CLEAN

CLEAN method for LEAN practitioners

Constraint-led LEAN: Theory of Constraints governs the system. LEAN tools belong in subsystems — after the system rules are set. Plus Critical Chain (CCPM) for projects.

Briefing · Frisse Bronnen · 2026

WHY THIS BRIEFING EXISTS

The LEAN ceiling

LEAN removes waste. Six Sigma reduces variation. Both are valuable. Neither automatically raises the throughput of a dependent system.

In production and in knowledge work, teams often perfect every station. Local efficiency rises. Lead times and cash do not. Eliyahu Goldratt named the underlying law: the system is limited by its constraint. Improving non-constraints creates the illusion of progress.

> "A system of local optima is not an optimum system at all." – Eliyahu M. Goldratt

Audience: LEAN practitioners and project leaders who sense a plateau and want a larger effect without discarding what already works.

What CLEAN is

CLEAN means *Constraint-led LEAN*. It is a hybrid sequence, not a replacement toolkit:

- Apply Theory of Constraints holistically to the system as a whole.
- Only then place LEAN methodologies and tools inside subsystems.
- For projects, use the same logic via Critical Chain Project Management (CCPM).
- Keep LEAN competence — change the order of attack.

THEORY OF CONSTRAINTS

The power of the weakest link

Theory of Constraints (TOC) is not "another improvement tool." It is a management philosophy: strengthen the constraint that limits the whole — and subordinate everything else to it.

Instead of chasing efficiency (using fewer resources everywhere), TOC pursues effectiveness: maximum result from the system. That often means large gains without new investment, reorganisation, or headcount cuts — in profit and non-profit organisations alike.

What changes when you focus on the constraint

- A ~10% gain at the constraint can lift total output by 10–30% or more — often visible in cashflow and lead times within days.
- A "balanced" factory is an illusion. A stable, profitable system is deliberately unbalanced: spare capacity on non-constraints absorbs variability and protects flow.
- Management itself is often the scarce resource — when calendars fill with cost hunts and annual budgets, flow stalls at the top.

Three measures that keep decisions honest

- **Throughput (T)** — sales revenue minus truly variable costs of what is actually sold (not what sits finished in a warehouse).
- **Inventory (I)** — money tied up in the system (materials, WIP, assets held to generate throughput).
- **Operating Expense (OE)** — money spent to turn inventory into throughput (often largely fixed). Control OE, but never at the expense of throughput.

> Goal: increase T while reducing I and OE – simultaneously. Local cost accounting alone will mislead you.

FOUNDATIONS

Five Focusing Steps

Goldratt's practical response to dependence and variability. One (or a few) constraints set the rate of the whole.

#	STEP	WHAT IT MEANS
1	**Identify**	Find the constraint that limits total throughput – resource or policy.
2	**Exploit**	Squeeze every usable minute from it without large investment.
3	**Subordinate**	Align every other process to protect and feed the constraint.
4	**Elevate**	Increase constraint capacity only when exploitation is exhausted.
5	**Repeat**	When the constraint moves, start again. Never freeze the map.

Drum-Buffer-Rope (operations)

The constraint drums the pace. A buffer protects it from upstream disruption. A rope prevents the front of the system from running ahead and flooding work-in-process. Flow becomes compact and robust — including under Murphy.

> CLEAN step after this: place LEAN and Six Sigma only where they raise constraint output or protect its buffer.

METAPHOR

The marching column

Same soldiers. Different command. This analogy makes the LEAN–TOC difference concrete.

Imagine your process as a column of soldiers marching through a forest. They walk in fixed order, each with a different maximum speed. The front soldier starts work: materials enter the process on the sergeant's signal (customer demand). Column length — distance from first to last — is work-in-process (WIP). The rear soldier delivers finished output. How far the column advances is what you ship.

LEAN's command

Drive toward smooth single-piece flow. The sergeant (customer) sets the pace. Remove waste and shrink buffers. When variability is low, the column looks beautiful. When someone stumbles, the fragile spacing collapses — stops and restarts cut total distance marched.

TOC's Drum-Buffer-Rope

The slowest soldier drums the pace of the whole column. First exploit him so he reaches true maximum speed. Place a small buffer of space ahead of him so upstream stumbles do not idle him. Rope the front soldier so he cannot race ahead and stretch WIP. Soldiers behind the drum already have spare capacity and catch up. Result: a compact column that marches steadily and maximises output.

> CLEAN: after drum, buffer, and rope govern the system, LEAN tools free or protect the slowest soldier – they do not "optimise" every soldier in isolation.

WHERE LEAN FITS

Subsystem tools – after system rules

CLEAN does not argue against Ohno. It places LEAN where it multiplies system results: after subordination is clear.

Use LEAN here

- At and around the constraint
- On starvation and blockage of the constraint
- On quality that wastes constraint time
- On changeovers that steal constraint minutes

Defer or refuse here

- "Efficiency everywhere" drives
- Buffer removal that destabilises the drum
- Local KPI wars that fight subordination
- Projects that do not move throughput

Six Sigma in the same frame

Precision methods belong on variation that threatens constraint availability or the quality of constraint output — not as a default programme across every process.

Standing on giants

Goldratt credited Ford and Ohno with foundational flow breakthroughs. Ohno himself noted that earlier awareness of TOC insights would have shortened decades of TPS development. CLEAN is that integration for today's LEAN organisations.

PROJECTS

Critical Chain Project Management (CCPM)

Operations use Drum-Buffer-Rope. Projects use Critical Chain — the same TOC logic for tasks, dependencies, and scarce people.

Where Critical Path fails

Critical Path Method (CPM) tracks the longest dependency chain and ignores resource contention. Safety buried in every task is consumed by Parkinson's Law and Student's Syndrome; multitasking stretches the rest. Delays stack; early finishes rarely help successors.

What CCPM changes

- **Critical chain** — longest path of dependent tasks *and* resource limits: the real project constraint.
- **50% task estimates** — remove local safety; pool it into a shared **project buffer** (plus feeding buffers into the chain).
- **No bad multitasking** — finish focused work so the next task can start early when reality allows.
- **Buffer management** — watch buffer consumption (fever chart), not fake task deadlines.

Why it matters

Industry cases (including aerospace and large programmes) report substantially shorter durations and more reliable due dates — often in the 25–50% range for development lead time. For manufacturers racing a window of opportunity, time-to-market can make or break the business case.

> CLEAN for project organisations: CCPM is TOC on the project system; classic LEAN tools still apply inside work packages once the chain and buffers lead.

GETTING STARTED

A practical first fortnight

No reorganisation required. A focused diagnostic often reveals the next move within days.

Days 1–3 – Map the system goal and flow

State the goal in throughput terms (units shipped, projects completed, cash generated). Sketch the dependent chain. List WIP and delays. For project environments, sketch the critical chain candidates and shared resources.

Days 4–7 – Identify the constraint

Where does work wait? Which resource is always busy while others wait? Which policy (batching, approval, priority rule, multitasking) throttles release?

Days 8–10 – Exploit and subordinate

Remove waste of constraint time. Stop starving it. Stop flooding it. Align upstream release to buffer status. In projects: cut bad multitasking and place a project buffer.

Days 11–14 – Select LEAN actions

Only then: choose two or three LEAN interventions that clearly raise constraint output or protect its buffer. Defer the rest.

> If a proposed improvement does not change the constraint or subordination, park it – however elegant the tool.

FOR THE LEAN COMMUNITY

You keep the tools. We fix the sequence.

CLEAN is written for people who already believe in continuous improvement. The message is not “abandon LEAN.” It is: let Theory of Constraints set the system rules so LEAN effort lands where it creates the largest result — and use CCPM when the system is a project portfolio.

What good looks like

- One visible system constraint and a shared subordination rule
- Buffers sized and managed — not treated as “waste” by default
- LEAN / Six Sigma backlog ranked by throughput impact
- Projects planned on the critical chain with pooled buffers
- KPIs that reward system flow over local utilisation

Dutch source material (frissebronnen.nl)

- From LEAN ceiling to TOC breakthrough
- LEAN vs. TOC — marching column metaphor
- LEAN, Six Sigma and TOC — critical confrontation
- Doubling results without investment (TOC power)
- Measuring with Throughput, Inventory, Operating Expense
- Critical Chain vs Critical Path · Goldratt’s CCPM insights · Time-to-market

NEXT STEP

Conversation

CLEAN is in early English release. Share this brochure with your improvement lead, operations peer, or project director and test whether the sequence matches what you see.

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Method name

CLEAN — Constraint-led LEAN.
Document: *CLEAN method for LEAN practitioners*
Proposed primary URL: https://clean.frissetech.com.

> Test readers (first wave): Georg Meyer · Daniël Willems