

Business Process Management

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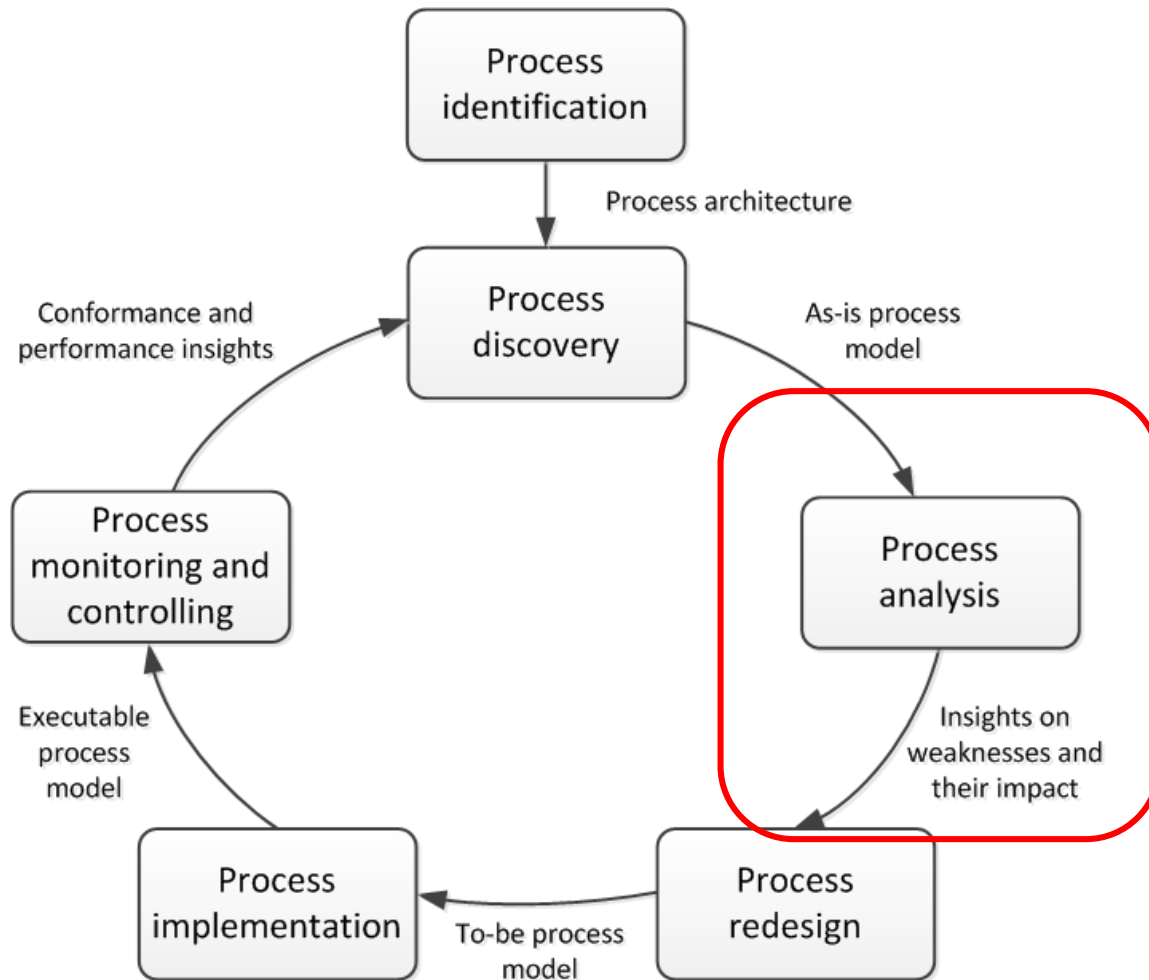
SAPIENZA
UNIVERSITÀ DI ROMA

Lecture 7: Qualitative Analysis

Adapted from the slides for the book :
Dumas, La Rosa, Mendling & Reijers: Fundamentals of Business Process Management, Springer 2013

<http://courses.cs.ut.ee/2013/bpm/uploads/Main/ITlecture4.ppt>

Business Process Analysis



Purposes of Qualitative Analysis

Identify and eliminate waste

- Valued-added analysis

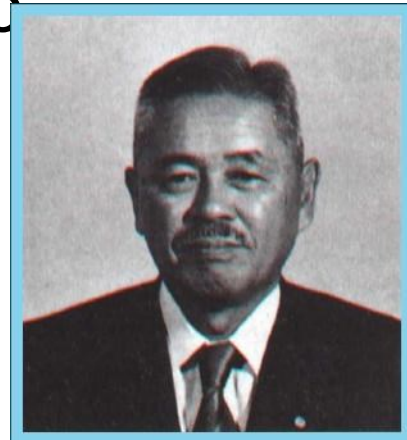
Identify, understand and prioritize issues

- Issue register
- Root-cause analysis (e.g. cause-effect diagrams)
- Pareto analysis

Eliminating Waste

"All we are doing is looking at the time line, from the moment the customer gives us an order to the point when we collect the cash. And we are reducing the time line by reducing the non-value-adding wastes"

Taiichi Ohno



7+1 Sources of Waste

1. **Unnecessary Transportation** (*send, receive*)
2. **Inventory** (*large work-in-process*)
3. **Motion** (*drop-off, pick-up, go to*)
4. **Waiting** (*waiting time between tasks*)
5. **Over-Processing** (*performing what is not yet needed or might not be needed*)
6. **Over-Production** (*unnecessary cases*)
7. **Defects** (*rework to fix defects*)
8. **Resource underutilization** (*idle resources*)

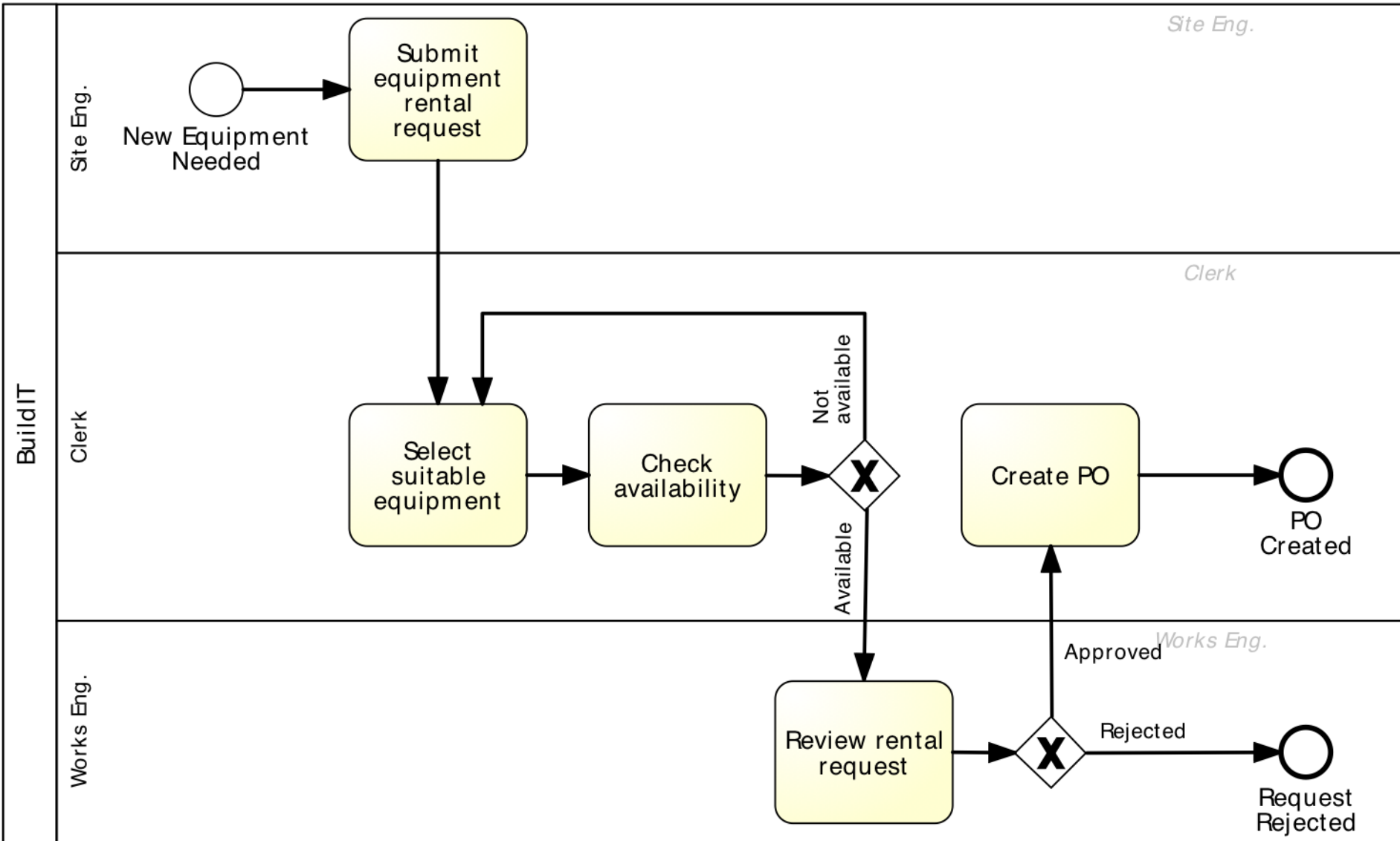
Source: Seven Wastes defined by Taiichi Ohno

8th waste coined by Ben Chavis, Jr.

Value-Added Analysis

1. Decorticate the process into steps
2. Classify each step into:
 - Value-adding (VA): Produces value or satisfaction to the customer.
 - Is the customer willing to pay for this step?
 - Business value-adding (BVA): Necessary or useful for the business to run smoothly, or required due to the regulatory environment, e.g. checks, controls
 - Would the business potentially suffer in the long-term if this step was removed?
 - Non-value-adding (NVA) – everything else including handovers, delays and rework

Example (Equipment Rental Process)



Example – Equipment Rental Process

Step	Performer	Classification
Fill request	Site engineer	VA
Send request to clerk	Site engineer	NVA
Open and read request	Clerk	NVA
Select suitable equipment	Clerk	VA
Check equipment availability	Clerk	VA
Record recommended equipment & supplier	Clerk	VA
Forward request to works engineer	Clerk	VA
Open and examine request	Works engineer	BVA
Communicate issues	Works engineer	BVA
Forward request back to clerk	Works engineer	NVA
Produce PO	Clerk	BVA
Send PO to supplier	Clerk	BVA

Admission Process

Consider the following process for the admission of graduate students at a university. In order to apply for admission, students first fill in an online form. Online applications are recorded in an information system to which all staff members involved in the admissions process have access to. After a student has submitted the online form, a PDF document is generated and the student is requested to download it, sign it, and send it by post together with the required documents, which include: 1. Certified copies of previous degree and academic transcripts. 2. Results of English language test. 3. Curriculum vitae.

When these documents are received by the admissions office, an officer checks the completeness of the documents. If any document is missing, an e-mail is sent to the student. The student has to send the missing documents by post. Assuming the application is complete, the admissions office sends the certified copies of the degrees to an academic recognition agency, which checks the degrees and gives an assessment of their validity and equivalence in terms local education standards. This agency requires that all documents be sent to it by post, and all documents must be certified copies of the originals. The agency sends back its assessment to the university by post as well. Assuming the degree verification is successful, the English language test results are then checked online by an officer at the admissions office. If the validity of the English language test results cannot be verified, the application is rejected (such notifications of rejection are sent by e-mail). Once all documents of a given student have been validated, the admission office forwards these documents by internal mail to the corresponding academic committee responsible for deciding whether to offer admission or not. The committee makes its decision based on the academic transcripts and the CV. The committee meets once every 2 to 3 weeks and examines all applications that are ready for academic assessment at the time of the meeting.

At the end of the committee meeting, the chair of the committee notifies the admissions office of the selection outcomes. This notification includes a list of admitted and rejected candidates. A few days later, the admission office notifies the outcome to each candidate via e-mail. Additionally, successful candidates are sent a confirmation letter by post.

Issue Register

- Purpose: categorise identified issues in as-is process modelling
- Usually a table with the following columns (possibly others):
 - issue number
 - name
 - Description/explanation
 - Impact: Qualitative vs. Quantitative
 - Possible solution

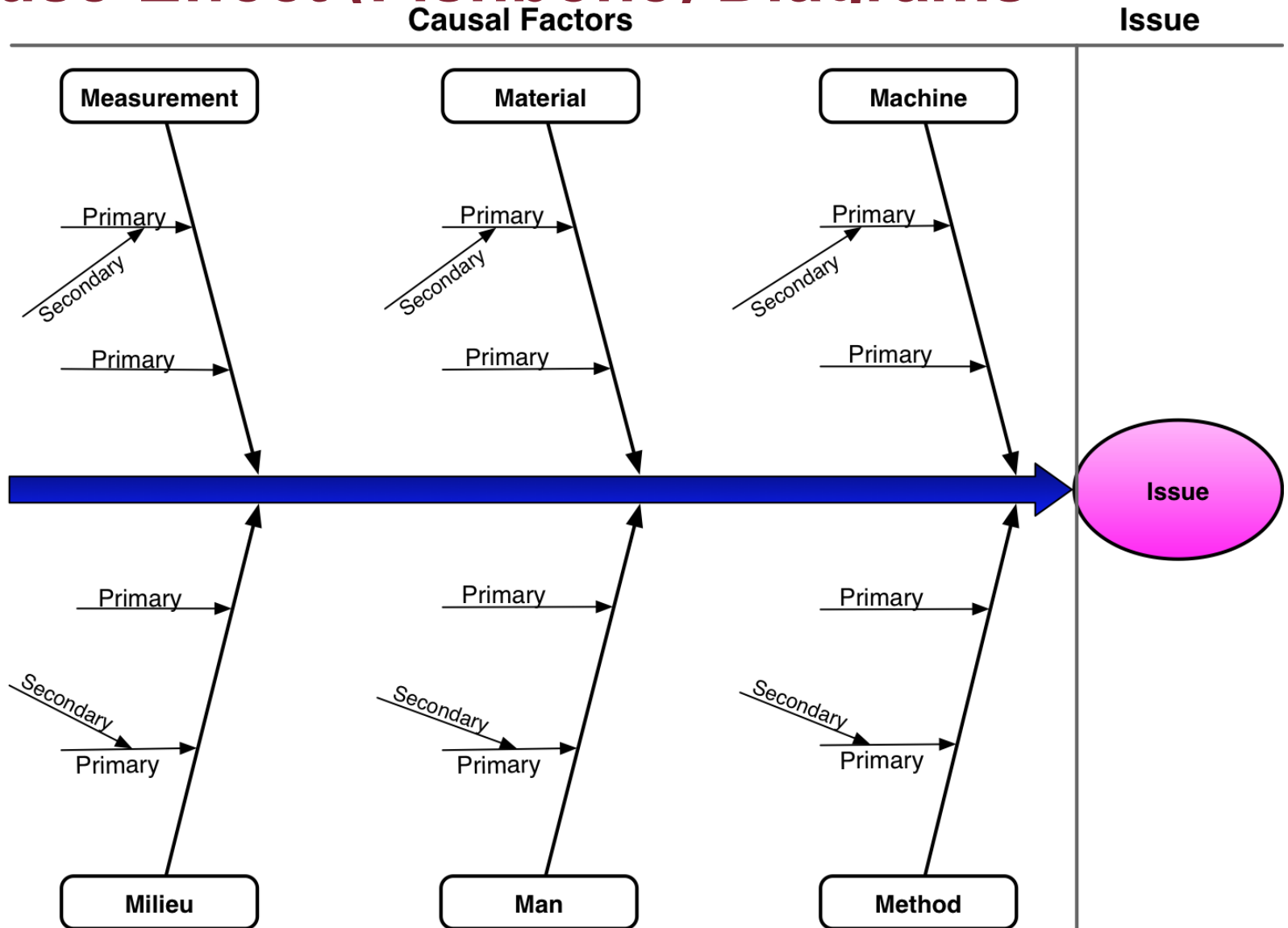
Issue Register (Equipment Rental)

Name	Explanation	Assumptions	Qualitative Impact	Quantitative Impact
Equipment kept longer than needed	Site engineers keep the equipment longer than needed by means of deadline extensions	BuildIT rents 3000 pieces of equipment p.a. In 10% of cases, site engineers keep the equipment two days longer than needed. On average, rented equipment costs 100 per day		$0.1 \times 3000 \times 2 \times 100 = 60,000$ p.a.
Rejected equipment	Site engineers reject delivered equipment due to non-conformance to their specifications	BuildIT rents 3000 pieces of equipment p.a. Each time an equipment is rejected due to an internal mistake, BuildIT is billed the cost of one day of rental, that is 100. 5% of them are rejected due to an internal mistake	Disruption to schedules. Employee stress and frustration	$3000 \times 0.05 \times 100 = 15,000$ p.a.
Late payment fees	BuildIT pays late payment fees because invoices are not paid by the due date	BuildIT rents 3000 pieces of equipment p.a. Each equipment is rented on average for 4 days at a rate of 100 per day. Each rental leads to one invoice. About 10% of invoices are paid late. Penalty for late payment is 2%.		$0.1 \times 3000 \times 4 \times 100 \times 0.02 = 2400$ p.a.

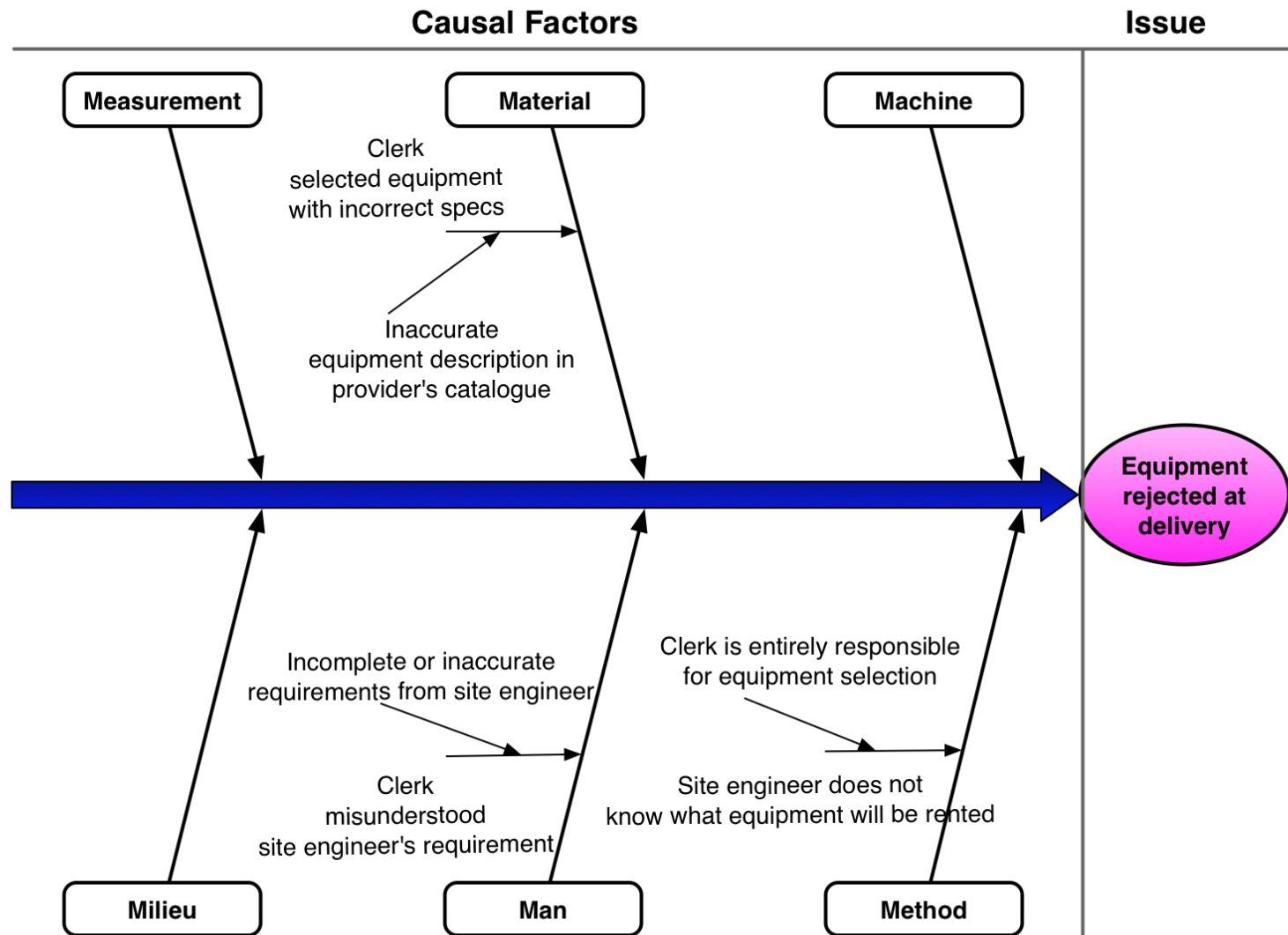
Techniques for issue analysis

- Cause-effect diagrams
- Why-why diagrams
- Pareto charts

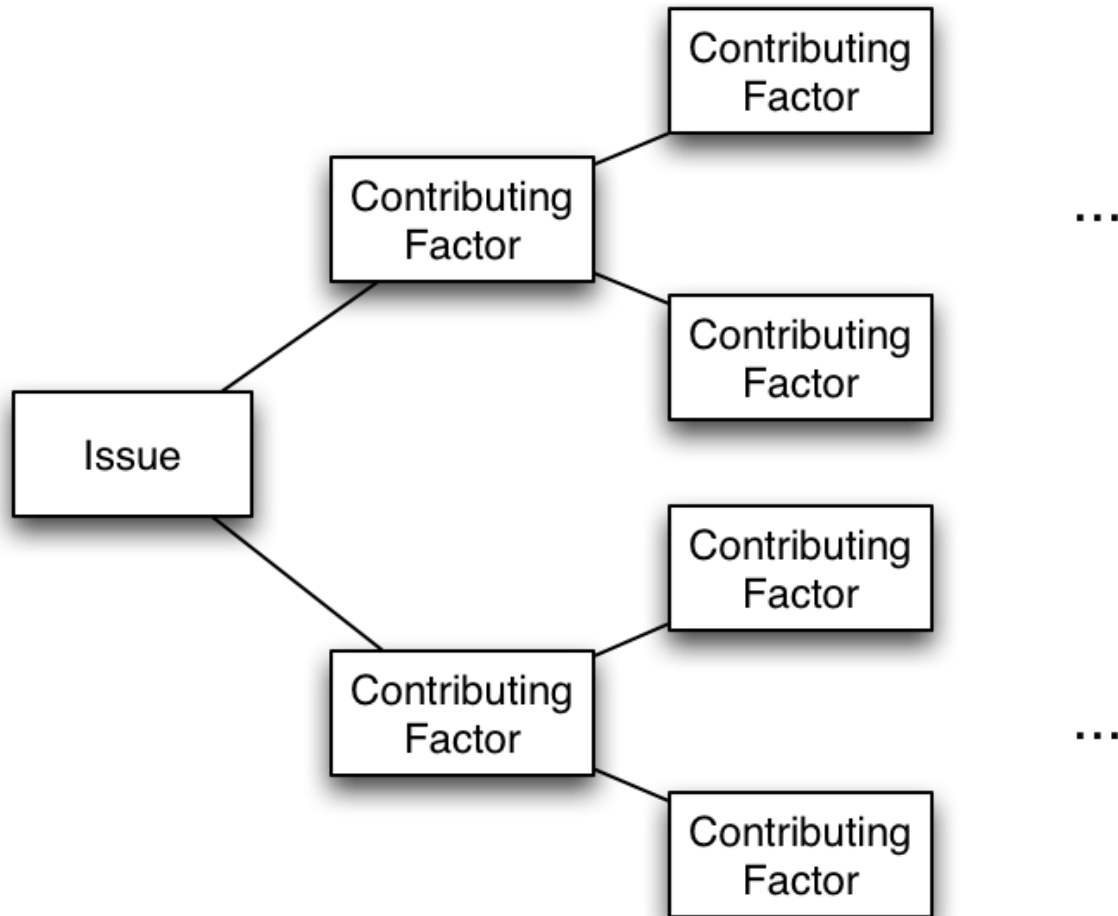
Cause-Effect (Fishbone) Diagrams



Cause-effect diagram (rejected equipment)



Why-Why Diagram



Why-why diagram (equipment rental)

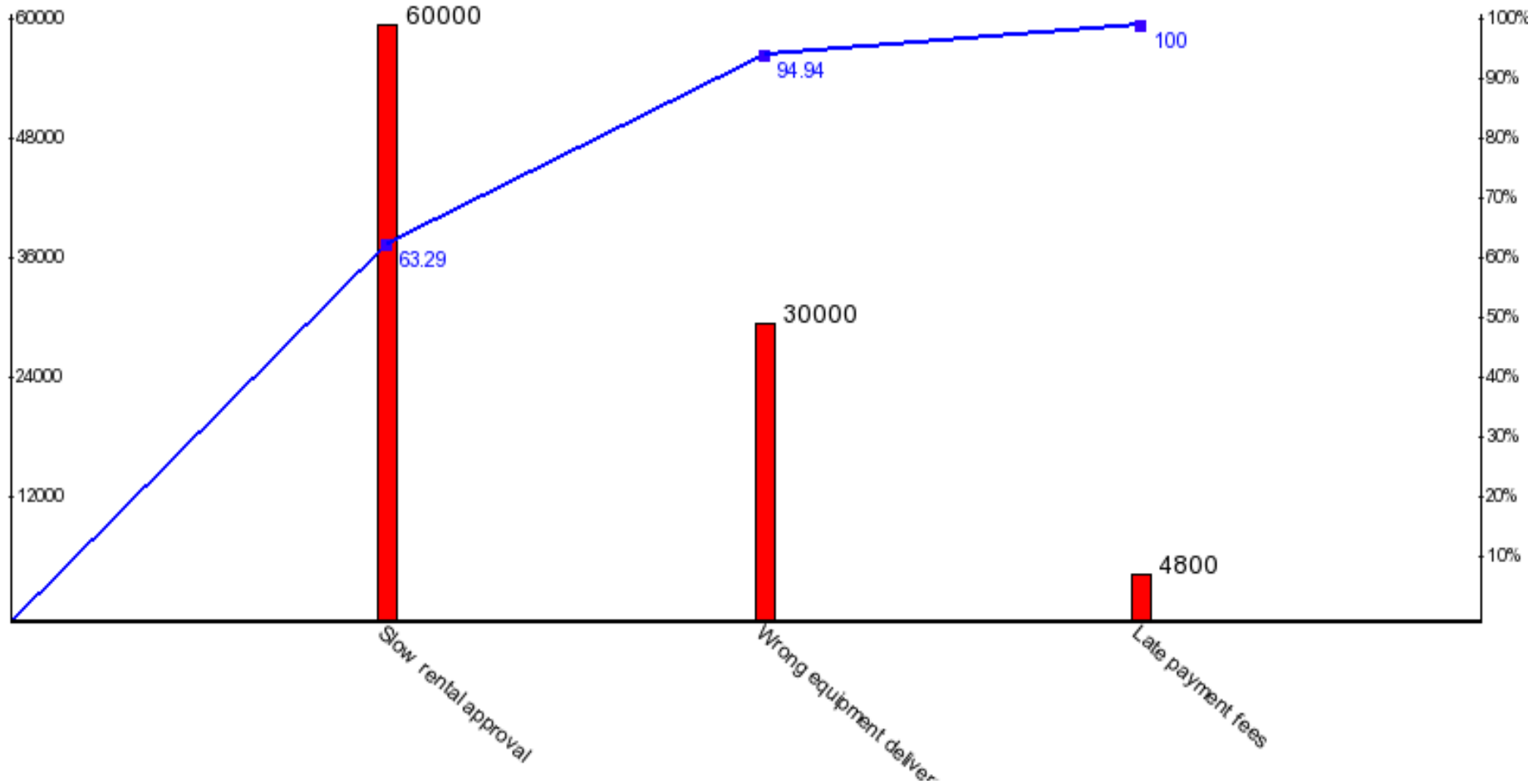
Site engineers keep equipment longer, why?

- Site engineer fears that equipment will not be available later when needed, why?
 - time between request and delivery too long, why?
 - excessive time spent in finding a suitable equipment and approving the request, why?
 - time spent by clerk contacting possibly multiple suppliers sequentially;
 - time spent waiting for works engineer to check the requests;

Pareto chart

- Useful to prioritize a collection of issues or factors behind an issue
- Bar chart where the height of the bar denotes the impact of each issue
- Bars sorted by impact
- Superposed curve where the y-axis represents the cumulative percentage impact

Pareto chart (excessive rental expenses)



<http://pareto-chart.qtcharts.com/index.php?g=prtt>