Lean – Project Management

Norbert Majerus
2019

13 years experience as LEAN PM in the Goodyear Innovation Centers

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Poll: Who Heard About Lean PM?

- ☐ YES
- ☐ NO
- ☐ What is Lean PM?

Who manages projects?

SHARE

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- Safety/quality were good (must continue trend)
- Late on almost all launches – only contracted work was on time (less than 20%)
- Less than 50% of the new products met business case
- Disbanded all prior improvement activities (BPR, TQC, 6-Sigma…)
- Engagement scores less than acceptable and people quit for lack of work
- "We could help you improve your process if you had one"

7 years Later

- Safety, quality – all time high
- 1,500, 95%, 100%
- 75%
- 3x
- Flat Budget
- Better engagement

2016 Recipient of the AME OpEx Award

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PM Success

- Before Lean – 50%

- After Lean - 100%

What Projects Are We Talking About?

- R&D, software, …
- Initiatives, lean, major change ….
- Capital,
- Continuous improvement
- Organizational, HR …
- …..

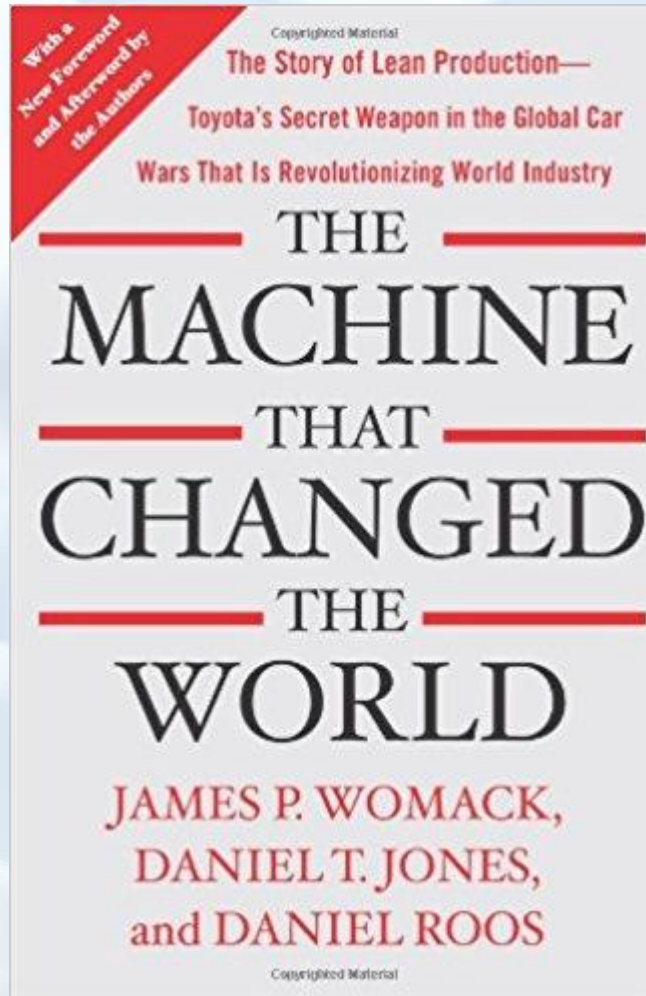# What are the Biggest Problems With PM

You first

1. Project is late and/or over budget
2. Project did not deliver
3. Scope and other changes
4. Frustrated and overworked people
5. Too much wasted effort (updates, reviews…)
6. The other project managers
7. Leadership and team members

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So Why Did you Become a Project Manager?

- What is the Motivation?
- **ETP – imagine the day the project is implemented and it works**

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What is Lean

The Story of Lean Production—
Toyota's Secret Weapon in the Global Car
Wars That Is Revolutionizing World Industry

THE MACHINE THAT CHANGED THE WORLD

JAMES P. WOMACK,
DANIEL T. JONES,
and DANIEL ROOS

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Learning PM From Toyota

- Not much information about Toyota PM
  - ✓ Use of the Chief Engineer concept
  - ✓ Matrix-like organization

How I Learned PM

- Discretionary funding project – NOT well prepared/educated

- My first PM class - could not use what I learned

- PM Software Initiative -– EXPENSIVE BAD PROCESS

- Agile and Lean Project Management – NOW making progress!!

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Agenda – Lean PM

- Pre-requisites
- The inspired traditional principles
- The lean principles
- Agile management
- Metrics
- Reflection
- Managing people in a lean organization

Pre-Requisites

- Organizations
- The PMO
- The Toyota Chief Engineer
- The Lean Project Manager
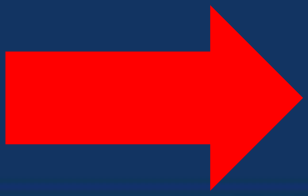- The Lean Team
- Principles over tools
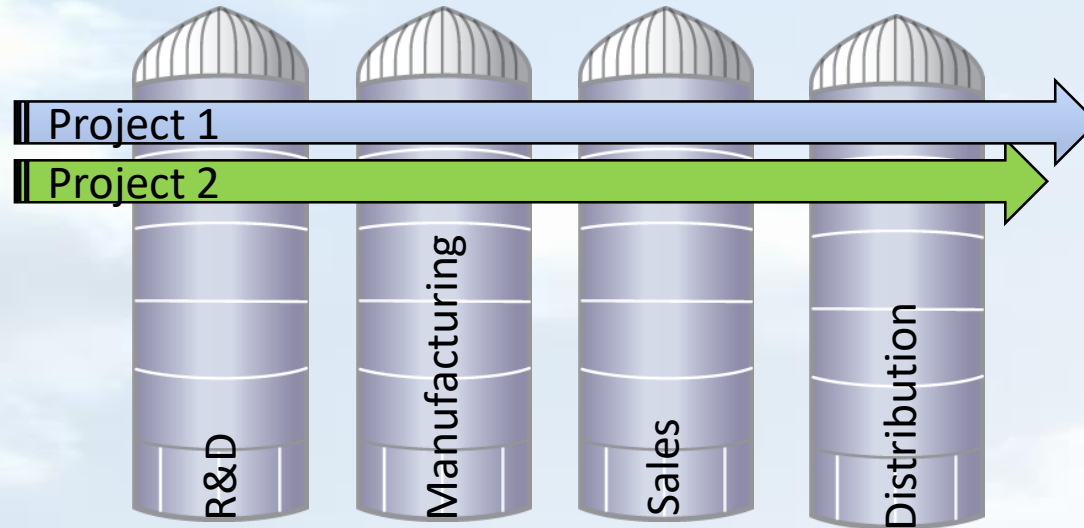
Organizations

Which ones do you know?

- Functional
- Project
- Value Stream
- Matrix
- Teams
- Modern

From

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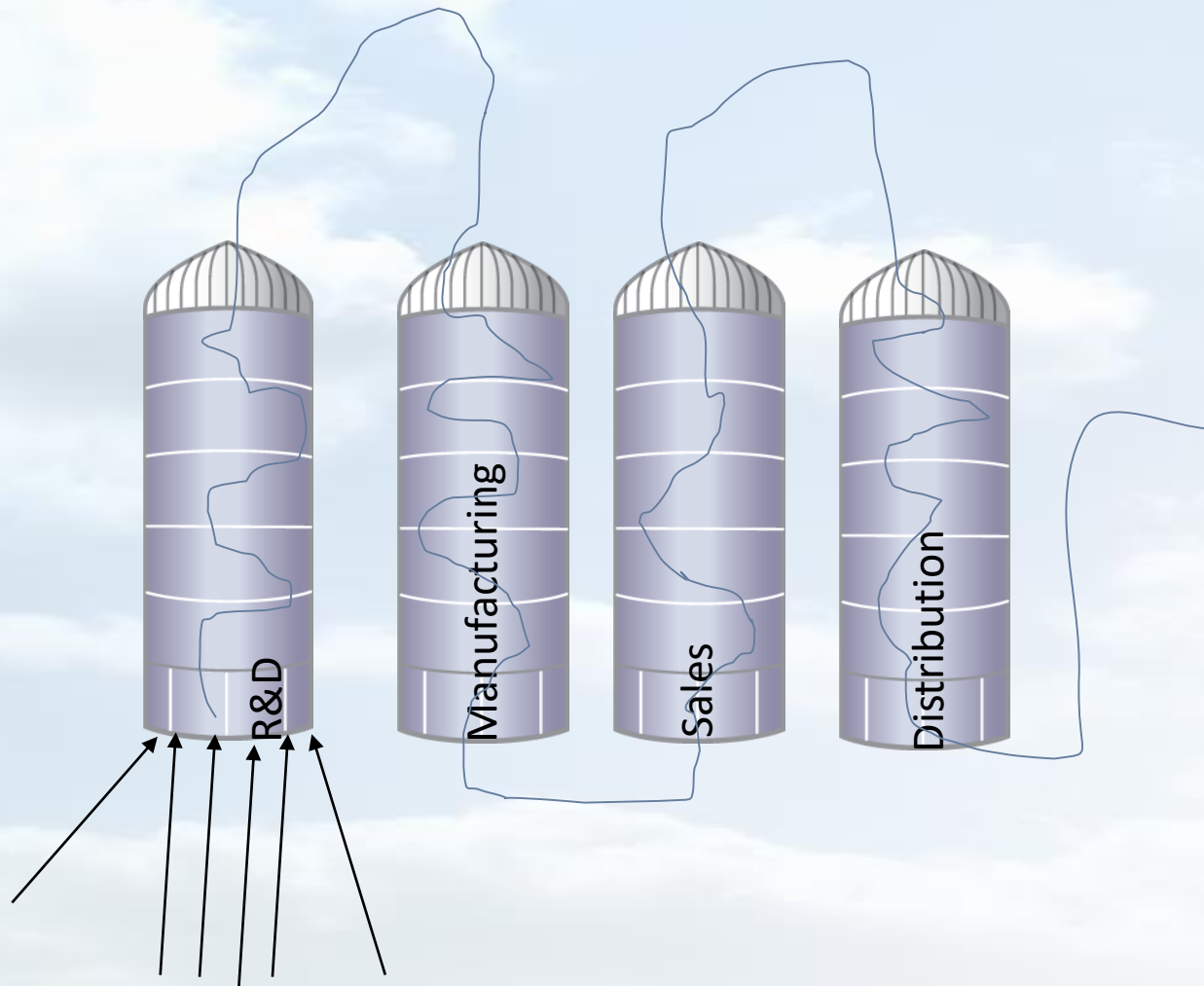
- **R&D is about creating knowledge - Organized in functions based on skills**
- **Projects must be managed horizontally - across the functions**

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Good Organization for PM

- Move the people where the work is
- Standard work – flexible resources
- Accommodating management and leadership
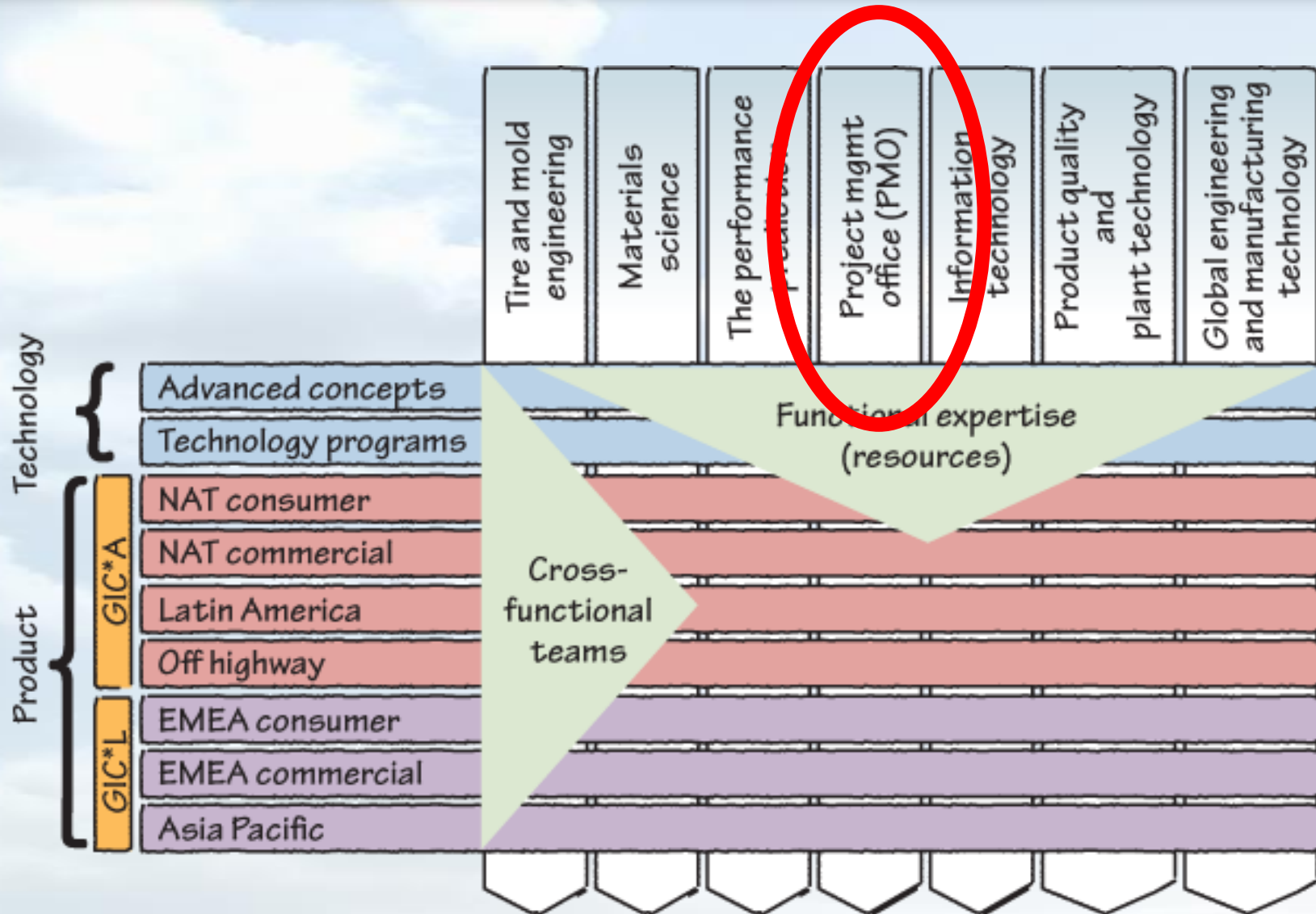
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Matrix

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Pre-Requisites

- Organizations
- The PMO
- The Toyota Chief Engineer
- The Lean Project Manager
- The Lean Team
- Principles over tools

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PMO Function

- What is a function doing?
- Purpose of function
  - Support Projects
  - Develop Knowledge
  - Manage the knowledge
- DUAL REPORTING to functions and PM office
- Goodyear experience with KM

- Get the organization out of the way FIRST!

Pre-Requisites

- Organizations
- The PMO
- The Toyota Chief Engineer
- The Lean Project Manager
- The Lean Team
- Principles over tools

What Happens If …

…you plug the chief engineer position on the wrong organization?

Chief Engineer Toyota

- Project Superman - Study

- Represents the customer

- No people authority and very small dedicated staff

- Ford example

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Goodyear

- *Technical and business skills*
- *Project management expertise*
- *Manage people*
- *Good planners*
- *Coach and mentor*
- *Drive collaboration*
- *Open communication*
- *Crisis management*
- *Courageous leadership*
- *Risk managers*
- *Lean managers*

My Description

- Doing the right thing AND doing things right - customer advocate then company advocate
- PM with technical expertise, value stream knowledge
- Must drive COLLABORATION and alignment
- Manage PEOPLE (without authority)
- Emotionally stable/survivor
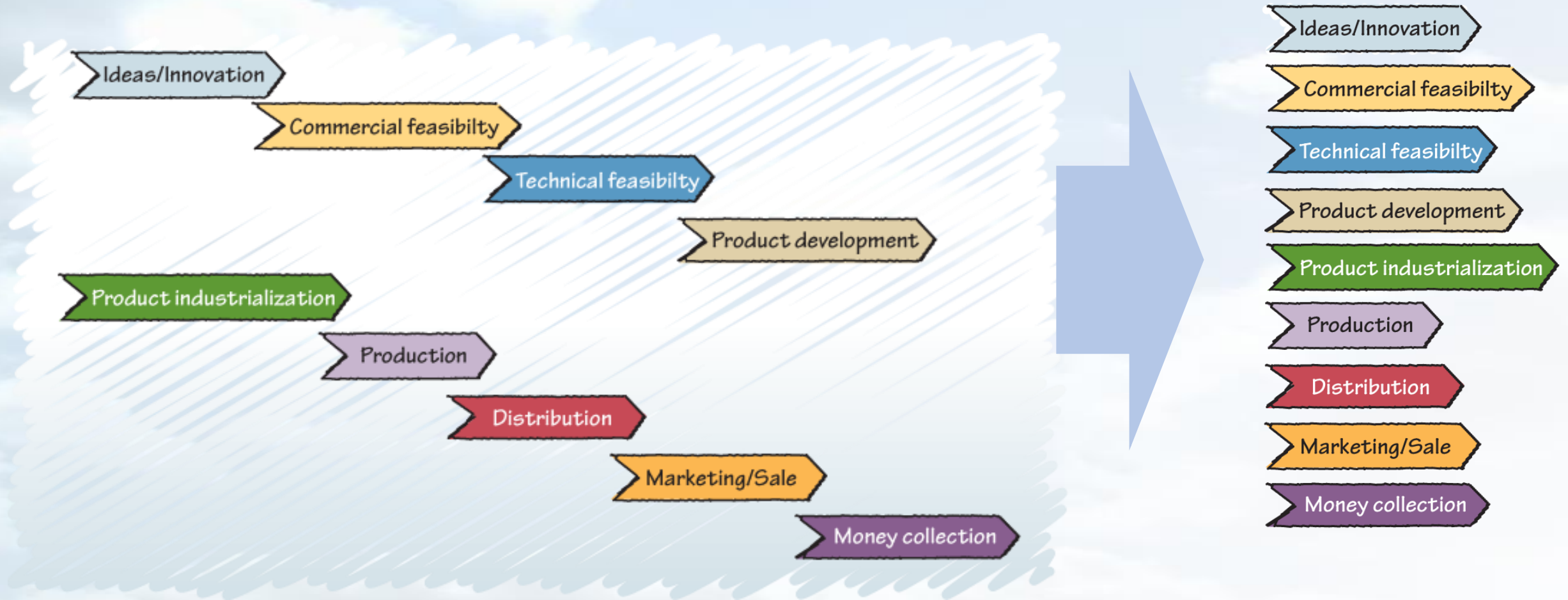- Allows choosing from a large variety of options

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Pre-Requisites

- Organizations
- The PMO
- The Toyota Chief Engineer
- The Lean Project Manager
- The Lean Team
- Principles over tools

Winning at the Intersections

Innovation Excellence

"Great products meeting consumer needs"

Sales & Mktg Excellence

"Consumer-centric driven pull"

Operational Excellence

"Right product right place, right time and "
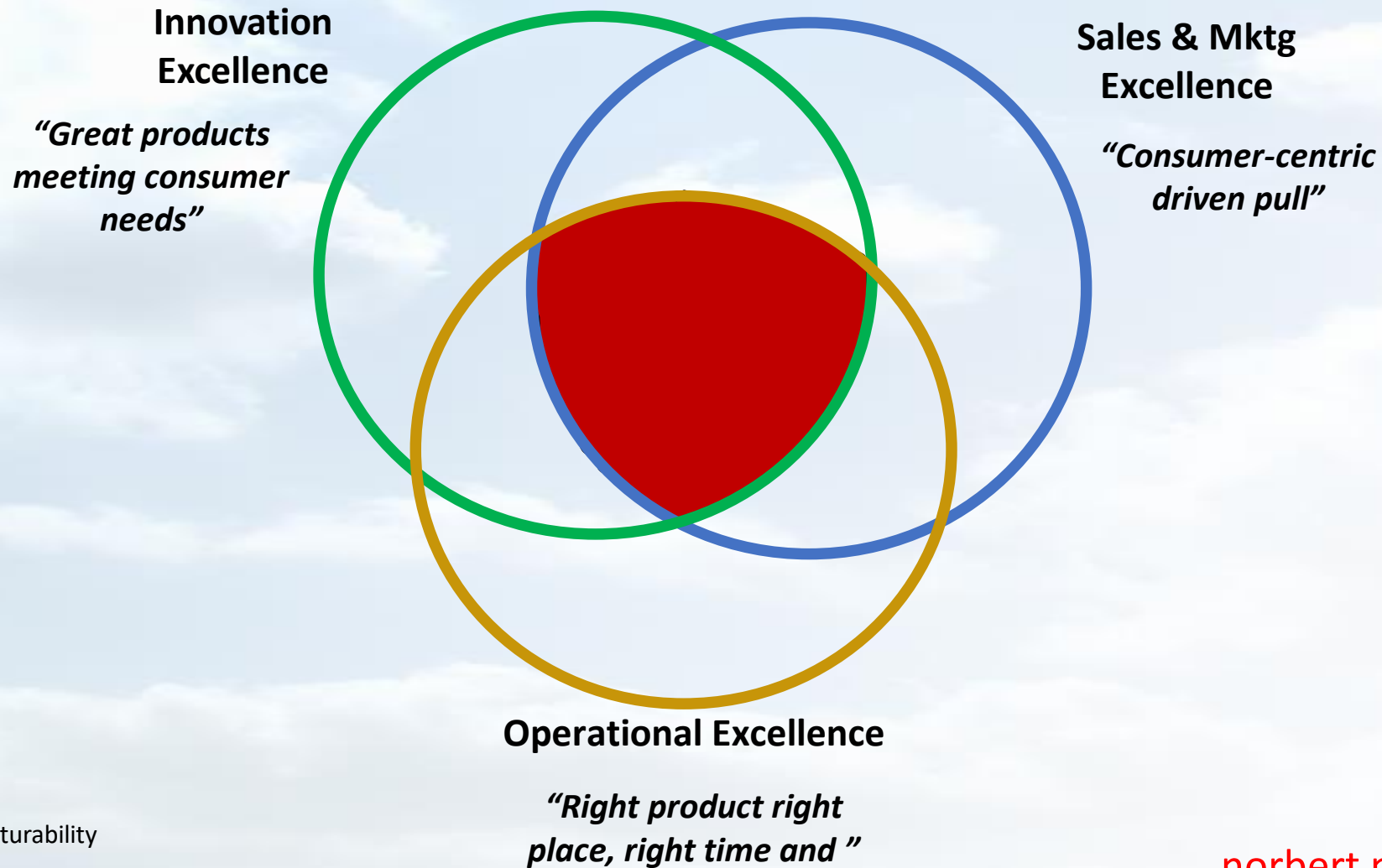
Design for manufacturability

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Concurrent Development

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Collaboration

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Collaboration vs Cooperation

- Happy Team
- Goodyear examples
- Customer happy or employees happy
- Easy way out
- Who is the competitor – teams fighting each other

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The camel and the horse

- The Taurus Story – Sobek – Good conflict makes good cars

- Why do we compromise (cooperation – happy employees)

- Ford Mustang Story – tail lights

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TEAMS of Empowered Experts

- A single person rarely has the expertise and the time to develop a product alone
- Some leaders think they can
- Some Chief Engineers/Project managers certainly can when they have a good team
- Experts – the team experts should be trusted to have the technical expertise to do their job (or they should be paired with an expert, so they can learn)
- They should be empowered to suggest the right decision BUT
- **They all must collaborate for the best value for the customer and the best outcome for the company**

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The One With The Most Tools Wins

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Which is the Best Lean Tool

- ❑ Hackathon
- ❑ Lean Startup
- ❑ Design Thinking
- ❑ Agile
- ❑ TRIZ
- ❑ SCRUM
- ❑ Quick Learning Cycles
- ❑ Others

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What is the best tool

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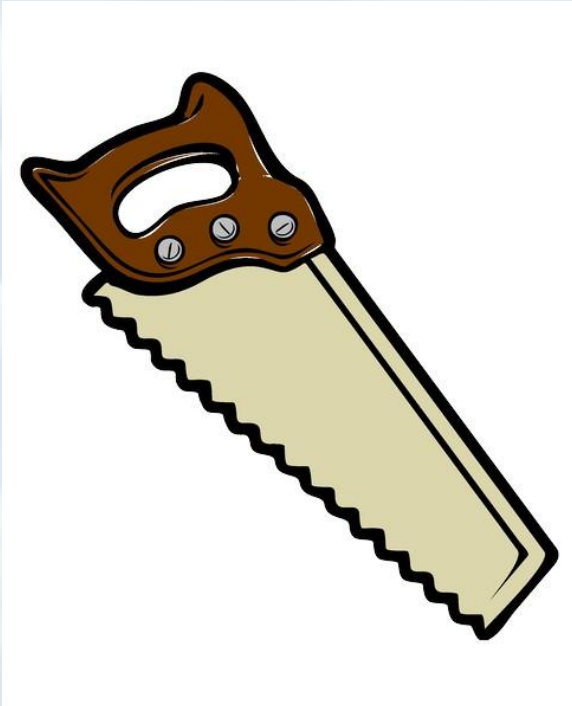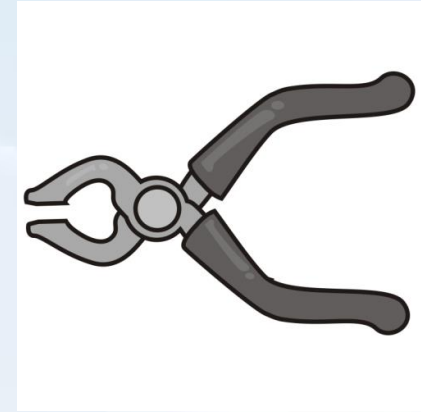
Chasing after lean tools is like….

….a dog chasing a car – he would not know what to do with it even if he caught it

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Agenda

- Pre-requisites
- The inspired traditional principles
- The lean principles
- Agile management
- Metrics
- Reflection
- Managing People in a lean organization

Traditional Inspiration

- Portfolio Management
- Goals
- Sponsor
- Risk Management

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Portfolio Management

- Business (and even R&D) projects should not be be considered in isolation

- Consider the TOTAL value of the portfolio (NPV)

- Project decisions must be made based on the change of the total portfolio value

Portfolio Management

- R&D projects **MUST** be assessed in a Portfolio
- For any changes – additions AND DELETIONS – the value of the portfolio must be re-assessed
- Unless anything better – use **NPV (**Net Present Value) to assess projects
- A portfolio must be balanced by
  - Type of business that is supported
  - Innovation / Mature projects
  - Income – target for income from new products
  - Opportunities

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NPV

Net present value (**NPV**) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. **NPV** is used in capital budgeting to analyze the profitability of a projected investment or project.

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_o$$

In this equation:
C_t = net cash inflow during the period t
C_o = total initial investment costs
r = discount rate, and
t = number of time periods

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Balance

Cash Flow

Resources

Current Products

Growth

Innovation

Features

Revenue

New Technology

Risk

Short/long Term Income

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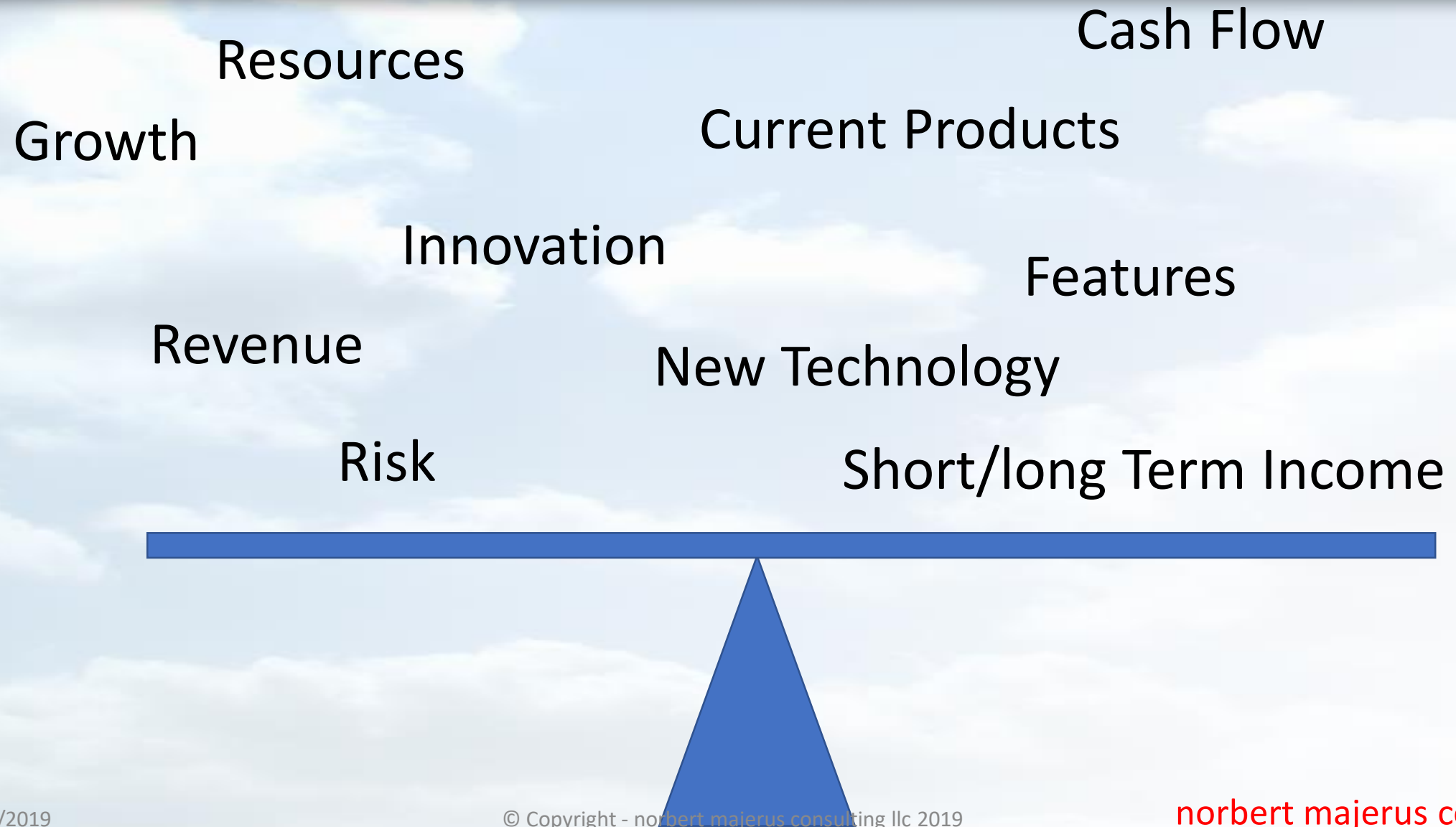
How to balance a new product portfolio

- Computer Programs

- SIMPLE STUFF
  - 30% revenue from new products
  - Take old products OUT
  - Do not overload the system
  - The riskiest projects are not always the best
  - Beware of "pet projects" and "smelly fish"

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Key Rules for New Peoducts or Services

- Take the OLD product out
- Assure mix meets strategy
- Have suffient amount of new stuff
- Balanced RISK
- Decide on VALUE of portfolio
- Align product portfolio with development portfolio
- Avoid overloading
- Portfolio drives AOP

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Traditional Inspiration

- Portfolio Management
- Goals
- Sponsor
- Contract
- Risk Management

Traditional

- SMART (Specific, Measurable, Attainable, Realistic/Relevant and Time Bound)
- Always Achieved
- Or else – severe consequences

- You get the 10%
- Little learning
- Buffered

Aspirational

- Much higher – you get 2 to 3 times as much
- More Learning

- Need different performance measurement

Catchball

Game

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Principles

- Engagement
- You tell me – right to know
- I agree and I support you
- Responsibility and Accountability
- Let me know when things change and when I can help

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Traditional Inspiration

- Portfolio Management
- Goals
- Sponsor
- Contract
- Risk Management

Sponsor

- Goodyear experience
- Role of Sponsor
  - Help
  - Educate/coach
  - Ask the right questions
  - Remove obstacles
  - Use his/her influence

Traditional Inspiration

- Portfolio Management
- Goals/Contract
- Sponsor
- Risk Management

Risk Management

- Traditional RM is often difficult due to lack of data/information
- Mitigation process >>> lean??
- FMEA and other good tools
- Agile a lot better === later

Agenda

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- Metrics
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- Manging People in a lean organization

The Lean Stuff

- The economic importance
- Upside down triangle
- Speed
- Manage projects in small pieces
- Visual planning / huddles
- Late start
- Concurrent work
- Critical path management
- Wastes
- Standard Work
- Resource utilization

Goodyear Fuelmax

Market called for AGILITY

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The Cost of Time/Delay

Cost to the Business

No Product

Missing Feature

Additional Resources
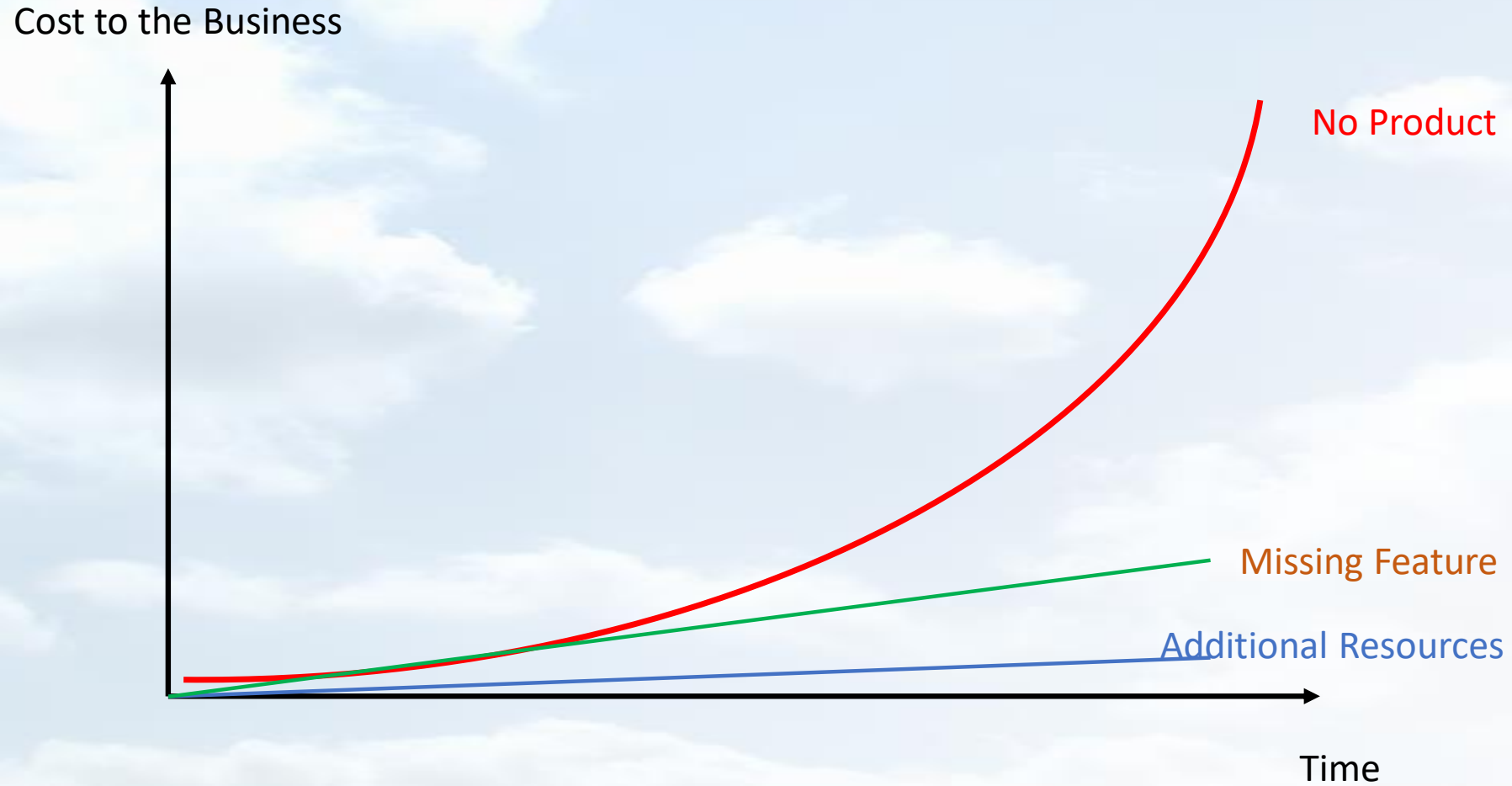
Time

R&D Department vs Company

Formula COD

$$COD = monthly\ financial\ measure * number\ of\ months + fixed\ amount$$

$$COD = \sum_{k=0}^{n} monthly\ cod + \text{fixed part}$$

Only Project Managers who do not know the COD let project timelines slide

The Upside Down Triangle

SCOPE

Not Negotiable

Development Cost   Time

Variable

Budgeted

Cost   Time
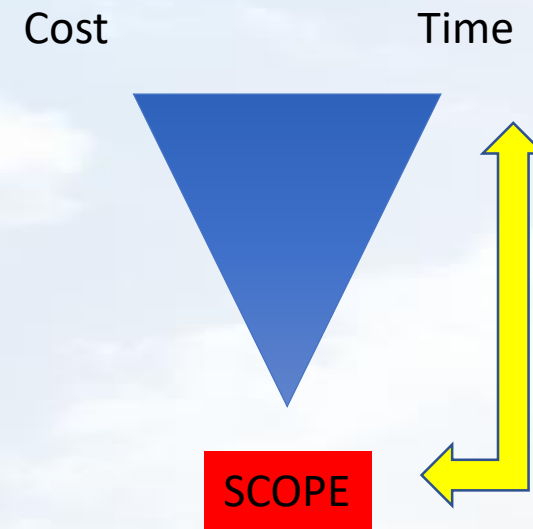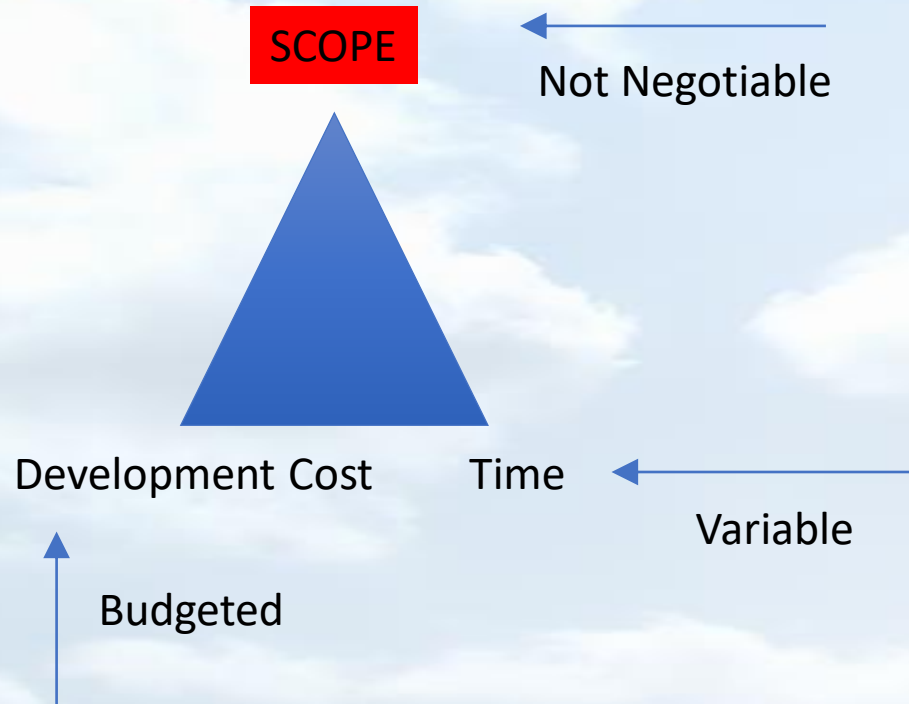
SCOPE

Understand the Cost Of Time

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Agility – My Definition

- Agility is the ability (flexibility) to change the project scope, deliverables …
  - ➢ As requirements change
  - ➢ An new things are learned
  - ➢ As constraints are coming up

Fast Is Better Than Slow

If I had only one thing to focus on, it would be SPEED/Agility (after safety, quality, delivery)

- Competitive advantage
- Faster Learning, better risk management
- Better cash flow
- **Collaterals of efficiency**

Rebecca Morgan:

"Without a destination in mind, speed is irrelevant."
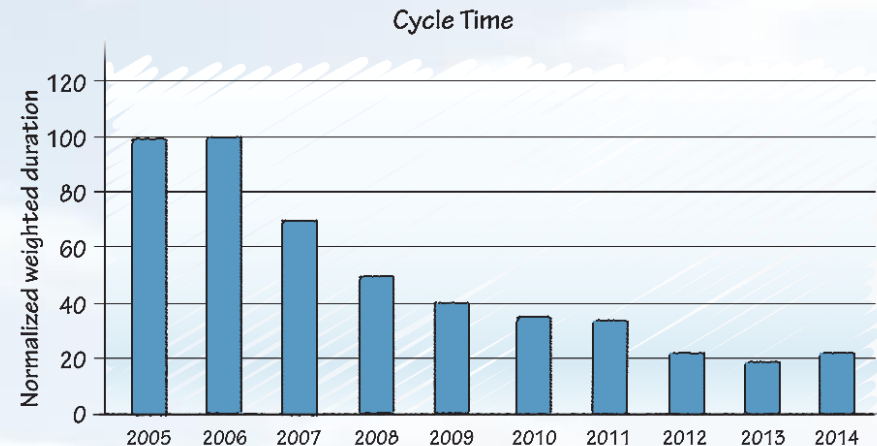
Cycle Time

Some Goodyear iterations require more time than others. In order to track cycle time across all iterations, regardless of the varying time, Goodyear established a measure of normalized weighted duration, establishing a base of 100 in 2005.

Faster Project Delivery

- *First-mover benefits*
- *Tap new technology*
- *Agile capability*
- *Faster learning and process improvements*
- *Capitalize quickly on cost savings*
- *Better cash flow and faster return on investment (ROI)*
- *Motivated and engaged engineers*
- *…………*

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Re-Use

- Whatever is possible
- Especially KNOWLEDGE

Waste of Imbalance

Remove MURI overburden
Minimize MURA fluctuation
Then,
we can eliminate MUDA waste

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Waste

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Waste

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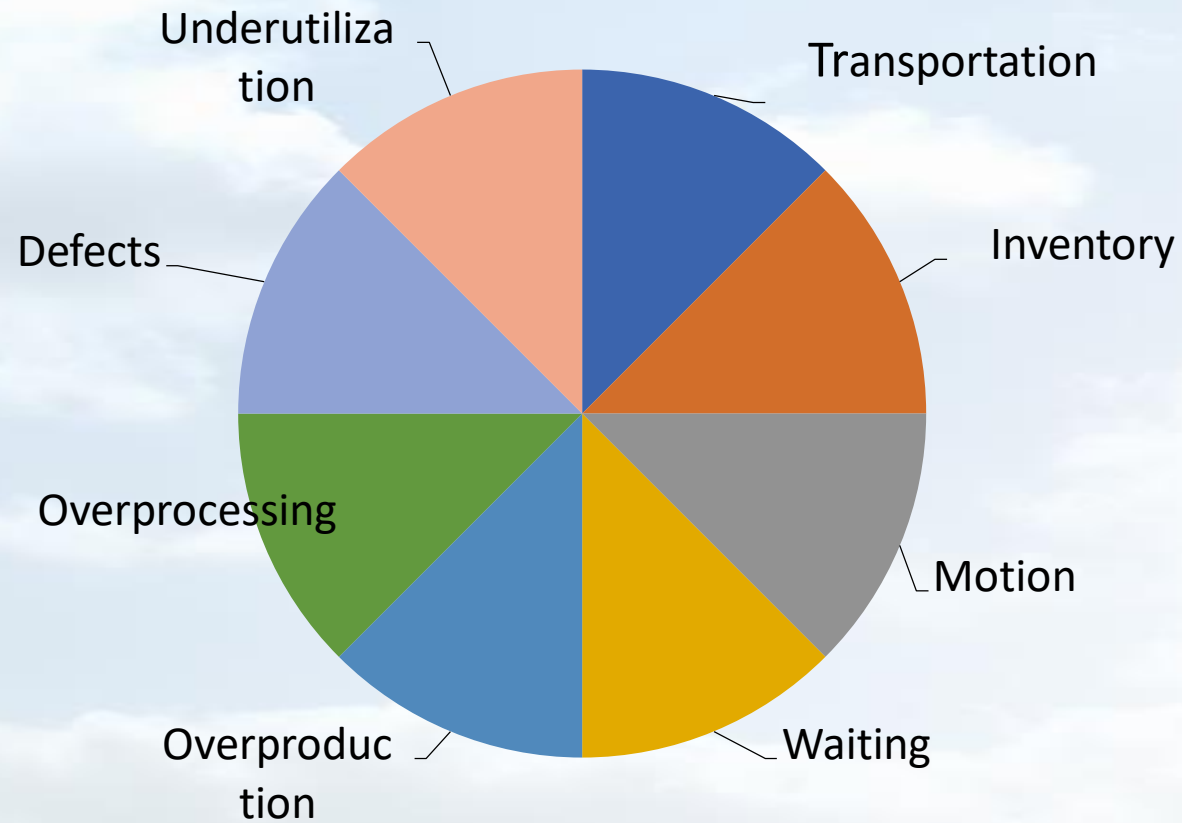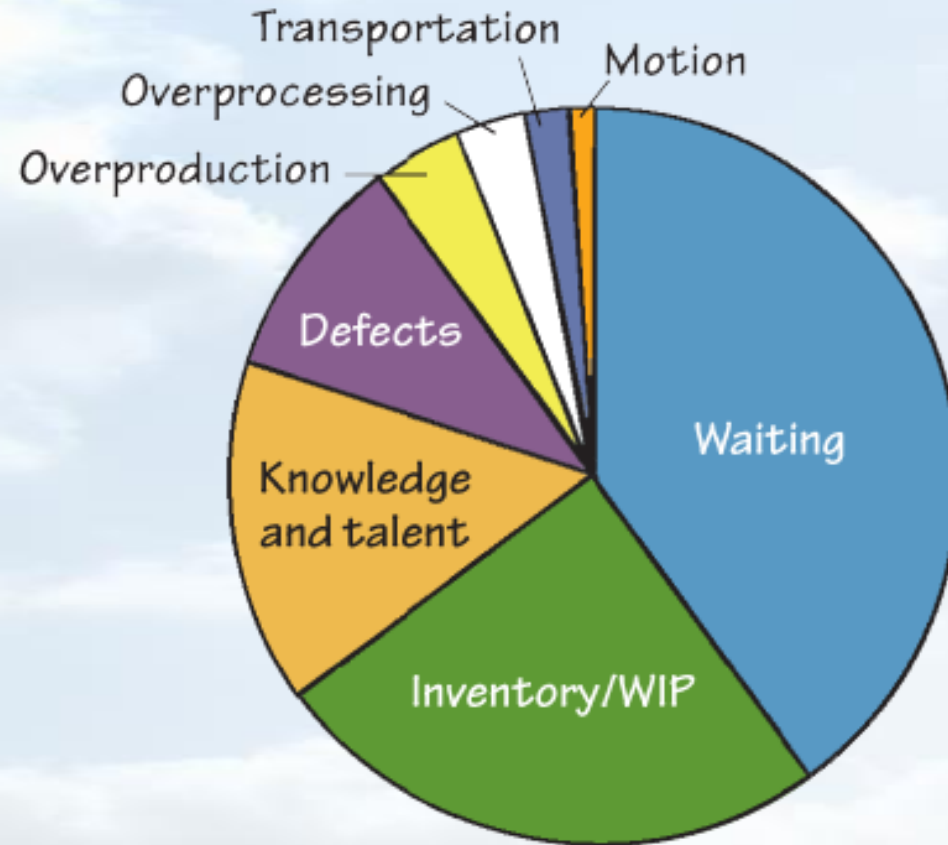
Start eliminating waste at the top

- Projects
- Manage incoming work
  - ✓ Accept only what capacity you have
  - ✓ Level on highest point

Managing Projects in Small Pieces = Agility

- Much easier to schedule
- Manage risk in small pieces – allocate money in small chunks
- Creates agility – decision after every small step
- Addresses problems faster
- Faster learning

- BUT must maintain focus – hoshin kanri helps

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Managing in Small Pieces - Tetris Principle

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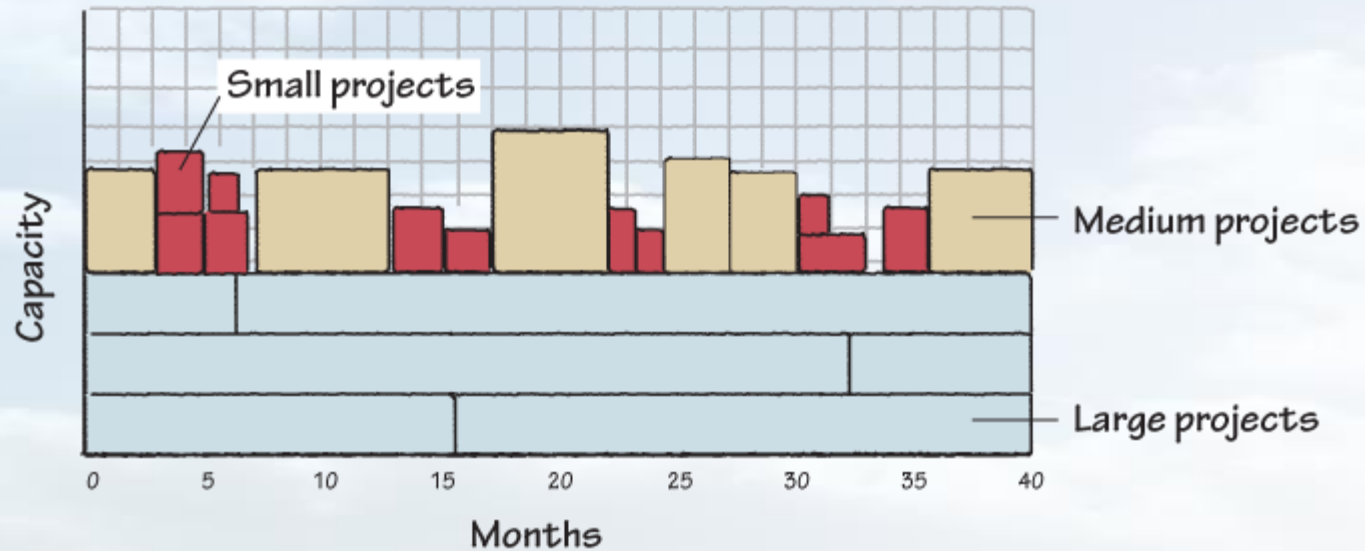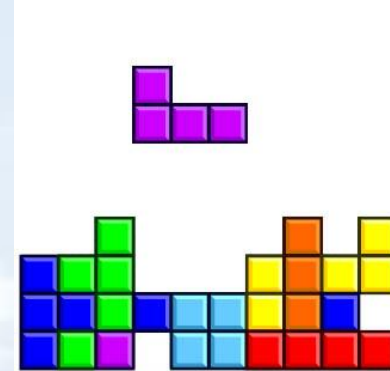
Tetris Principle – Managing in Small Pieces

Large blocks are hard to fit.
Split large blocks into smaller pieces.

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Tetris Principle

Large blocks are hard to fit.
Split large blocks into smaller pieces.
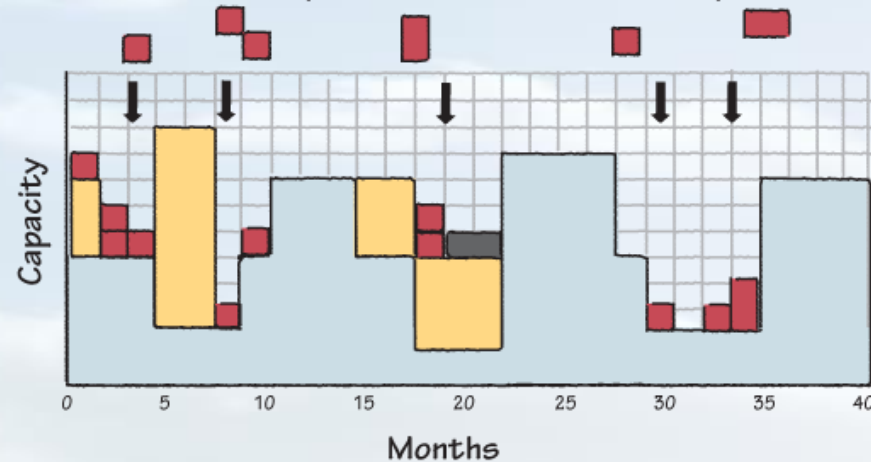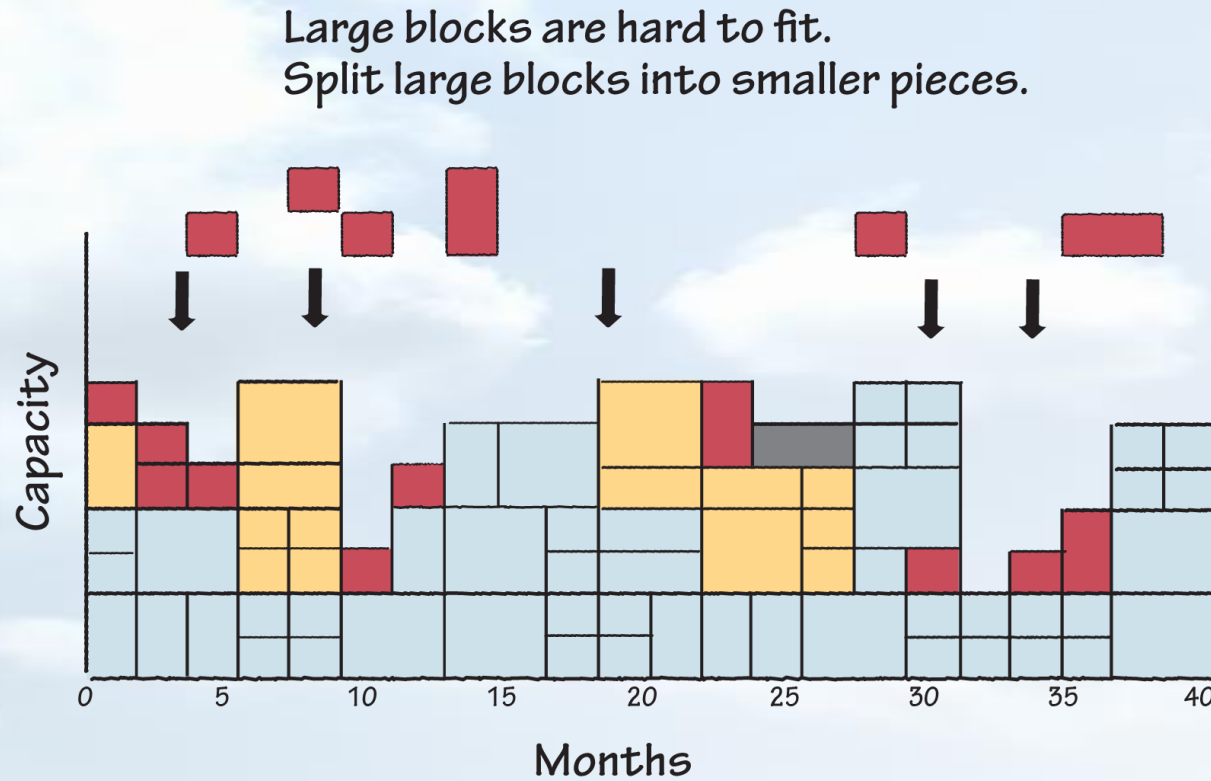
Short Cycles

- **Are easier to schedule**
- **Allow better risk management**
- **Create knowledge faster**

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Goodyear Iterations

Goodyear Iterations

PROJECT: Too Much Variability

ITERATION: Just Right

Detailed TASKS: Too much detail
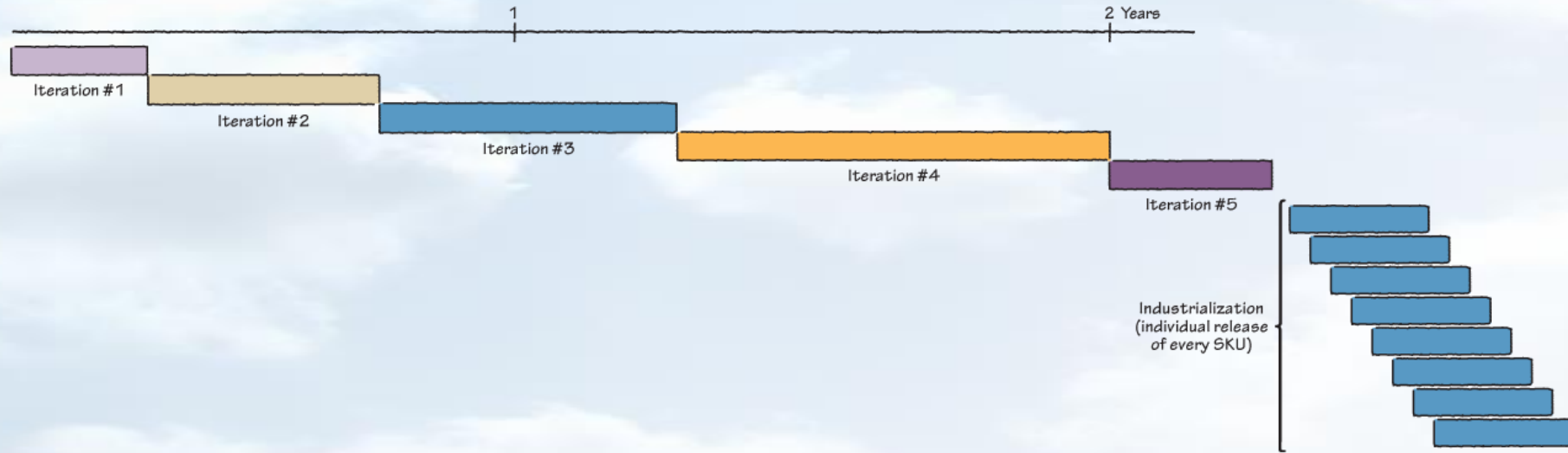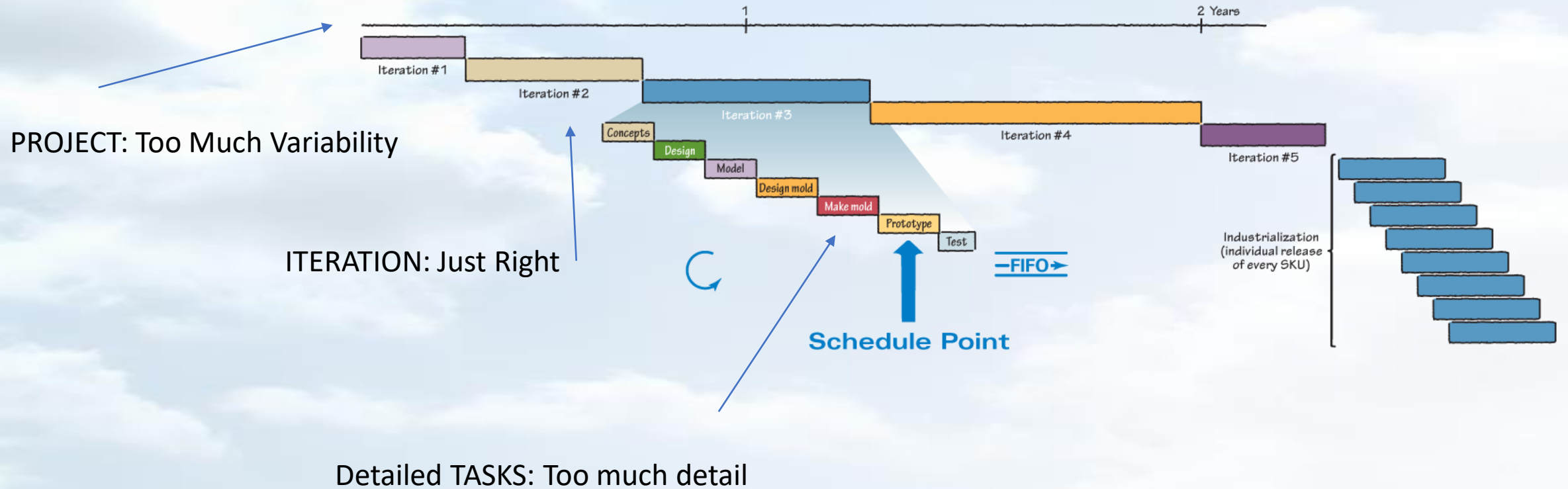
10 Second Rule
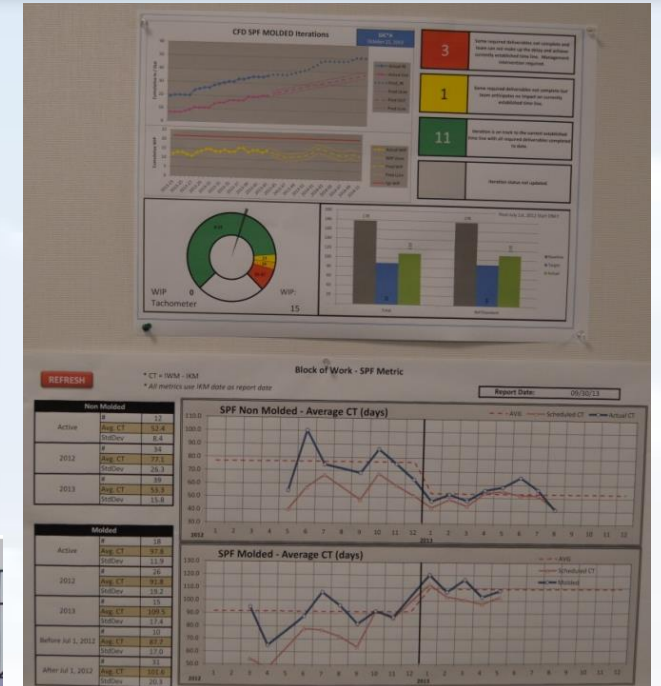
Visual Management

- Show deviation from standard – 10 sec rule
- QUICKLY activate standard problem solving process
  - One time deviation
  - Systemic problem
- Verify solution
- Make new standard

"The primary role of managers must shift from firefighting to designing, aligning and improving systems."

- Shigeo Shingo

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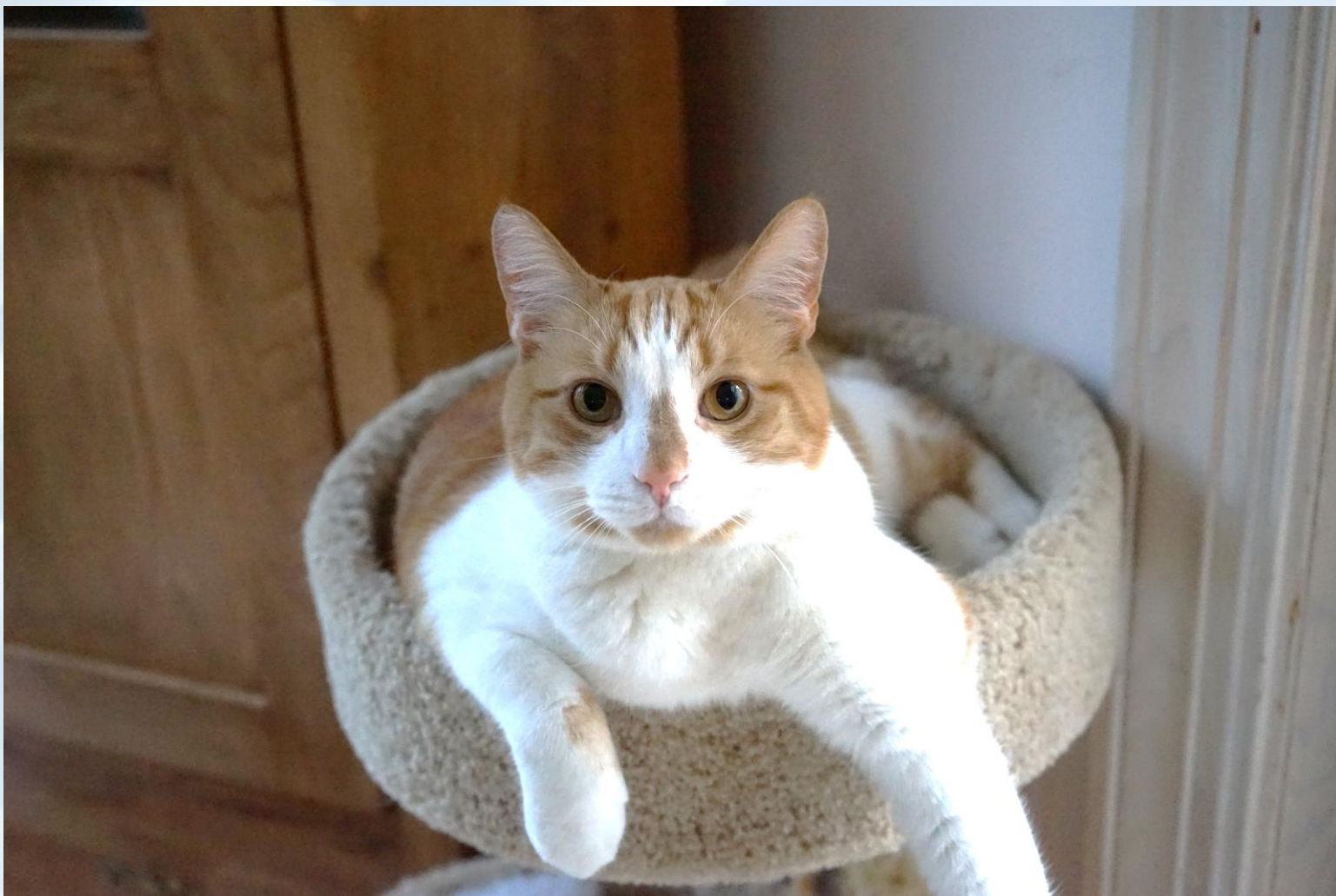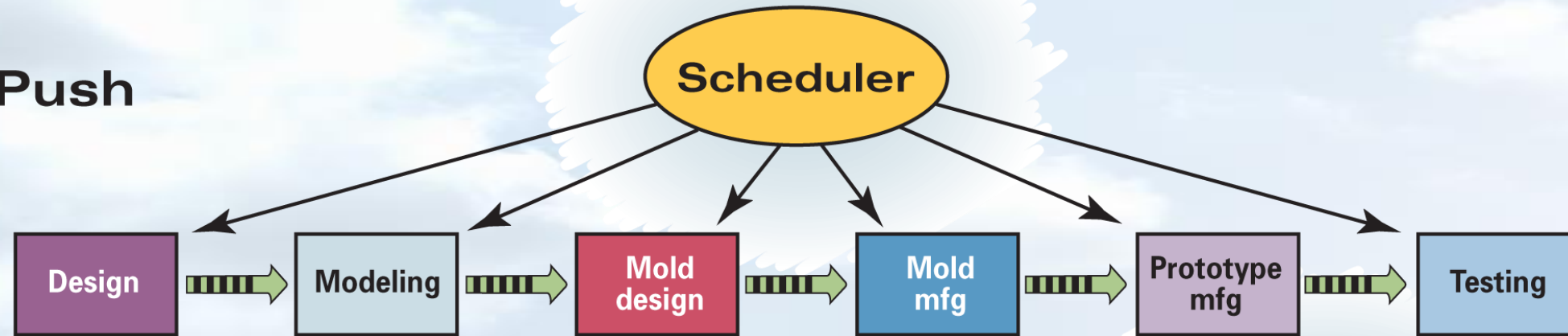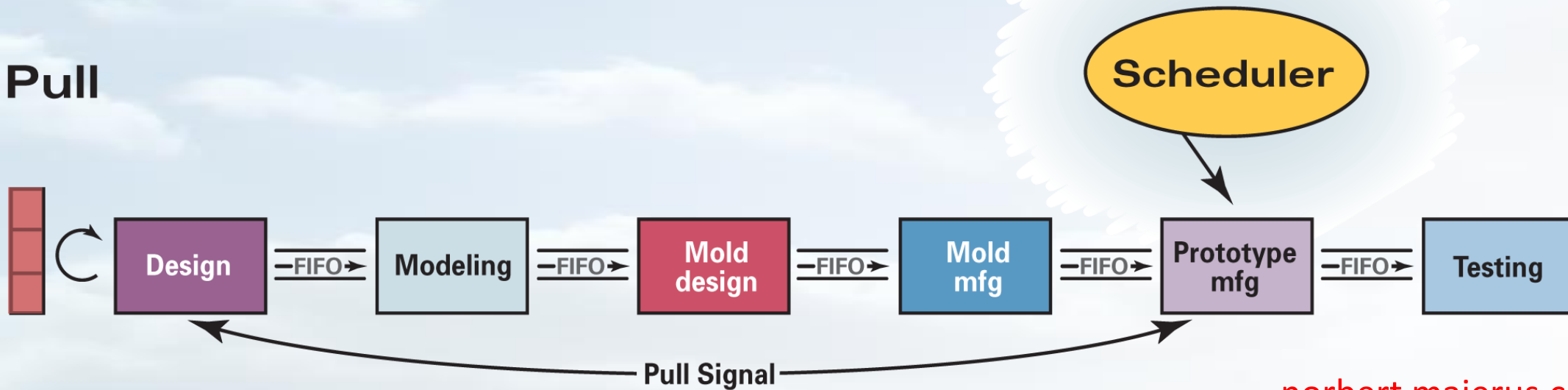
Advantages of Pull

- Self adjusting/aligning
- Limits inventory / work in progress

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Multitasking

One major project per engineer at one time

- Must have back-up and filler tasks
- People can only do one complicated task at one time
- Can lead to mistakes / poor quality
- Task switching is inefficient – often result of too many priorities
- Multitasking often root cause of slow progress

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Multitasking

- Exercising, listening to music and talking or cooking and talking on the cell phone could be considered doing two or more things at the same time!

- Doing two projects at the same time is not as easy – normally one is being worked on, the other one waits.

- This multi-task game may be a little like trying to handle too many projects at the same time…

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"I'm sending you to a seminar to help you work harder and be more productive."

GLASBERGEN

https://www.kongregate.com/games/IcyLime/multitask

http://www.kongregate.com/games/IcyLime/multitask

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Multi-tasking (= Batching)
One Engineer, Four Jobs

Finish

1    $
2    $
3    $
4    $

All jobs start and finish at the same time

WIP = 4 jobs
Average cycle time = 1 (year)
No economic value until all jobs are complete.

1    $$$$$$$$$$$$$$$$$$$$$$$$$$
2    $$$$$$$$$$$$$$$$$$$$
3    $$$$$$
4    $

WIP = 1 job
Average cycle time = 0.25 (year)
Economic value starts after 1st job is complete.

1,2,3,4, = business priorities. The delay of #4 is less costly than the delay of #1.

Note: This is multi-tasking by the same resource

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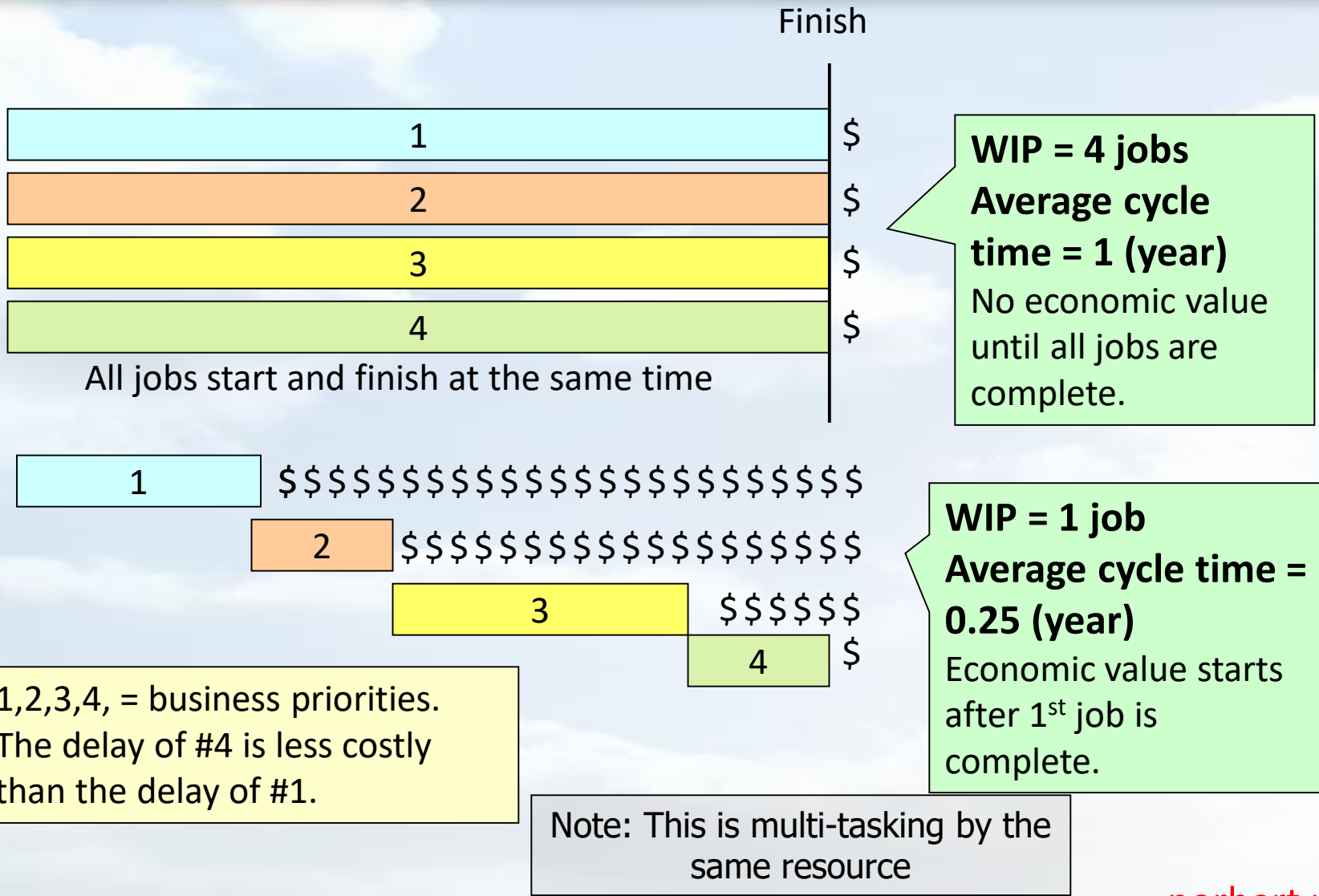
$$\text{Cycle Time} = \frac{\text{Work in Progress}}{\text{Throughput}}$$

What is more expensive?

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Stop and Go

- A lot of people who think they multitask are actually only working on one task at the same time – all other tasks wait.

- This leads to "stop-and-go."

- Doing a task in "stop-and-go" mode adds extra time due to "restart delays."

- A good analogy is traffic:
  - Red lights
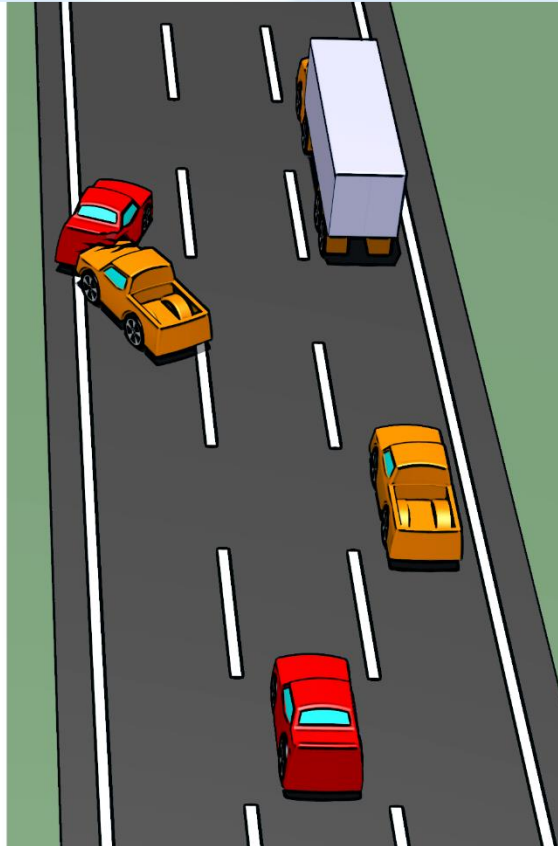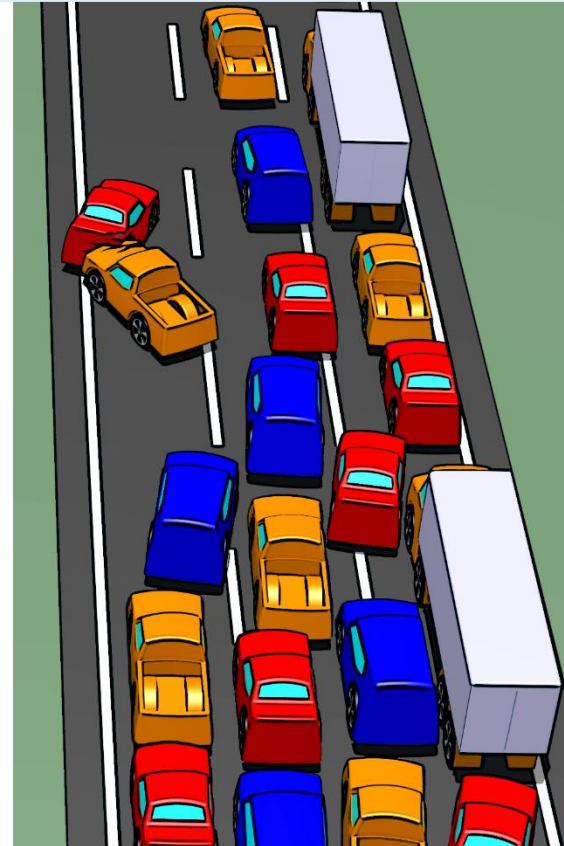 - Stop Signs
  - Roundabouts

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To

From

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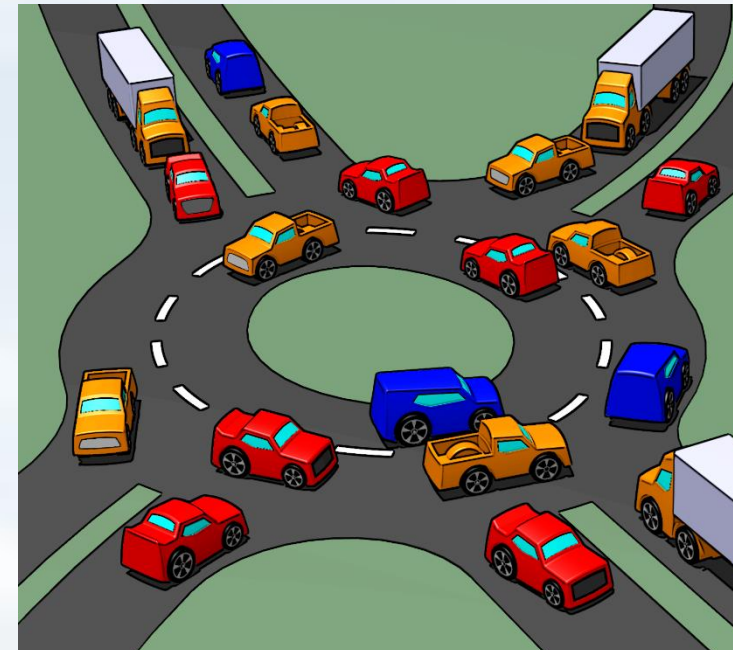
5:00 AM

5:00 PM

Utilization and Cycle Time   Kingman Equation

Effect of Utilization on Cycle Time
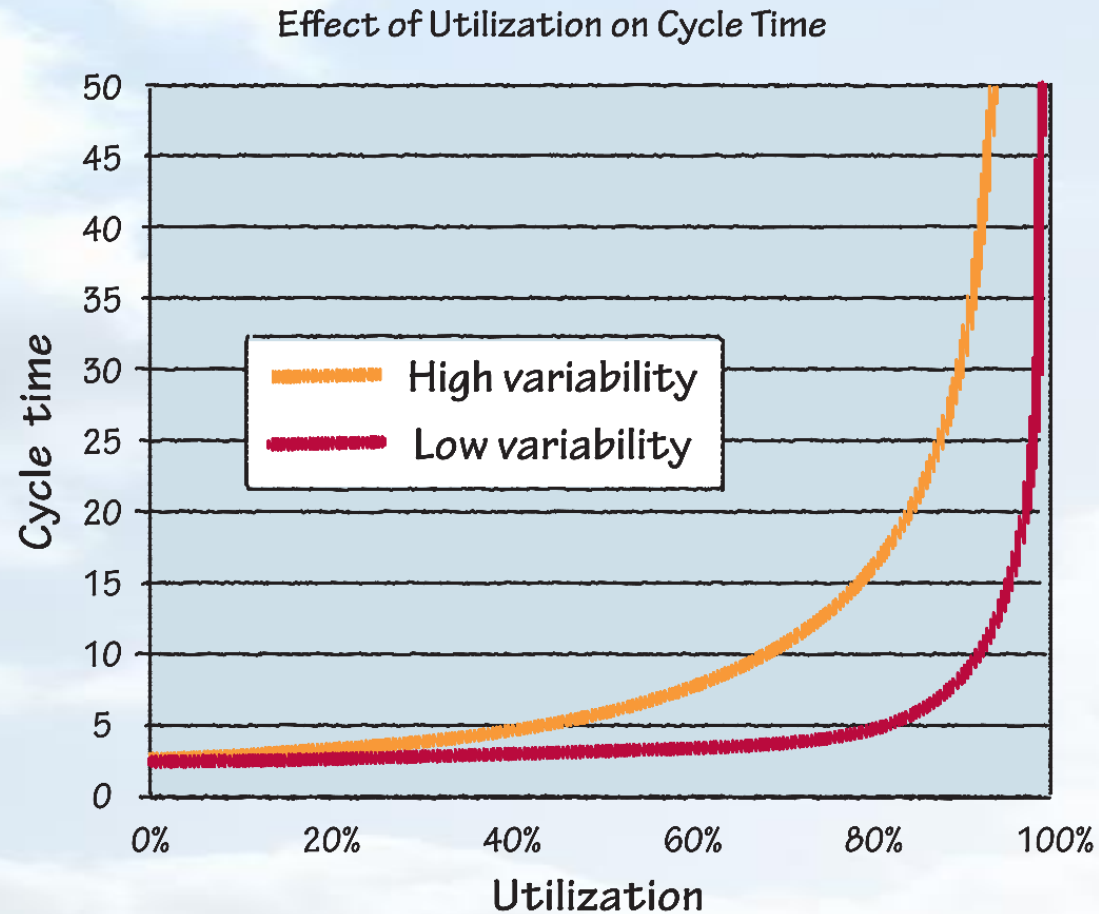
*The basic relationship:

CT = Average Processing Time * (Utilization Ratio / (1-Utilization Ratio)).

Search "Kingman's formula" and related for more information.

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Variability Buffering

- Variability in a production system will be buffered by some combination of 1) Inventory, 2) Capacity, 3) Time.

Some examples of variability buffering

Ballpoint pens. Retail sales of inexpensive ballpoint pens. Variable demand. Customers want immediate supply.
  – **What is the buffer?**

Emergency service (fire, ambulance, etc.).
  – **What is the buffer?**

Getting to the airport in Sao Paulo in the rain
  – **What is the buffer?**

Factory Physics, 3rd Ed., Wallace J. Hopp and Mark L. Spearman, 2008.

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What is the most commonly used buffer in R&D, project management, …. ?

⇩

Always TIME

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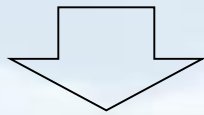
Late Start
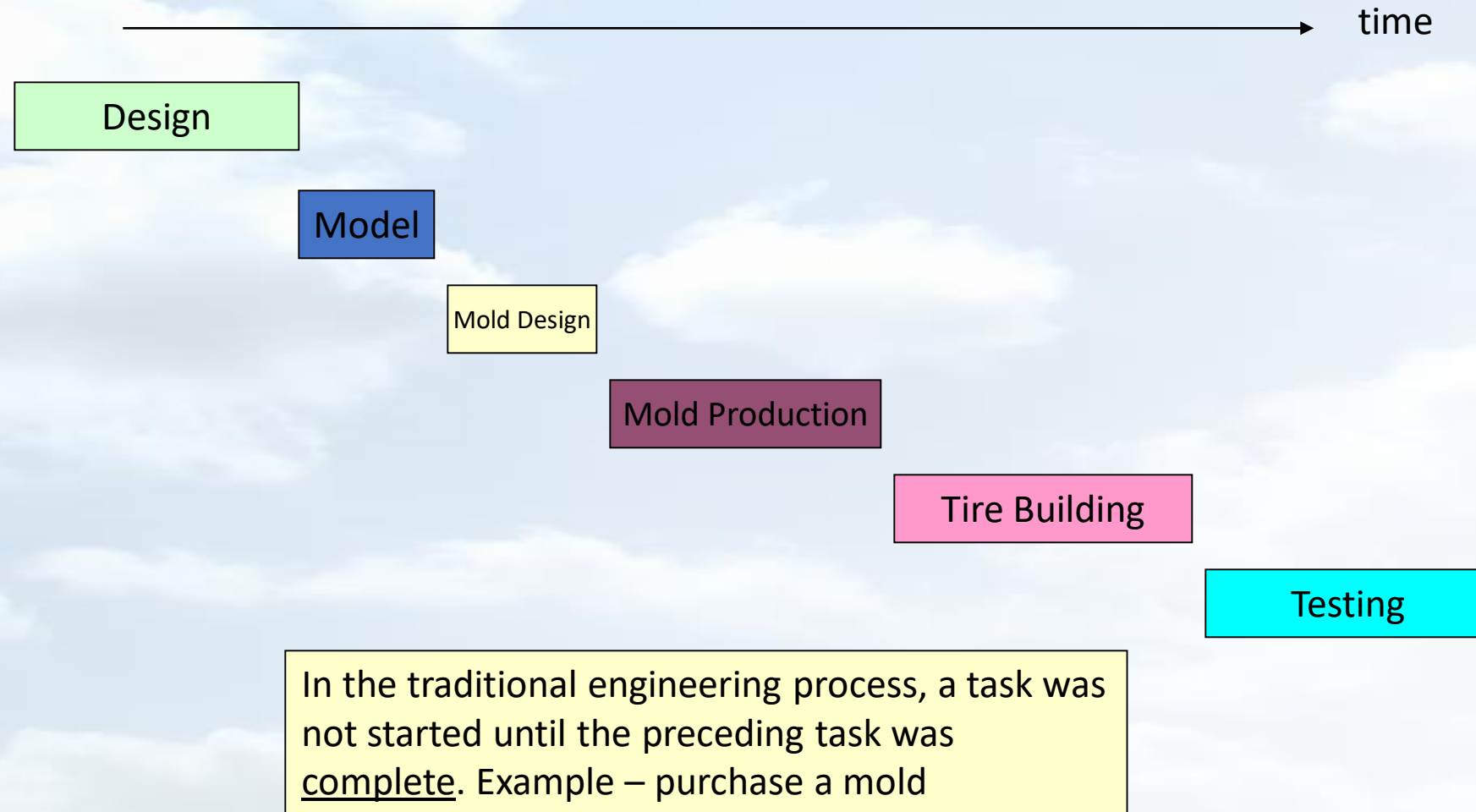
Every iteration is started as late as possible but with enough time to finish, including a small buffer to account for variability

Late Start

From
Work   Wait

To

Time Buffer

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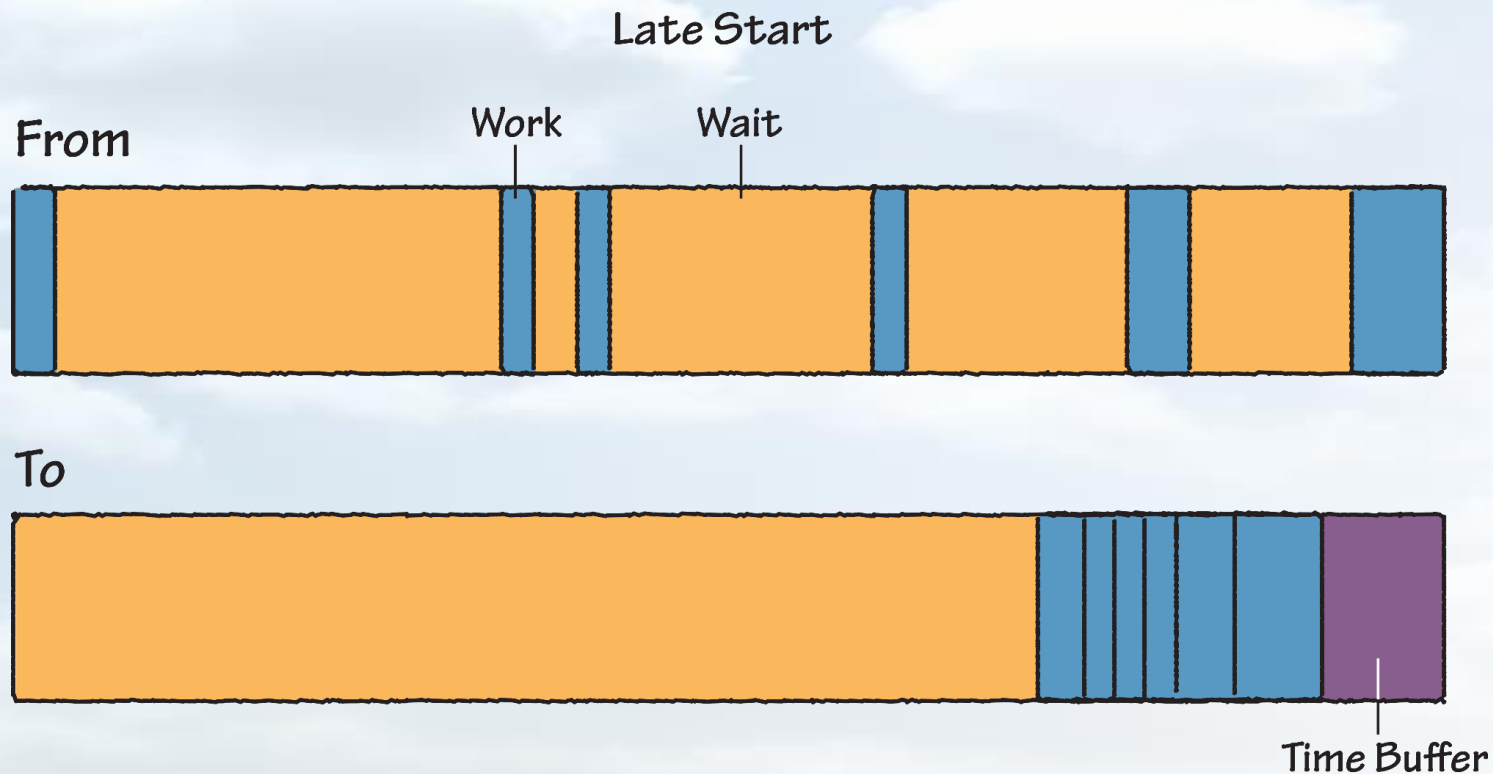
WHY Late Start

- Know more - Latest technology and opportunities
- Keep options open
- Manage changes
- Dealing with engineers (Parkinson Principle)
- Investment / cash flow

Traditional Engineering

time →

Design

Model

Mold Design

Mold Production

Tire Building

Testing

In the traditional engineering process, a task was not started until the preceding task was <u>complete</u>. Example – purchase a mold

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Concurrent Engineering

time

Results

Design

Model

Mold Design

Build Wire

Mold Production

Tire Building

Testing

With concurrent engineering, next-step work begins as soon as sufficient information is available.

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Concurrent Engineering

ITERATION KICKOFF MEETING

Prepare Design

Prepare Mold Eng.

Prepare Mold Mfg.

Prepare Construction Modeling

Prepare Materials Development

Prepare Tire Build

Prepare Tire Testing

Single Piece Flow → Focus Resources and Eliminate Wait Times

Kickoff Meeting → Shared Information / Up-Front Preparation

Teamwork / Parallel Engineering

Downstream Activities are Planned / Scheduled

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Critical Path

Material development

construction

time

Results

Model

Build Wire

Mold Design

Mold Production

Tire Building

Testing

Definition
Longest path of planned activities to the end of the project, and the earliest and latest that each
activity can start and finish without making the project longer

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Critical Path Management

- ONLY the critical path matters for speed
  - But it may change
- Many lean and traditional PM principles apply to good critical path management
- TOC (Theory of constraints) applies to the critical path just like to a bottleneck
- I personally do not like parts of "critical chain" – I prefer to assign resources based on economic considerations and in small chunks

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TOC Principles

- Identify Bottleneck – critical path
- Remove constraints (waste) from critical path
- Support the critical path – make sure nothing has to wait for non critical path activities
- Add resources to the critical path as needed – based on economic considerations
- Notice when the critical path changes

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Managing Critical Path with TOC

- Give the critical path what it needs
  - Resources
  - Reduce waste (no waiting)
  - …
- Do not starve the critical path
  - Everything the critical path needs must arrive on the critical path
- Improve the critical path first
  - Resources
  - Equipment
  - Continuous improvement
- The critical path will move

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Advantages

- Quality, Speed, Delivery, Efficiency
- Engineers do not have to worry about the process
- Projects become PREDICTABLE

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Agenda – Lean PM

- Pre-requisites
- The inspired traditional principles
- The lean principles
- Agile management
- Metrics
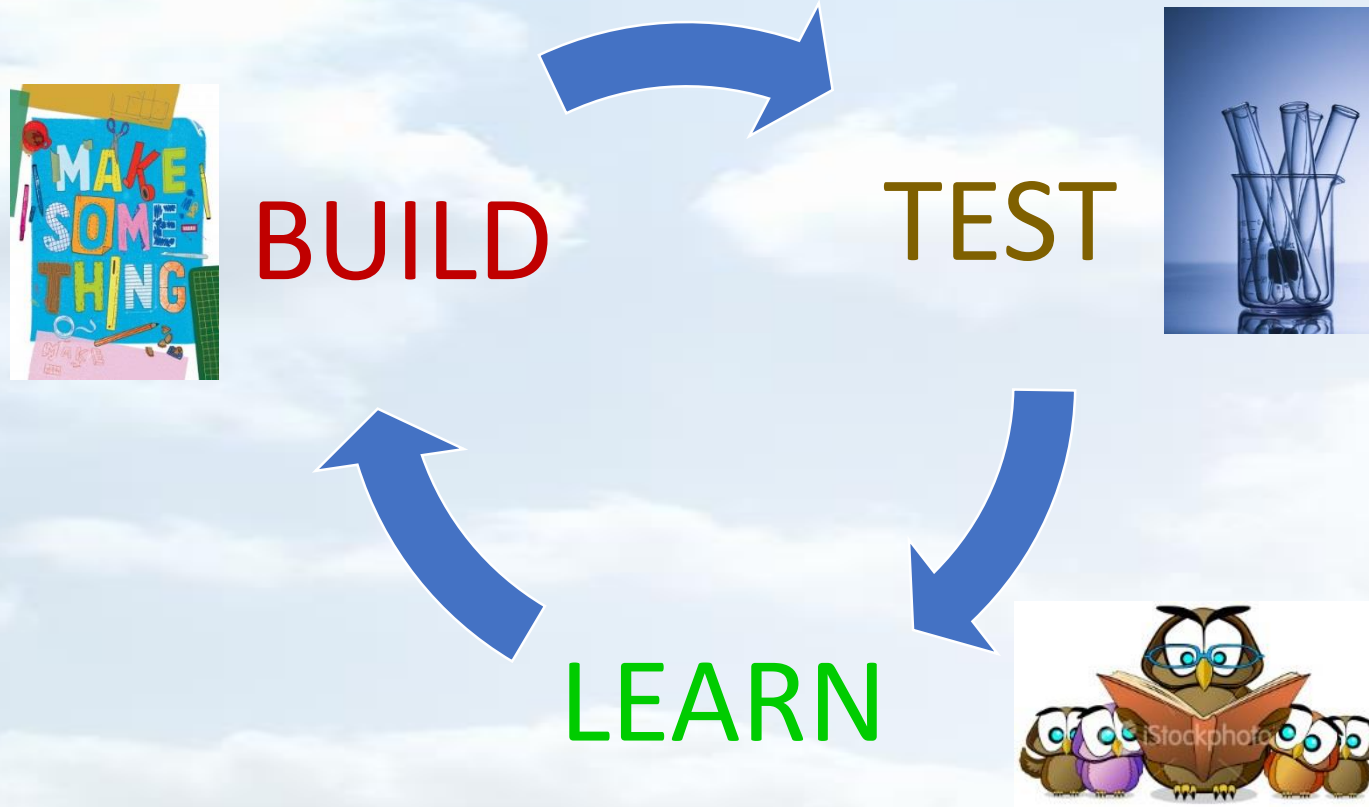- Reflection
- Managing people in a lean organization

Agility – My Definition

- Agility is the ability (flexibility) to change the project scope, deliverables …
  - ➢ As requirements change
  - ➢ An new things are learned
  - ➢ As constraints are coming up

Is Agile a Tool?

- What about SCRUM?

BUILD

TEST

LEARN

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Scrum/Sprint Training

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Now the puzzle

- Write down what you will work on
- Test it on your own
- Make a retrospective
- Plan next sprint

Play Agile - Puzzles

- Assemble
- Scrum master
- Make plan
- Set target
- Run Experiment
- Reflect

Agile Project Management

- Very short horizon (manage in small batches)
  - Well defined
  - Assumed to change
- Crossfunctional team sets feasible deliverables
  - Everybody makes their own commitments
  - Flexible, agile, things can change
- Close to the customer
- Visual plan
- Concurrent
- Daily standup/reassessment, adjustment …

Bob Melvin

- Science project completion rate went from 7% to 100% by using a scrum board
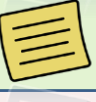- REASONS???
- - visibility
- - peer pressure
- - …

Daily Huddles

- Catch everything before itbecomes a problem
- Question – when is the problem the easiest to solve?

Quick Learning Cycles – SCRUM, sprints, agile ...

Time Period

Goal, deliverable ….

Name function or work to do	TO DO	IN PROGRESS	DONE

Potentially Shippable Product after every cycle

- Work in very small steps, FAST – often time limited steps
- Cross functionally from the beginning
- Retain flexibility through the process – launch or pivot at any time
- And
  - In the right order
  - With the minimum effort

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Building a house

Start Digging

- Buy land
- Make a drawing
- Get a permit
- Start digging

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What are the knowledge gaps?

CRITICAL QUESTIONS

- Can we sell it?
- Can we make it?
- Is new technology needed?
- Will we get approval?
- Is it legal?
- Do we have the talent?
- Can we buy the technology?
- Etc …………..

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- Google search engine
- Uber
- Sticky notes
- Self driving cars
- Affordable 3D printing machines
- Vertical farming
- Tire with recycled material
- A wind turbine for the high school

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- Google search engine – can we beat yahoo
- Uber – can we overcome taxi unions
- Sticky notes – can we create a market
- Self driving cars – will people use them?
- Affordable 3D printing machines – can it be made cheap and safe
- Tire with recycled material – will people pay extra
- Vertical farming – will urban planners allow it
- A wind turbine for the highschool – will bird associations allow it

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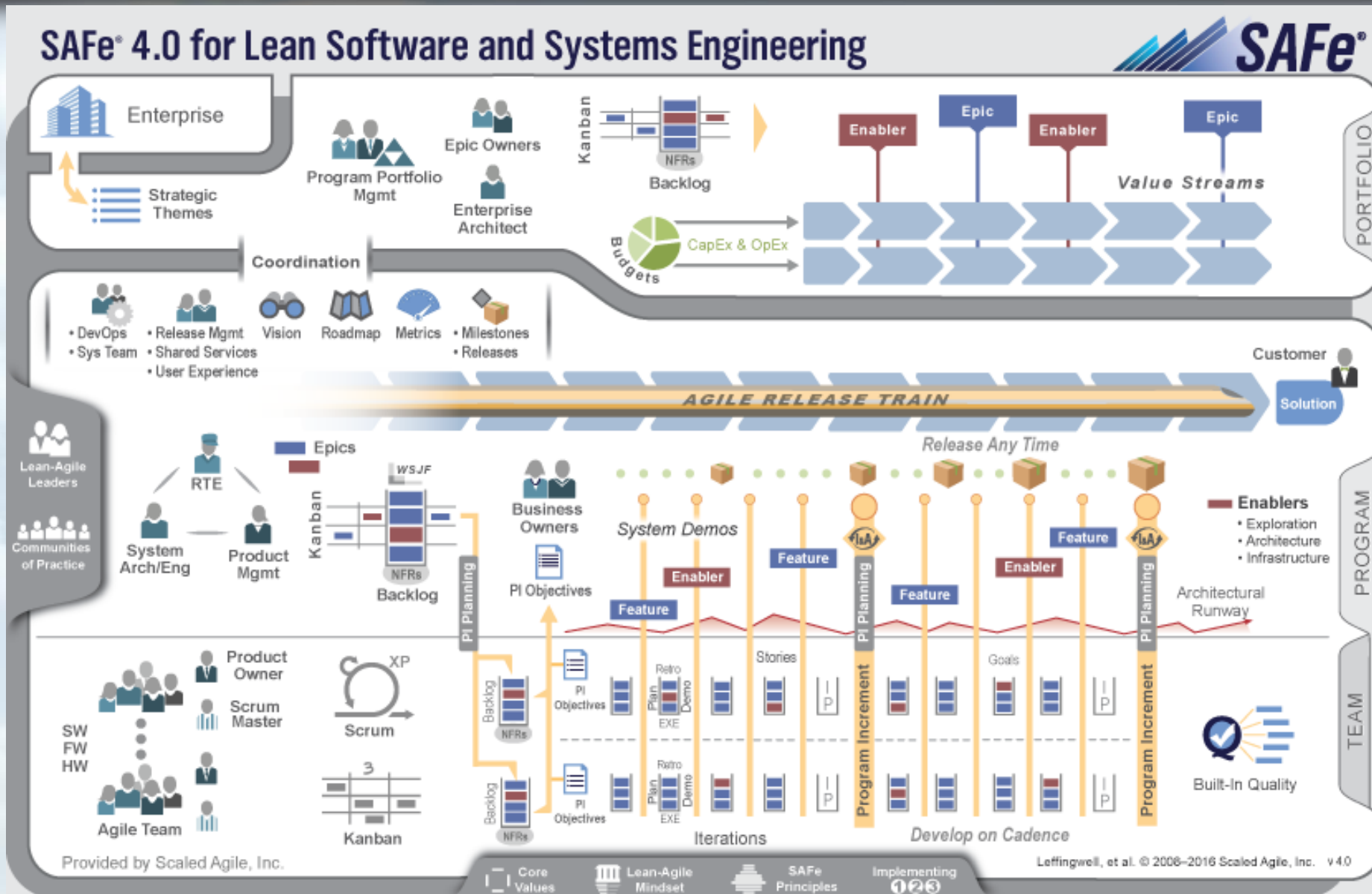
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The Big Bang Theory episode

https://www.youtube.com/watch?v=CdF2zVoXi-s

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Maximum Learning
With Minimum Effort

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Scaled Agile

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Lean Scheduling
Overview
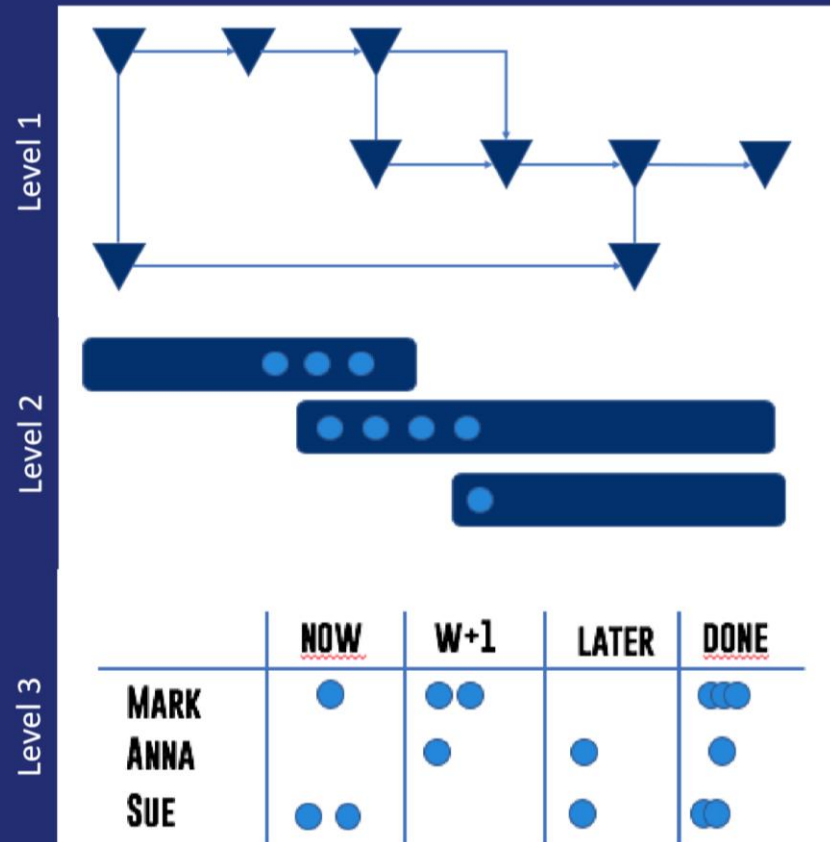
Lean scheduling ©Suzanne van Egmond

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Agenda

- Pre-requisites
- General Stuff
- The inspired traditional principles
- The lean principles
- Agile management
- Metrics
- Reflection
- Managing People in a lean organization

Hyrarchy

- Safety
- Quality
- DELIVERY
- Efficiency
- People Engagement

Good Project Metrics

- On Time Delivery

- Customer satisfaction

- Advancing the knowledge

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Agenda

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Why Reflection

- Learn (from mistkes)
- How is it shared
- Develop/Improve PM playbook

The Perils of the Reflection

- Admitting mistakes
- My experience

Personal Reflection

- Team AND personal reflection
- Try to do better the next time
- Use a coach / mentor

Becoming a Better Project Manager

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Agenda

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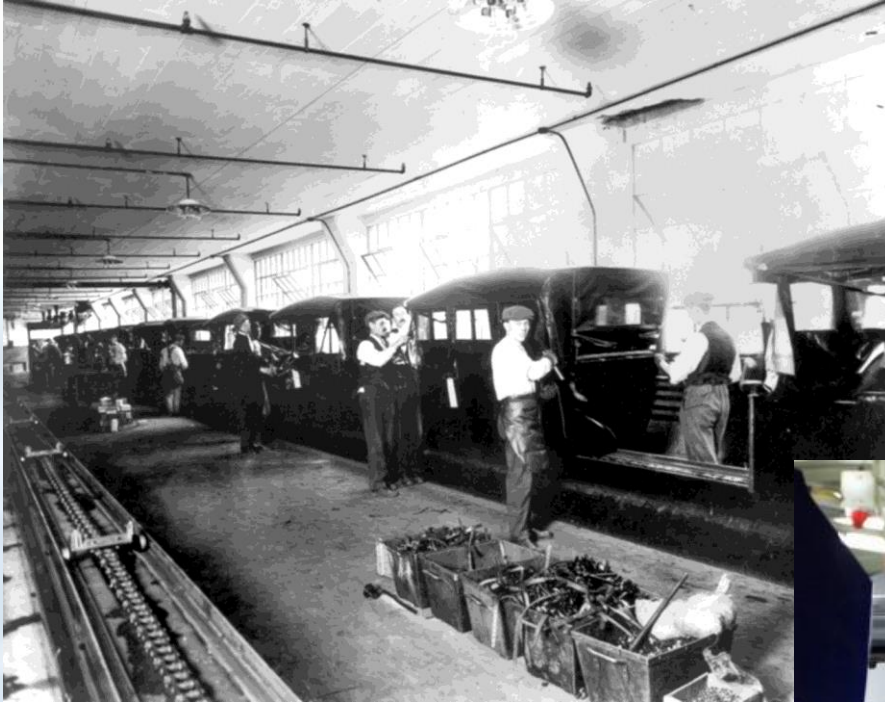- Reflection
- Managing People in a lean organization

Managing People in a Lean Innovation Process

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Managing People in a Lean Innovation Process

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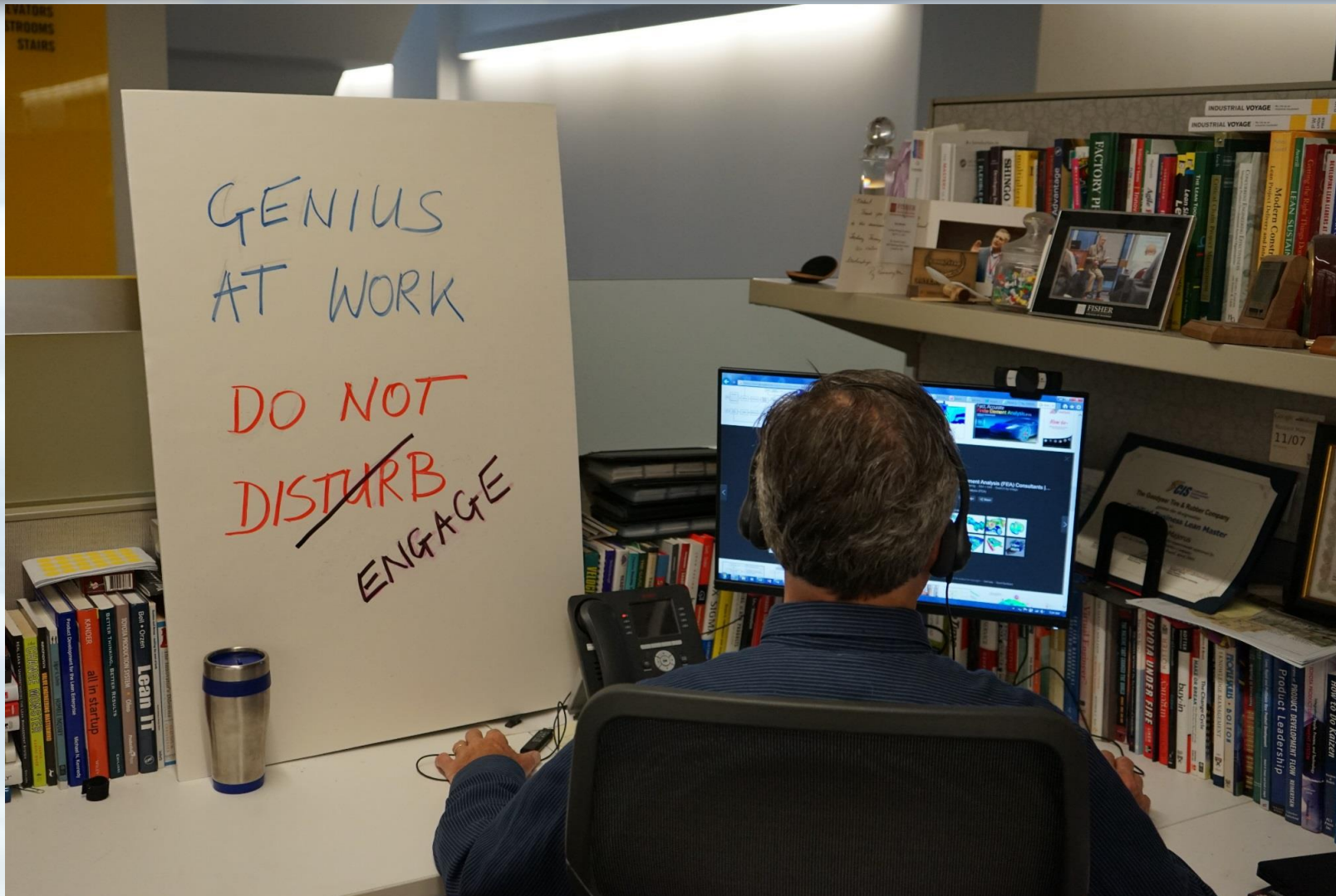
Manufacturing Innovation

A pair of hands
One Model

Many Models
JIT/Jidoka, TPS …
Hands and Brain
Andon Cord
…..…

7% automation

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Who is the best positioned to make recommendations about improving the work people do?

It is easier to teach the process experts the lean principles than it is to teach an outsider the process and the culture

Inside Out Transformation

1. Learn the principles
2. Teach the principles to the people who do the work
3. Engage the people and coach them through the transformation
4. Help sustain the gains

Engineers

Factory Workers

Service Providers

Want To

Have To
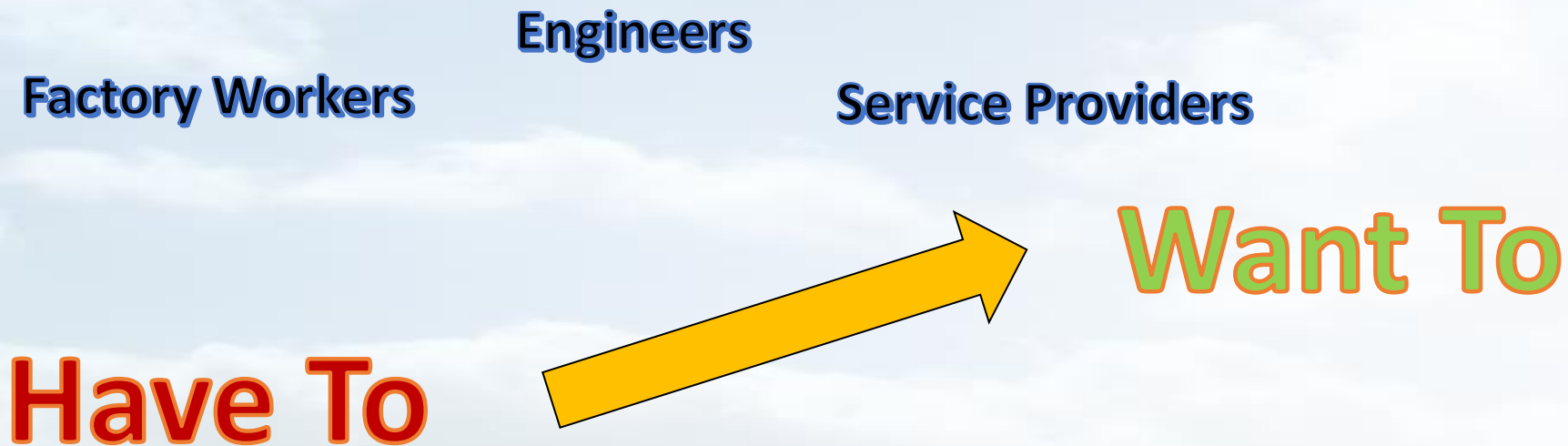
People Engagement

- Engagement – Who is best positioned to suggest improvements
- Goodyear Experience
- Respect for people
- Upside Down Leadership

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- They know the process
- You cannot just replace them
- They can improve and sustain the change
- Engagement motivates people

HOW to Engage the People

- Communicate, teach (WHY)
- Listen to the concerns
- Focus on the influencers first
- Go see – build trust - help and support
- Thank and reward
- **Show respect**

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Respect

- People come to work to do a good job
- If they cannot, look at process, training, qualification, equipment …
- Help the people be successful (ALL) – even the marketing folks
- Ask questions, do not give answers
- Learn to manage the round peg in the square hole – (google)

Hard on the Process, Easy on the People

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Leadership

- Similar skills for company leadership and project manager
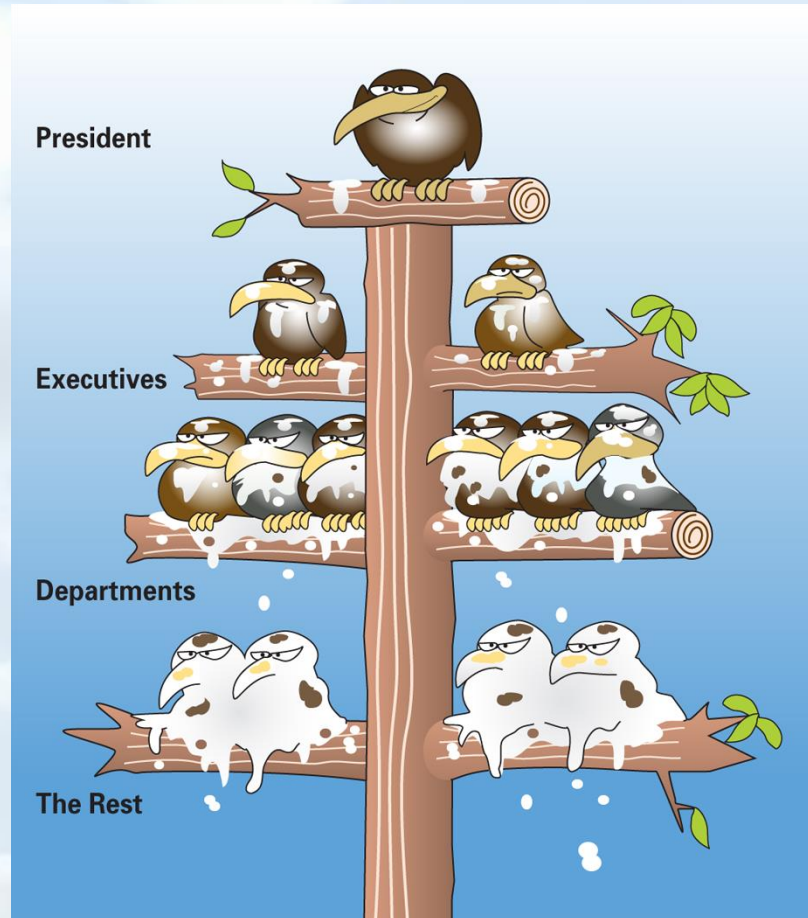
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Upside Down Leadership

Billy Taylor, Director NAT Manufacturing

Ellis Jones, Plant Manager Akron

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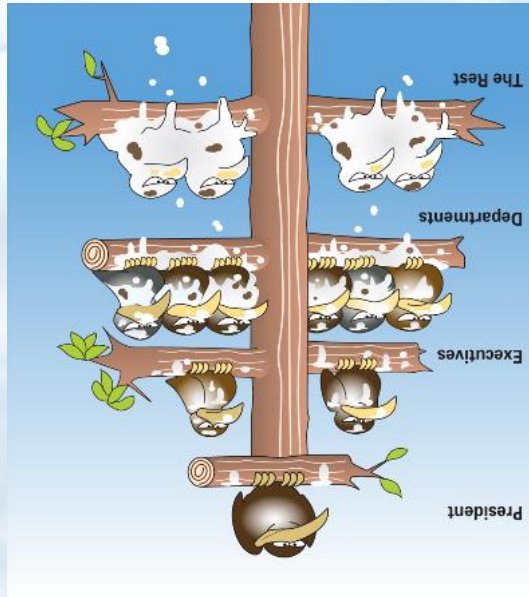
Leadership

*Inspired by unattributed graph
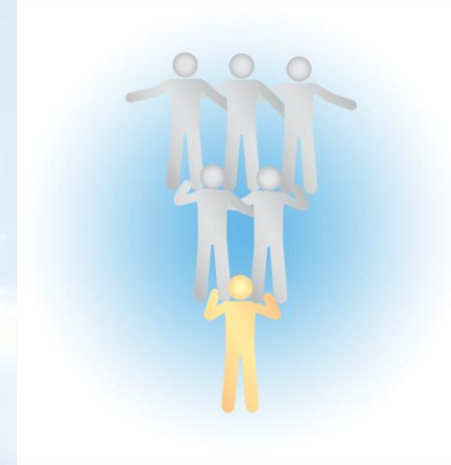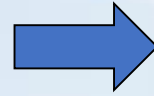
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Lean Leadership

Location Ho

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Leading Without Authority

- Project Manager vs Leader - not having it vs not using it
- DEVELOP people – Managing to learn
- HOW to influence people
  - Education – why
  - Motivation / Engagement / Empowerment – you tell me
  - Responsibility / accountability
  - Respect

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Managing Project Team Members

- Understand "Change Management"

- Respect for people: Hard on the process – Easy on the people

- Learn to lead without authority –
  - Good lean **leaders** do not use authority either

- Drive for COLLABORATION not compromise

- Engage team members
  - Educate – start with the "WHY"
  - Help and ask questions
  - From empowerment to accountability

- "Good conflict makes good cars" (Nemawashi, Waigaya ..)

- Develop / coach team members

Becoming a Better (lean) Project Manager

- Make sure your organization is right for PM
- LEARN Project Management
- Follow the applicable principles of Lean PM
- Learn to manage R&D/innovation projects
- Practice Continuous Improvement (personal and with the team)
- Use a coach/mentor

- What is the difference between a good lean leader, a change leader and a good lean project manager?

Summary/Recap

- Prerequisites/Matrix
- Manage by economics
- Collaboration/compromises
- Manage small steps
- Manage for speed
- Agile / Scrum works well for the creative part of the project
- Leading People is an important skill

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