



# Does a Good Engineer make a Good Project Manager?

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# Introduction

## Biography

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- As a technical author and trainer, he has written several papers, developed and presented several training programs to NASA Glen Research Center, Kennedy Space Center, and industry on-site locations.
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# Introduction

What I am presenting here, is in no way aimed at any one person or several people.

It is merely a presentation of my “prospective” of what I have observed, experienced, and learned over the course of my experience.

My information is based on lessons learned, formal training (engineering, management, and physiology education), OJT, and the many mistakes I have made.

Some generalities are drawn and made.

At the end, Q&A and discussion is encouraged.

# Introduction

## Lessons Learned

- Observations – How often have you found yourself saying “Why is that person a Project Manager – they are really bad at it?” For the most part, it is said much too often – WHY? If that’s what’s observed, what’s the manager missing?
- Management training and Mentoring – how much training do each of you get? Do you get training on how to advance your career into management? Once you are a manager, how much training do you get on being a Project Manager? You do get training on personnel matters, developing and conducting performance reviews – why not training on qualities of a manager, what is required, leading people, building teams, and empower people.
- History – all too often people you know who would make a good project manager is passed over and the people you know wouldn’t make a good project manager are promoted. Projects that have good project managers usually come in on time and within budget. That’s not to say projects that come in late and over budget always have bad project managers, sometimes the project was not bid correctly, too little time and money – and sometimes Murphy won.

# Introduction

I believe there to be two major types of engineer – the systems engineer and the detail design or analyst

- Systems Engineers – the ones that see, understand, and create the means to make sure the BIG Picture gets completed. (I don't use the word "successfully" created, as any number of things can go wrong at anytime, which maybe totally out of the control of engineering and/or management – Murphy).
- Detail design/analyst – the ones that see, understand, and pay attention to what needs to happen at the lowest of levels. By creating the details at the lowest of levels, the big picture begins to take shape and gets build from the bottom up.

Which of the two types usually becomes a project engineer?

Which of the two types best scribes you?

# Introduction

I have observed 3 major type of managers/leaders

- Micromanagers  
something in between
- Hands off  
something in between
- Lead from behind

Which of the three types have you observed?

Which of the three types make a good project manager?

Which of the three types best describes you?

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Michaelangelo, upon choosing a piece of marble to sculpt, believed he was only releasing the sculpture that was already inside the marble – he could see what was already there.

## Types of Engineers

### System Engineers

- Understands the “big” picture (sees / understands / perceives) what needs to be developed and can also dive down to the details to understand what the detail design engineers are doing.
- Follows the project for the full life cycle
- Develops the system level requirements of what will be completed by the detail design engineers.
- Performs trade studies required to develop requirements.
- Supports the development of the test requirements.
- Works closely with the project office, customer, and contractors.
- Coordinates the development of the outline and contents of all major review presentations.

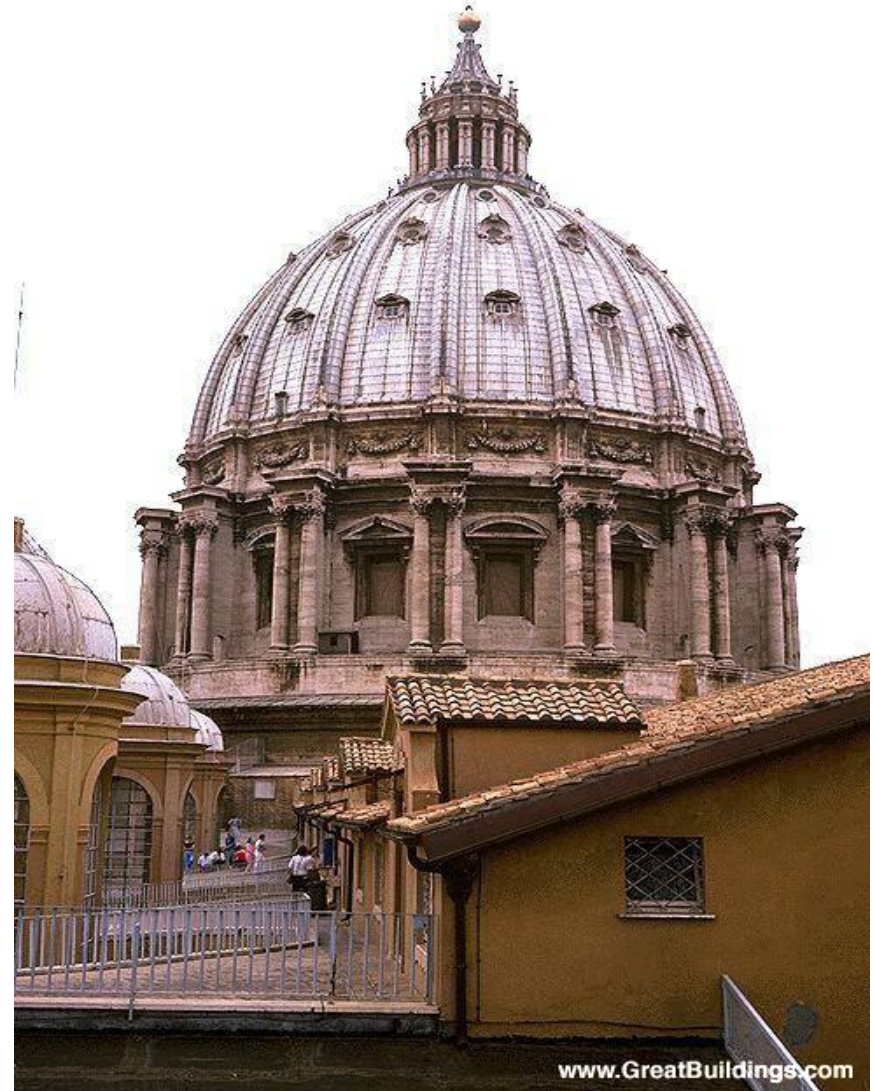


While erecting St. Peter's, Michaelangelo was able to work with the architect to understand and see what was to be created, from the top down and the inside out.

## Types of Engineers

System Engineers can't

- Chairs any number and type of meetings.
- Has the ability to see, understand, and discuss the details with the design engineers.
- Works with the scheduler and understands the day-to-day activity, status, and what needs to be done.
- Tracks the action items and closures.
- Works with the Systems Assurance Manager in identifying and mitigating all risks.
- Works with the Safety engineer in identifying all hazards and reconciling all safety requirements with the system level design requirements.



# Types of Engineers

## System Engineers can't

- Works with the launch site integration lead on schedule and test requirements.
- Works with the Operations Manager and Principle Investigator on the development of the ops documentation and sequence of testing and validating the instrument.
- Supports the closeout and hand off of the development phase to the operational phase.
- On call to work any operational issues that may come up.
- A good system engineers need to be able to multi-task.



# Types of Engineers

## Detail Design/Analyst Engineers

- Works with the System Engineer in the creation of the subsystem and detailed level derived requirements.
- Designs and/or oversees the detail design.
- Selects and procures the detail components.
- Designs the packaging, arrangement, and mounting of the detailed components.
- Performs the detailed analyses that are required and support the detail design.
- Develops the detailed test plans and procedures at the component, subsystem, and system levels.

While painting the Sistine Chapel, Michaelangelo was able to sit on his back inches away from the ceiling, paint each separate piece of the overall picture, maintain focus, and when finished, the entire picture was created.



# Types of Engineers

## Detail Design/Analyst Engineers can't

- Performs the component, subsystem, and system level testing.
- Develops the presentation material for all major reviews.
- Participates and supports any number of and types of meetings.
- Develops Integration & Test test procedures.
- Conducts Integration & Test testing.
- Supports all environmental testing.
- Detail design leads support the launch site activities.
- Support the development of the Operational documentation.
- A good design engineer, need to be able to multi-task.

While painting the Sistine Chapel, Michaelangelo had to have the big picture in mind while creating the details required to create the big picture.



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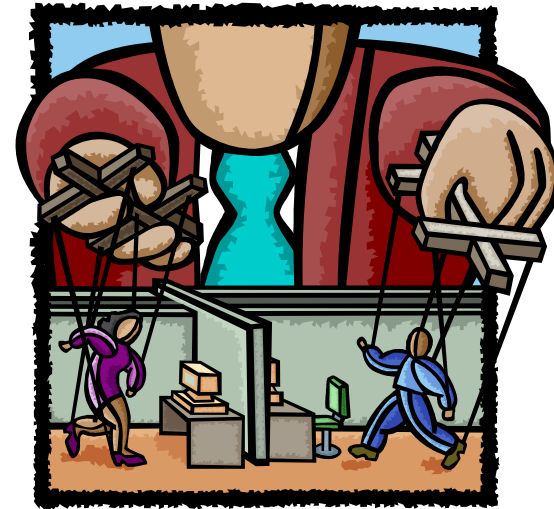
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# Project Manager Qualities

## Micromanagers

- Never delegate
- Always have to do it (what ever “it” is)
- Doesn’t plan (and wonder why there is always a problem)
- Looks to blame instead of encourage results
- Performs crisis management
- What ever is done – isn’t done good enough
- Designs can be over designed
- Never enough time to get anything done
- Claims the fame
- Very little reward of subordinates
- Based in control



# Project Manager Qualities

## Hands off

- Always delegates
- Never does “it”
- Asks others to do the planning
- Reviews very little
- Approves everything
- Doesn't understand why decisions are made
- Seems to work in the shadow of others
- Doesn't make decisions
- May/may not reward subordinates
- May/may not claim the fame
- Based in fear



# Project Manager Qualities

## Lead from Behind

- Delegates with an eye open
- Shares in the work
- Works with others in the planning
- Always looking ahead - plans
- Empowers those that work for them
- Reviews the work and makes suggestions for improvement
- Pushes those that work for them to step forward (empowerment)
- Encourages creativity
- Looks to solve the issues – not blame
- Looks to do the right thing
- Manages time
- Based in empowering others.



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# Tie In

Good engineers know how/when to:

- Multi-task
- Step back to look at the big picture
- Have the ability to focus on the details as well as the big picture
- Interpret the requirements
- Develop correlating/functional derived requirements
- Be a team player
- Listen to others opinions
- Make decisions
- Brain storm, then whittle down
- Empower and teach others
- Takes constructive criticism

## Tie In

Why don't all good engineers become good managers?

As a managers and leading people, they have trouble:

- Coordinating
- Leading people
- Planning
- Working well in a team environment
- Making decisions
- Being responsible for greater cost and the schedule
- Delegating
- With change
- Taking constructive criticism
- Accepting others opinion

## Tie In

Why don't all good engineers become good managers?

What may begin to happen that makes a good engineer become a bad manager:

- They become fearful of taking on much more responsibility
- Become fearful of making decisions
- Feel blamed or take on the blame when things go wrong
- Become fearful of being fired, getting a bad performance review, or being demoted
- Realize they don't know enough to do a good job
- Don't ask for help (see it as a form of weakness)
- Don't get any training or get inadequate training
- Begin to lose focus on end goal and focus on the issues and problems
- Lose trust in their immediate management team (they become insecure)
- Have fear taking bad news up the chain and try and hide it (fear of getting reprimanded)
- Down play the real issues
- Have difficulty with change and want to control everything to minimize the change

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There are detail Design Engineers who are too focused on the details to be able to step back to look at the big picture and be capable of multi-tasking.

There are System Engineers who are too broad of thinkers and focus on the big picture too much to be able to dive into the details.

Is there a correlation between which type of engineer becomes what type of manager?

- Not that I have found – both detail design and system engineers become managers.

Is there a correlation between which type of manager makes the best manager?

- I believe so – the “Lead from Behind” manager makes the best manager.

## Summary

Good leadership traits can be seen throughout the engineers career, from the first job on.

Why is it difficult for some detail designers to be good project managers?

Why is it difficult for some systems engineers to be good project managers?

Good systems engineers (or engineers capable of seeing the big picture and multi-tasking) typically become good project managers, where good detail design engineers typically make good subsystem leads or I&T leads.

## Summary

Nobody likes working for a Micromanager and the project usually performs poorly.

Nobody likes working for the Hands off Manager and again, the project usually performs poorly.

The Lead from Behind Manager is typically liked, well respected, and has the typical traits:

- Works well with other, is a team player
- Empowers their people and teaches them
- Secure in their decisions making process
- Always looking ahead and plans
- Encourages creativity
- Brain storms and whittles down to appropriate/realistic/practical solutions
- Willing to take appropriate risk, make mistakes, get dirty (look bad), and fail
- Learn from mistakes and failures
- Plot a new course and proceed forward