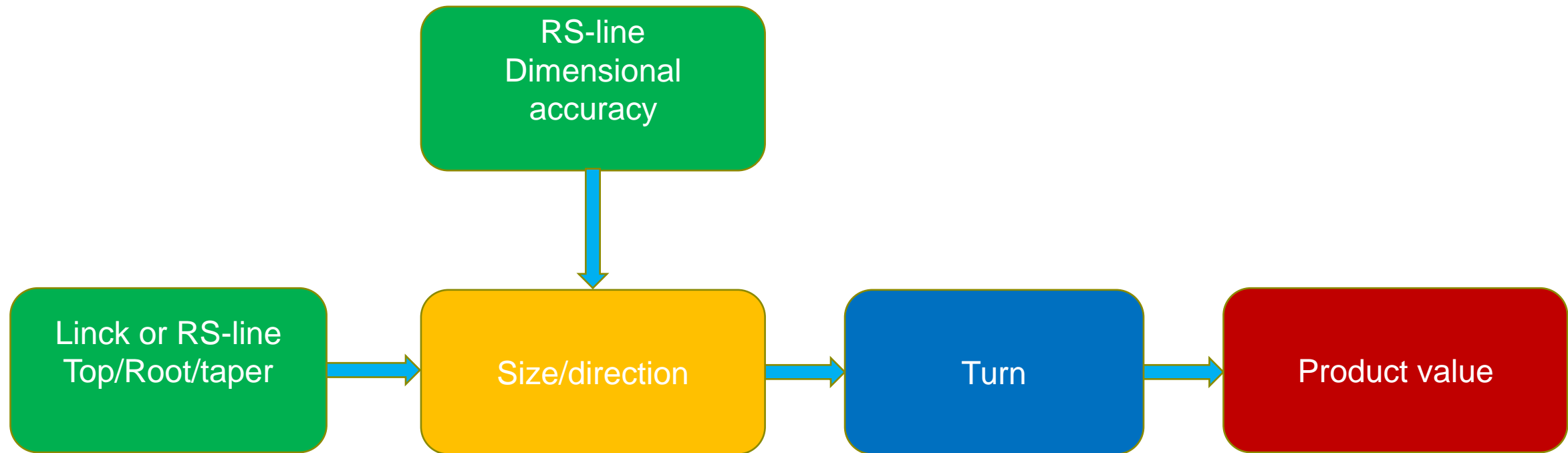
Operator – Monitoring, Immediate action

Planner – Follow-up, steering, days, weeks

Management – Follow-up, weeks, months, years

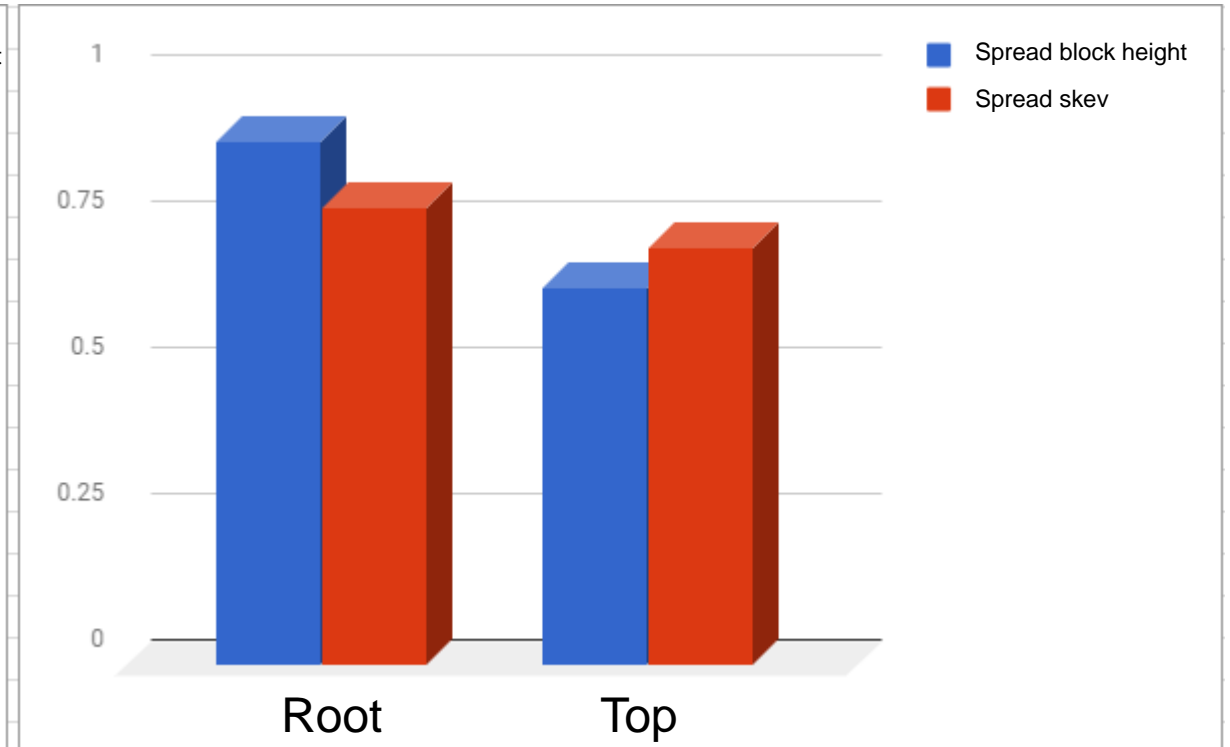
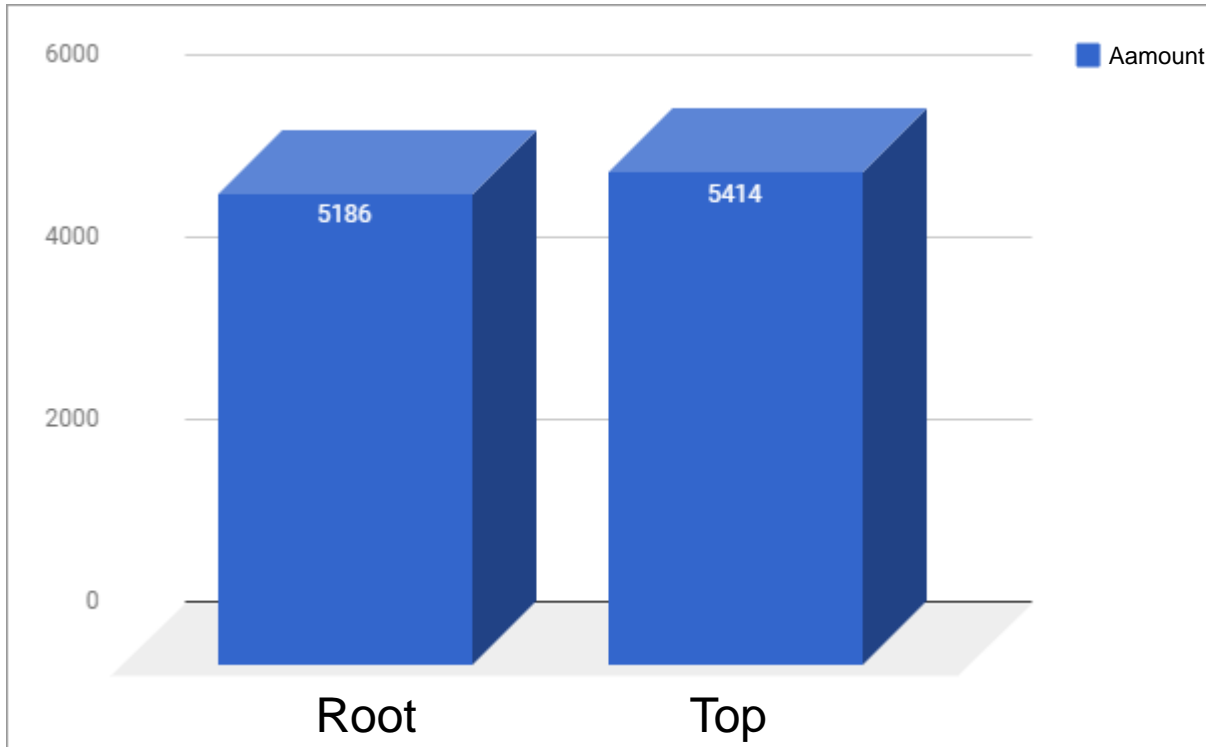
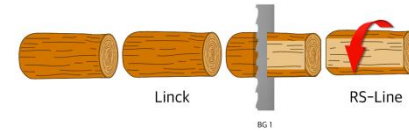


Example of analysis to make  
Does the top/root first or tapering measure affect the  
accuracy?



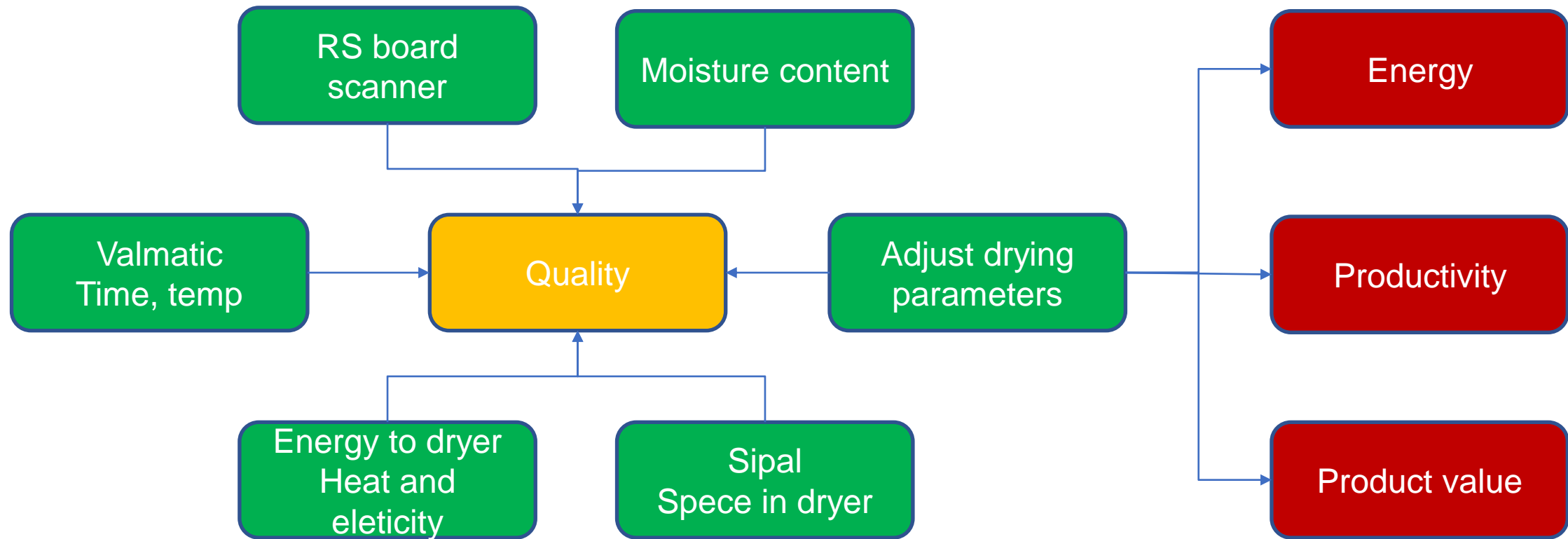
# Top or root first?

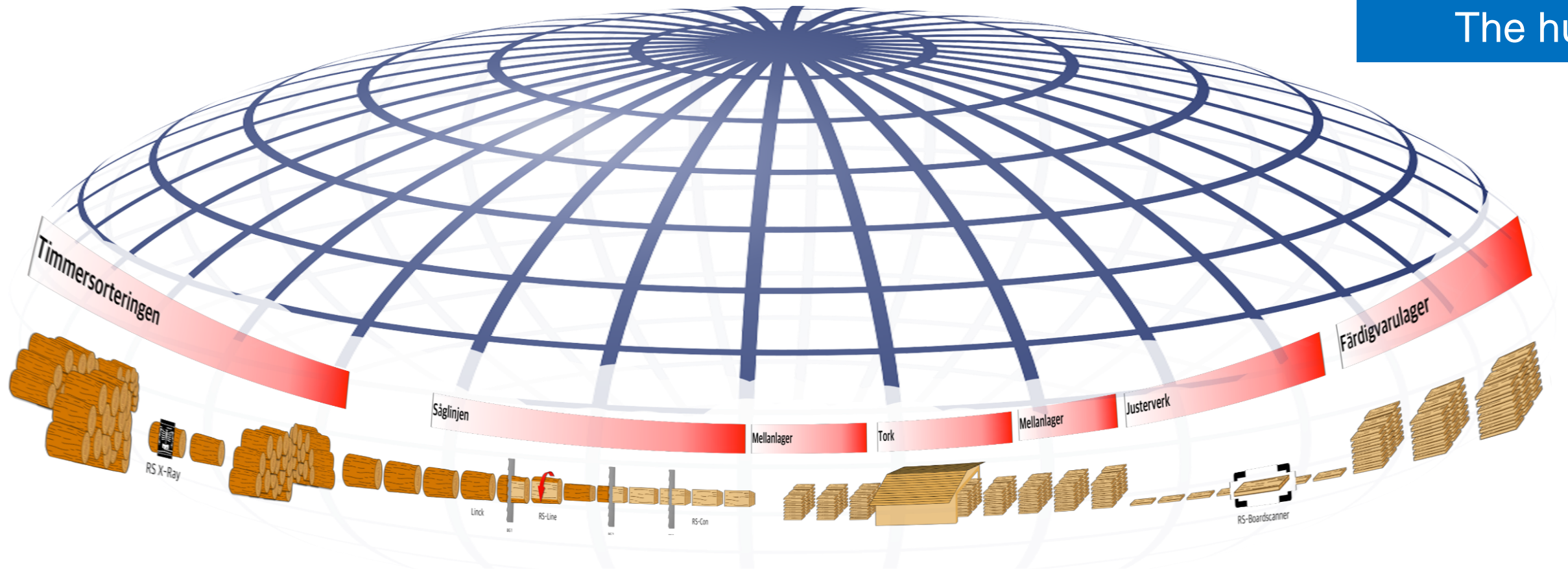
Såglinjen





# Example of analysis to make - How does the drying parameters affect the final quality?



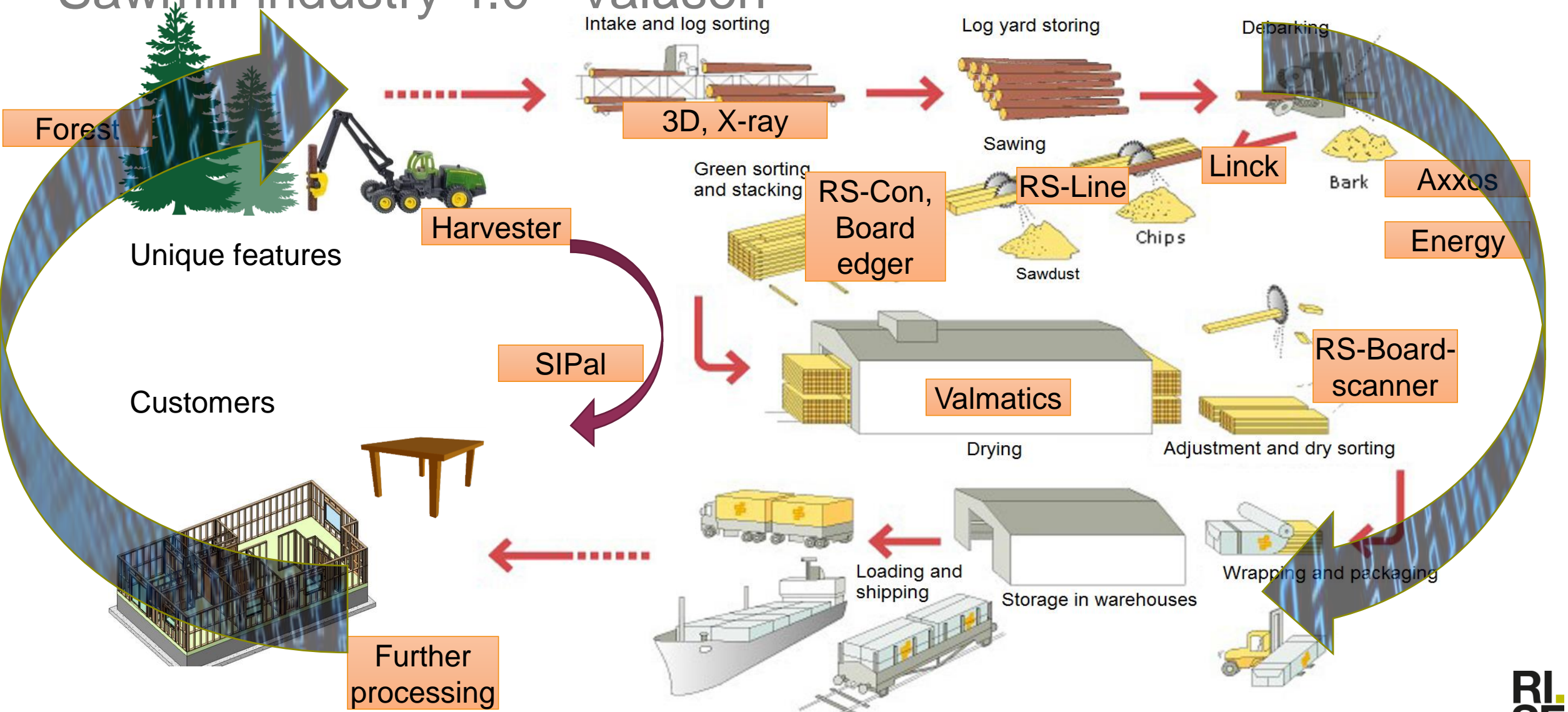


Follow a log to boards  
throughout the process



# Almost done!

## Sawmill industry 4.0 - Valåsen



Based on an image by Swedish forest industries federation



Thank You!

Hans Holmberg

[hans.holmberg@ri.se](mailto:hans.holmberg@ri.se)

Research Institutes of Sweden

**Bioeconomy**



This project is  
supported by  
Vinnova

