Pareto Cube (Pareto³)
Recursive Methodology for Strategic Analysis

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License: CC BY 4.0 – "Pareto Square™ & Pareto Cube™ – Adrian (Adi) STAN"
*Note on originality: The terms **"Pareto Square" (Pareto²)** and **"Pareto Cube" (Pareto³)**, as well as the mandatory integration of the "5 Whys" technique within this process, are introduced for the first time in this document. They do not exist as established procedures in the literature, being an original extension of the Pareto principle. The trademark (TM) notice refers to the branding of this specific methodology.*
Motto: "Don't look for more answers. Look for the better question." (Adrian Stan)
"By repeating 'why' five times, the nature of the problem, as well as its solution, becomes clear." (Taiichi Ohno)

Abstract

This document introduces **the Cube Pareto (Pareto³)**, a "cascade" methodology for solving complex problems, which integrates **the Pareto Principle (80/20) with the "5 Whys"** root cause analysis technique. The methodology is designed to identify, with minimal effort, the levers of action that produce maximum impact. Two operating modes are presented: **Strategic ("Light")**, optimized for speed and direct action, and **Systemic ("Complex")**, an adaptive mode that adjusts the depth of analysis depending on the nature of the problem, optimized for deep understanding.
Goal: reduce the problem to a very small (**under 1%**), essential subset of causes – where the action produces the **majority** impact (**over 51%**).

Key terms
Pareto - The 80/20 Principle - 20% of the causes generate 80% of the effects.
Pareto² (Pareto Square) - Repeated application: 20% of the initial 20% (~4% total) generates ~64% (~2/3) of the effects.
Pareto³ (Pareto Cube) - Applied 3 times: ~0.8% of causes generate over 51% of effects.
5 Why? - The technique of identifying the **root cause**, by repeatedly asking the question "Why?".

Preamble: from Observation to Action

We live in a world of overwhelming complexity. Every problem, from the personal to the global, seems to have a thousand interconnected **causes**. The result is paralysis: they all **seem** important, but **not all are**.
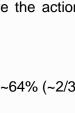The Pareto Principle, or the 80/20 rule, was the first step in cutting through this noise. It showed us that, in any system, a **minority of causes (~20%)** generate **the majority of effects (~80%)**.
In a hyper-connected world, even 20% is too much. We need a more powerful method, a tool capable of not just identifying the vital, but getting to **the core** of it.
Pareto³ is that tool. It is a structured thinking methodology that recursively applies the Pareto principle to distill any complex problem to its actionable essence (~0.8%), combined with the Socratic rigor of the "5 Whys" technique to ensure that action is applied to the root of the problem, not its symptoms. **The Pareto Cube offers an architecture - an algorithm for achieving clarity.**
It is crucial to understand that **Pareto³** is not presented as an empirical law of nature, but as a **heuristic architecture for thinking**. A heuristic is a tool designed to solve problems, not a theory that describes reality. Its value lies not in being "true" in an absolute sense, but in being consistently **useful.**

- **The nature of the N_opt formula:** The formula for calculating the optimal number of "Whys" is a perfect example of this philosophy. It is not derived from statistical data, but is **built on logical first principles**: it anchors in established practice ("5 Whys"), adjusts with concentration (logarithmically) and complexity (linearly). It is a rational starting point, not an empirical endpoint.

- **Invitation to validation:** This document and the methodology it describes are published under an open-source license (CC BY 4.0) precisely to invite the global community to **test, empirically validate**, and **refine it**. Each application of **the Pareto Cube** is an opportunity to collect data that, over time, can calibrate and improve this architecture.

Therefore, Pareto³ should not be judged by the standards of a completed scientific theory, but as an **open protocol, in version 1.1**, offered to the world as a tool to build clarity.

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1. The Foundation: From Pareto to Pareto³

Pareto Principle (Pareto¹): A fundamental empirical observation that states that, for many systems, approximately **80% of the effects come from 20% of the causes.**
- *Effort = 20% (b), Result = 80% (a)*

Pareto² (Pareto Square): The first iteration of the principle. If we focus our efforts only on the 20% of critical causes, we will find that the same law applies within them.
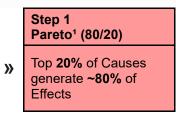- *Effort = 20% of 20% = **4% (b^2)***
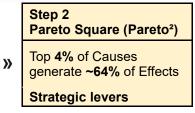- *Result = 80% of 80% = **64% (a^2) (~2/3)***

Pareto³ (Pareto Cube): Second iteration. Applying the principle to the 4% of causes already identified leads us to the fundamental lever of the system.
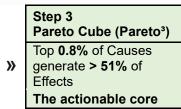- *Effort = 20% of 4% = **0.8% (b^3)***
- *Result = 80% of 64% = **51.2% (a^3)***

Analysis Engine (Socratic Clarification) - "5 Whys": To correctly identify the root causes at each level, we use the iterative "5 Whys" technique (*credit: Taiichi Ohno, Toyota Motor Corporation*), which guides us from the symptom to the systemic source of the problem. A method of causal analysis that, through successive "Why?" questions, moves from a visible symptom to a fundamental (root) cause.

Complete problem		Step 1 Pareto¹ (80/20)		Step 2 Pareto Square (Pareto²)		Step 3 Pareto Cube (Pareto³)
100% of Causes generate 100% of Effects	»	Top **20%** of Causes generate **~80%** of Effects	»	Top **4%** of Causes generate **~64%** of Effects **Strategic levers**	»	Top **0.8%** of Causes generate **> 51%** of Effects **The actionable core**

Note:

In **Pareto²** and/or **Pareto³** iterations, another **Pareto distribution** can be used (80/20, 90/10, 95/5). The "Complex" mode introduces the variable S (Pareto Concentration) for this purpose.

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2. Operating architecture

Pareto³ methodology can be applied in two ways, depending on the purpose of the analysis.

Mode 1: Strategic ("Light") - optimized for speed and direct action

This iterative mode is optimized for **speed and direct action**. The goal is to find the main lever (Pareto Cube) as quickly as possible.

Process:
1. **Pareto selection¹:** Top 20% causes are identified.
2. **Pareto² selection:** Top 4% causes are identified (subset from the previous step).
3. **Pareto³ Selection:** The unique factor of 0.8% (subset from the previous step) is identified.
4. **Root Cause Analysis: A single "5 Whys"** analysis is applied to just this final 0.8% factor to understand its deep mechanism.

Mode 2: Systemic ("Complex" / Adaptive) - optimized for deep understanding

This recursive-adaptive mode is optimized for **deep system understanding**. It does not just look for a single solution, but a causality map. Ideal for complex systems with uneven distribution of causes.

Process:

This mode introduces an **adaptive mechanism** that automatically adjusts the depth of the "Why" analysis at each step, based on two variables: **Pareto Concentration (S)** and **Problem Complexity (C)**.

- **A. Complexity Estimation (C):** Evaluate the problem on a scale from -1 (Low) to +1 (High), based on the number of factors, their interdependence and dynamics.
- **B. Concentration estimation (S):** It is estimated whether the problem is of type 80/20, 90/10 or 95/5. (S = 0.2/p where p = percentage of causes: 0.20 at 80/20; 0.10 at 90/10; 0.05 at 95/5).
- **C. Calculating the optimal number of "Why" (N_opt):** The heuristic formula is used to determine the optimal number of "Why" questions (between 3 and 7) for each step of the analysis:

$$N\_opt = clamp_{[3,7]}(round\ (5 + 0.5{*}C - 0.8{*}\log_2(S))$$

This formula automatically adjusts the number of "Whys". For simple problems with concentrated causes (e.g. 95/5), fewer questions are needed to get to the root. For complex problems with more dispersed causes (e.g. 80/20), more questions are needed to navigate through the "noise". The logarithmic function provides this adjustment. The formula is a starting heuristic, not an empirically derived law, and is designed to provide an adaptive framework and guide the depth of analysis. It is based on the principle that more complex (high C) and more dispersed (low S) problems require deeper investigation.

Results for N_opt:

Concentration	Complexity Low (C=-1)	Complexity Medium (C=0)	Complexity High (C=1)
80/20	4 "Why"	5 "Why"	6 "Why"
90/10	4 "Why"	4 "Why"	5 "Why"
95/5	3 "Why"	3 "Why"	4 "Why"

Example calculation for C=1 and S=0.2: N_opt = round (5 + 0.5*1 − 0.8*log $_2$ (0.2)) = round (5.5 − 0.8*(-2.32)) = round (5.5 + 1.856) = 7 → clamp[3.7] = 7

Notes:

- log2(S): Reflects Zipf 's law in complex systems ("Power laws, Pareto distributions and Zipf's law", M.E.J. Newman, 2005)
- constant 0.5: complexity (C) linearly increases the need for depth (Toyota: complex technical problems require 6-7 "Why?"). Complexity (C): Scale from -1 (simple) to +1 (complex):
    - C = -1 ("Low"): < 10 factors, simple interdependencies.
    - C = 0 ("Medium"): 10-30 factors, moderate interdependencies.
    - C = +1 ("High"): > 30 factors, nonlinear dynamics or chaos.
- constant 0.8: logarithm compensates for concentration (S) (SpaceX: drastic reductions in analysis for repetitive defects). Pareto concentration (S): 80/20 (S=0.2), 90/10 (S=0.1), 95/5 (S=0.05).

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3. User Guide (for AI implementation)

This methodology can be used both by a **human analyst** and implemented in an **AI system**. For implementation in an AI, the following simple interface is recommended:

1. **Upload the .md document (Strategic or Systemic)** containing the **Pareto Cube process**.
2. **Formulation of the problem** to be analyzed.
3. **Specifying the operating mode** at the end of the prompt:
    - **Strategic (Light)** mode, nothing is added. It is the default.
    - For the **Systemic (Complex) mode, the key** [systemic analysis] is added.
      To force a certain depth, use the syntax **{XY}**, where X is the number of Pareto steps (1, 2, or 3) and Y is the percentage of causes (80, 90, 95). Example: **{2-90}**. If the top 5% causes explain ≥ 60% of the effects, use S=0.05 (95/5). Otherwise, start with S=0.2 (80/20).

4. Methodological synergy: quantitative and qualitative filtering

The uniqueness and power of the system are given by the combination of the two techniques, which operate in tandem to ensure that the effort is applied with maximum efficiency, through iteration:

1. **Quantitative filtering (Pareto³):** Acts like a "progressive zoom". It starts with the whole picture of the problem (100% of the causes), then zooms in on the vital group (20%), then on the strategic levers (4%), and finally stops at the singular core (0.8%). This process answers the question: **"WHERE exactly do we need to act?"**
2. **Qualitative filtering ("5 Whys"):** Acts like a "drill." Once the exact point where action needs to be taken (the 0.8% core) has been identified, "5 Whys" digs vertically into that point to uncover the systemic cause, not just the superficial one. This process answers the question: **"WHY are we taking action here?"**

The result is an action of extraordinary precision: **applied at exactly the right point and at exactly the right level of depth.**

4.1. The heuristic nature of the methodology

Pareto³ is a heuristic methodology, not an empirical one.

Definition of the N_opt formula: The formula $N\_opt = \text{clamp}_{[3,7]} (\text{round} (5 + 0.5* C - 0.8* \log_2 (S))$ is a **rational construction based on logical principles**, not on experimental data:

- **The anchor value of '5'** is derived from Toyota's practice (the "5 Whys" technique);
- **The coefficient of 0.5** reflects the principle that more complex problems require deeper investigation;
- **The coefficient 0.8** implements the principle that more focused problems (large S) require fewer questions to get to the root. The value of 0.8% (b³) is theoretical; in practice, the actionable core can be 0.5%-1.5%, in real applications, the concrete percentages will be identified through analysis.

Purpose: This formula does not claim to be a discovered natural law. It is a **calibration tool** designed to provide a consistent starting point for depth of analysis, based on logical reasoning and known principles.

4.2. Limits

This methodology is NOT suitable for:

- Simple, linear problems with single identifiable causes;
- Systems in which causes have uniform distribution of impact;
- Contexts that demand absolute statistical precision instead of actionable understanding.

Validation comes from **practical utility** in solving problems, not from the replication of controlled experiments.

4.3. Invitation to improvement

N_opt formula is a **starting point for the community**. It is intended to be "tightly integrated into iterative development cycles" and refined based on practical experience.

We invite the community to:

- Test the formula on various cases
- Report when results seem inadequate
- Propose adjustments based on practical observations

5. Conclusion: A Method for a Smarter World

Extraordinary efficiency doesn't come from working harder, it comes from thinking deeper. But deep thinking doesn't have to be complex. Often, it comes down to finding the right question. The entire edifice of the "Pareto Cube" rests on a single fundamental act, a single 0.8% lever that unlocks everything.

Pareto³ is more than a model of efficiency. It is a **philosophy of action**. It teaches us to look for the elegant simplicity behind complexity, to have the courage to ignore the noise, and to focus our efforts where they can produce real and lasting change. The principle is one of cognitive economy: maximize understanding and impact - with minimal effort.

*Pareto³ is an **open-source thinking architecture**, offered as a public good. It does not claim to be a final answer, but a **better question**. Its value can be demonstrated not by its theoretical part, but by the clarity it will generate in practice. It is an open invitation to all those who seek to build a better future, with a wiser decision, at a given moment. **Rogo, ergo emergo.***

When is Pareto³ NOT used?

This architecture is optimized for complex systems with many interconnected causes. **It is not suitable for simple, linear problems**, or for **systems where the causes have a relatively uniform distribution of effects**, where **classical RCA remains optimal**. Like any tool, Pareto³ has limits. The maximum efficiency of the **Pareto Cube** ™ is achieved in problems with *an uneven distribution of causes*. For systems with fast dynamics, it is necessary to reapply Pareto³ at regular intervals.

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6. Practical examples

principle Pareto³ applied to Pareto³

The language distribution is a case of extreme concentration, much closer to a 95/5 ratio than to 80/20. The translation strategy of the "Pareto Cube" model is a demonstration of **the principle** that underlies **Pareto³**: that a **highly concentrated effort** can produce a **majority impact**. A core of 7 languages (~0.1% of all spoken languages) was selected to allow access to over 56% of the global population. Although this list was not generated by the mechanical application of the Pareto³ methodology, it directly validates its effectiveness, demonstrating **the adaptability** of the principle.

Integration with SWOT Analysis

How SWOT works alone:

A team brainstorms and generates four lists of points. The result is usually an overwhelming overview: 10 strengths, 12 weaknesses, 8 opportunities, 9 threats. The final question, which **SWOT does not answer**, is: **"So what do we do now?"**

How Pareto³ intervenes:

Pareto³ is applied **separately to each relevant list** to distill the essence.

- **to Weaknesses:**
  - **Pareto[1]:** Identify the 2-3 weaknesses that cause 80% of internal problems.
  - **Pareto[2]:** Identify that **single weak point** that, if resolved, would have the greatest positive impact.
  - **"5 Whys":** Applied to that weak point, it reveals **the systemic cause** behind it.
- **Applied to Opportunities:**
  - **Pareto[1]:** Identify the 1-2 opportunities that offer 80% of the growth potential.
  - **Pareto[2] & Pareto[3]:** Distill that **single opportunity** that, if pursued, could fundamentally change the trajectory of the company.

Final result:

*"We need to focus all our resources on solving **this one weakness** (after applying a Pareto analysis³, we found that its root is X) and capitalizing on **this one opportunity**."*

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7. Annexes

Markdown files for uploading to AI platforms:

- **markdown_pareto3-strategic.txt** - mode 1, **Strategic** ("Light") - optimized for speed and direct action;
- **markdown_pareto3-sistemic.txt** - mode 2, **Systemic** ("Complex" / Adaptive) - optimized for deep understanding.

paretocube.org & pareto3.org