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The purpose of the Journal is to disseminate knowledge, experience, and best practice in engineering & manufacturing.
The articles are written by practicing professionals in the Engineering City (EC). They cover issues relevant to their projects, operations, and organizations.
The articles address the challenges of the time. As such, the Journal is also a chronicle of the evolution of the EC, its companies, and its individuals.
It is the aim of the Journal to advance the engineering & manufacturing practice, to enrich the engineering & manufacturing community, and to contribute to the worldwide discourse in engineering & manufacturing.

Table of Contents

ENGINEERING MANAGEMENT CORNER 1
. Democracy, Dictatorship, Willpower, and Romanticism in Engineering Practice 1
. What is Engineering as a Business (EaaB)? 2
. The Project Charter Template 3

Engineering Management Corner

. Democracy, Dictatorship, Willpower, and Romanticism in Engineering Practice

by Rama, EA



. Democracy is about free choice, free voice, free debate, …

. Dictatorship is about subordination to a higher authority.

. Willpower is the internal discipline that forces oneself to make something happen despite all the difficulties, challenges, and unpleasantries.

These three seem contradictory at first sight, but then, we see them all at play at the same time in engineering practice.

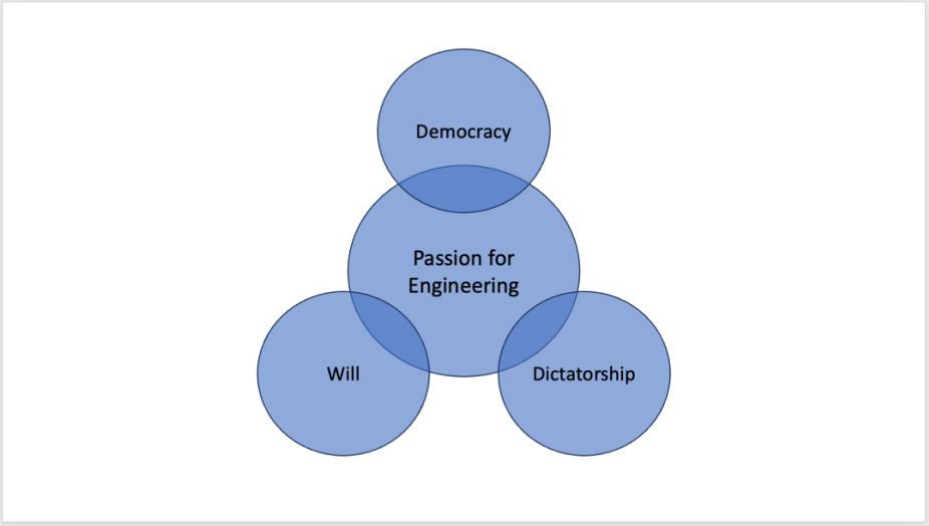
For example, let's take a new project that an organization has received. The project gets put on the table and people are freely deciding whether they want to be part of the project or not. This is freedom of choice. This is democracy.

But once the project starts, then the team is under the dictatorship of the project requirements – the technical requirement, deadlines, and budget. This complete subordination to the project is not democratic. This is dictatorship of the project, or if you will, the dictatorship of the contract, or if you will, the dictatorship of a promise. Having said that, there are still democratic elements in the project – for example, a free debate in the team about the best solution, the best approach, the best technology for the project. Yet, nevertheless, this is all under the dictatorship of the project requirements.

Now about willpower. Willpower is the ability to control or restrain ourself in the name of something that must be done. It is about "willing" ourselves to do it. There are many distractions away from what needs to be done. Yet, we exercise willpower to stay on the course of the project, no matter how attractive the distractions. This is willpower. We would think that freedom of choice would allow us to follow the distractions and temptations. But not in the project. We subdue our will to the project. Not everything in the project is something that we may like to do. For example, writing the documentation, or writing a report on the project, or do the project accounting, or, to fill the timesheet, or fill the continuous improvement sheet, … But we know that they must be done and we subdue ourself to do them - this would be an exercise of will power.

So, as we see, these three concepts may sound contradictory at first, but they are all present at the same time if we want to achieve anything of significance. Nothing can be achieved if not all three are practiced at the same time.

And now we come to the fourth element that ties all three together - romanticism. In my opinion, it is our passion for the engineering practice that holds all the three together. It is this passion of doing engineering that allows us to accept all three relations.



Pic. Romanticism holding all three together

Do you agree?

. What is Engineering as a Business (EaaB)?

by Rama, EA

When we finish high school and choose engineering as a profession, our idea of engineering is usually about technical & scientific knowledge. So, we go to university curious about acquiring this knowledge.

Engineering in our mind had the simple formula:

Engineering = Technical & Scientific Knowledge

But then, when we start working as an engineer in a commercial organization, we realize that there is a big second part to engineering, and that is economics. And the formula takes on the following form:

Engineering as a Business (EaaB) = Technical Knowledge + Economics

It is the Economics part what turns Engineering into a Business. The basic parameters of Economics are Cost, Price, and Margin; they are in the following relations with each other (Price = Cost + Margin). Cost is controlled by project management, price is controlled by product marketing, and the margins are controlled by the overall organization. The Cost is the most critical part here and is one of the most important parameters that Project Management is concerned about.

Then, as we go deeper into the business of engineering, we realize that there must be a customer whom we will serve:

EaaB = Technical Knowledge + Economics + Customer

And once there is a customer, then there necessarily appears a competitor:

EaaB = Technical Knowledge + Economics + Customer + Competitor

And once there are competitors, then you necessarily get into strategy for winning:

EaaB = Technical Knowledge + Economics + Customer + Competitor + Strategy

Then we realize that technical knowledge is not enough, but that we need to understand the engineering process from ideation to design to development to test to production:

EaaB = Technical Knowledge + Economics + Customer + Competitor + Strategy + Engineering Process

Then we realize that we cannot do the work on our own and that we need a team and an organization to do the work:

EaaB = Technical Knowledge + Economics + Customer + Competitor + Strategy + Process + Team + Organization

And finally we realize that we need the support of a whole community to be competitive in the market:

EaaB = Technical Knowledge + Economics + Customer + Competitor + Strategy + Process + Team + Organization + Community

This formula can go on to include many more aspects of EaaB. But we will stop here as this could be a good approximation to what the EaaB is. Note how we started off with a simple formula, and then as we got into the business of engineering we realized that there are much more to engineering than just technical & scientific knowledge.

But, if I had to reduce this formula to the most basics, then I would choose to emphasis these two:

Engineering = Technical Knowledge + Economics

And if I had to reduce down this formula to one more level, to a practical level, then I would formulate it as:

Engineering = Technical Knowledge + Cost

where cost must be controlled by Project Management.

. The Project Charter Template

by Lusya Adamyan, Advanced Technology Group

This is a project charter template that was made based on the experience gained in the complex engineering projects. Feel free to use the template as is or modify it. I'll be happy to hear back from you on this. Thank you.

Project Charter

Project Code / Name: [Insert Project Name and Code]	*Example:* NextGen RF System Design	**Project Owner:** [Insert Project owner Name]	*Example:* Armen Armenakyan
1. Project Description: [Brief description of the project]	*Example:* • Develop a next-generation RF system supporting 5G and Wi-Fi 6E for improved communication speed, capacity, and reliability.		
2. Project Purpose: [Brief description of why the project is being undertaken and its overall goals]	*Example:* To create a high-performance RF system for the telecommunications and IoT industries, enabling faster, more reliable wireless connections.		
3. Objectives: [Specific, measurable outcomes to be achieved and related success criteria]	*Example:* • **Objective 1:** Achieve full support for 5G NR and Wi-Fi 6E standards**.** • **Success Criteria:** System successfully integrates both standards and passes testing for both protocols by Q4 2025. • **Objective 2:** Ensure system latency remains below 1ms for real-time applications. • **Success Criteria:** Achieve latency under 1ms during live tests with no packet loss. • **Objective 3:** Develop a working prototype by Q3 2025. • **Success Criteria:** Prototype meets performance targets and is ready for internal testing by October 2025. • **Objective 4:** Obtain industry certification (e.g., FCC, CE) by Q1 2026. • **Success Criteria:** Certification granted and system passes all regulatory tests.		
4. Scope / Out of Scope: [High-level description of what is included and what is excluded in the project]	*Example:* **In Scope**: RF system design, prototyping, testing, and certification. **Out of Scope**: Commercial production, post-launch support.		
5. Key Deliverables: [List the major deliverables and their expected deadlines]	*Example:* • Prototype RF system by Q3 2025. • Performance testing report by Q4 2025. • Certification (FCC, CE) by Q1 2026.		
6. Risks: [What are the potential risks, challenges or limitations related to the project? What external factors could impact the outcome?]	*Example:* • **Supply chain delays for critical components.** • **Technological challenges with integration of new communication standards.** • **Potential regulatory compliance hurdles.**		
7. Milestone Schedule: [When the project is expected to start? What are the major milestones of the project? When should the project be officially closed? At what point should the project be reviewed for potential cancellation or termination?]	*Example:* • **Start Date: June 2025** • **Design phase complete: August 2025** • **Prototype testing: October 2025** • **Certification and Final Review: January 2026** • **Project Review Date: February 2026 (for potential continuation or termination).**		
8. Constraints [When must it be completed? How much is the expected total project budget? What kind of skills are needed (resources)]	*Example:* • **Deadline: Prototype to be delivered by Q4 2025.** • **Budget: Estimated total project budget of $2 million.** • **Skills Needed: RF engineers, software developers, certification experts.**		
9. Key Stakeholder List and project team [Who are the core team members working on the project? Who are the key stakeholders in the project?]	*Example:* • Armenak Armenakyan – Project Owner • Karen Martirosyan – Project Manager • RF Department: Responsible for technical infrastructure • Suppliers: Pasternack, Mouser, PCBWay • Arpine Kirakosyan - Procurement		
11. Project Exit Strategy	*Example:*		

[What are the criteria for the successful completion of the project: i,e, what need to be achieved to be considered that the project is completed?]	• **Successful Completion:** The project will be considered complete if the prototype meets performance objectives, passes certification, and is ready for mass production. • **Cancellation:** If the project budget exceeds $__ or if key deadlines are missed by more than 4 weeks, the project will be reviewed for potential cancellation.
12. Core requirements [What are the key technical requirements for the development/project/product]	*Example:* • The system must feature **beamforming technology** to enhance signal directionality and coverage. • The device must support **multiple-input and multiple-output (MIMO)** antennas to improve signal capacity and quality in dense environments.
13. Physical parameters [Are there any physical and environmental requirements]	*Example:* • The system must operate within a **temperature range** of **-10°C to 70°C** to ensure optimal performance in varying environmental conditions. • The design must comply with **IP67** rating for water and dust resistance to ensure reliability in both indoor and outdoor environments
14. Other parameters **[**Potential other parameters worth to mention**]**	*Example:* • The design must comply with **IP67** rating for water and dust resistance to ensure reliability in both indoor and outdoor environments. • The RF system should have built-in **AI-driven** software for dynamic frequency allocation and congestion control.
15. Industry / Application **[To which industry and application, the product relates]**	*Example:* • **Telecommunications industry**, specifically targeting **5G infrastructure** and **smart home IoT applications**. • The system will support **enterprise-grade applications** such as private wireless networks for businesses and smart cities.
16. Final product cost estimations	*Example:* • The estimated production cost per unit for the NextGen RF System is approximately **$__** for components, assembly, and testing. • The expected retail price for consumer-focused products, like smart routers or 5G devices, is projected to be around **$5__** per unit. • The total estimated development cost for the NextGen RF System, including R&D, testing, and prototyping, is around $--

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