How Systems Engineers learnt to meet all deadlines

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Cobb's Paradox:
We know why projects fail
we know how to prevent their failure
so why do they still fail ?

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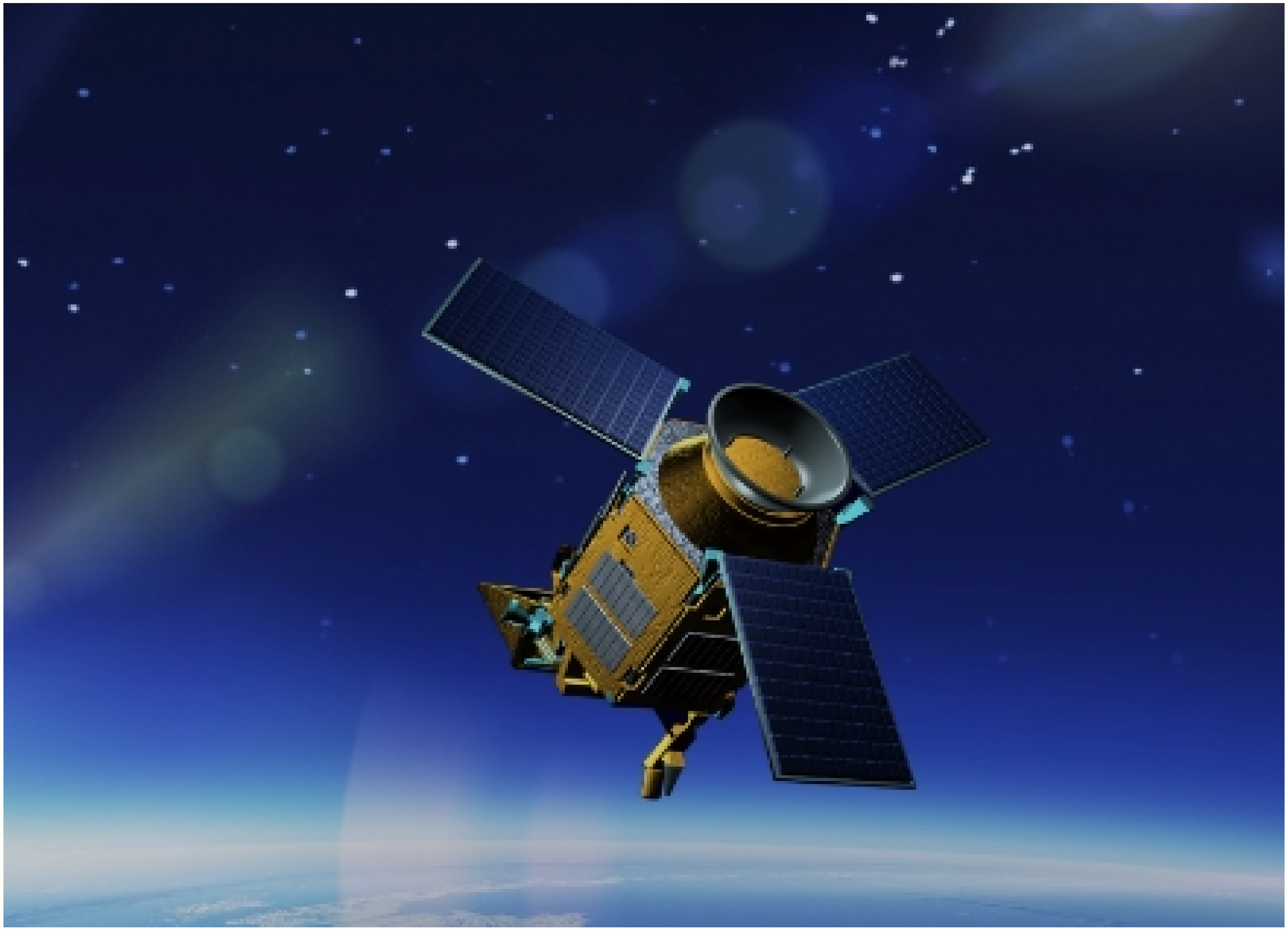
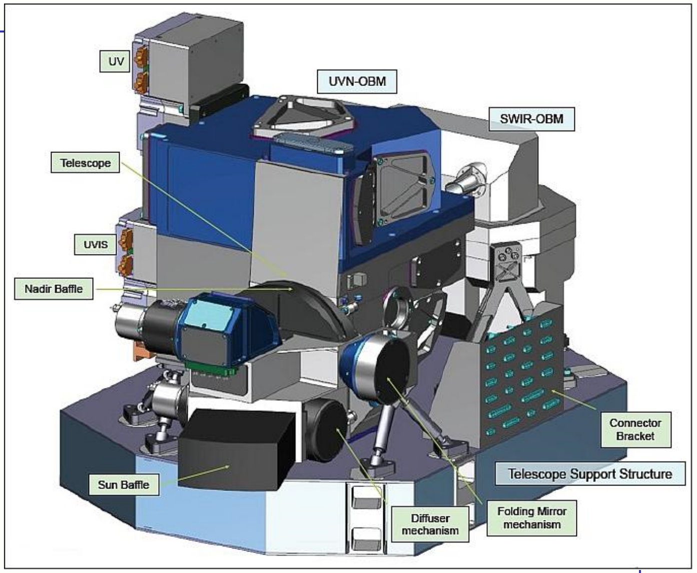
Can you help us ?

- We will be late and we don’t want to be late
- We cannot afford to be late
- When the money is used up, there is no more



source: www.tropomi.eu

In short



- Very experienced Systems Engineers
- Using quantified requirements routinely
- 6 year pure waterfall project (imposed by ESA process)
- Don’t know exactly where they’ll end up
- One problem: They missed all deadlines (can you help us)
- 9 weeks later: They haven’t missed any deadline since
- “Sorry, we delivered 1 day early” (instead of expected 1 year late)
- Savings: at least 40 man-year (about €6M)
- How did they do that ?

Issues

- Many interdependent Deadlines
- Many unforeseen issues, resulting in significant changes
- Delay declared unacceptable by customer
  - Launch date fixed
  - Money fixed
- Team overstressed, no clear focus on tasks at hand
- Everything 80% complete, nothing 100%

Ref Project Systems Engineer

- Project Manager
  - Systems Engineer
    - Mechanical
      - engineer
      - engineer
      - engineer
      - engineer
      - engineer
    - Electrical
      - engineer
      - engineer
      - engineer
      - engineer
      - engineer
    - Interface
      - engineer
      - engineer
      - engineer
      - engineer
      - engineer
    - Thermal
      - engineer
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    - Optical
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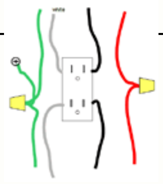
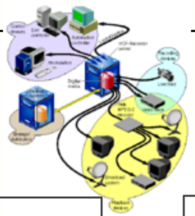
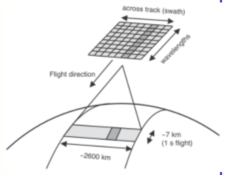






Many sub-contractors

First needed to convince the Project Manager

- We’ve been doing this kind of projects for 27 years
- We’re very good at it
- What do you think you can contribute to that ?

- Do you have to deliver anything by the end of the week ?
- A status report
- How much time do you need ?
- How much time do you have ?
- Does it fit ?
- What are we going to do about it ?

Evolutionary Project Management (Evo)

- Plan-Do-Check-Act
  - The powerful ingredient for success
- Business Case
  - *Why* we are going to improve *what*
- Requirements Engineering
  - *What* we are going to improve *and what not*
  - *How much* we will improve: quantification
- Architecture and Design
  - Selecting the optimum compromise for the conflicting requirements
- Early Review & Inspection
  - Measuring quality while doing, learning to prevent doing the wrong things

Why

What
How much
Are we done

How

Zero
Defects
Attitude

Check as early
as possible

Right Result

Quality On Time

Evo Project Planning

- Weekly TaskCycle
  - Short term planning
  - Optimizing estimation
  - Promising what we can achieve
  - Living up to our promises
- Bi-weekly DeliveryCycle
  - Optimizing the requirements and checking the assumptions
  - Soliciting feedback by delivering Real Results to *eagerly waiting* Stakeholders
- TimeLine
  - Getting and keeping control of Time: Predicting the future
  - Feeding program/portfolio/resource management

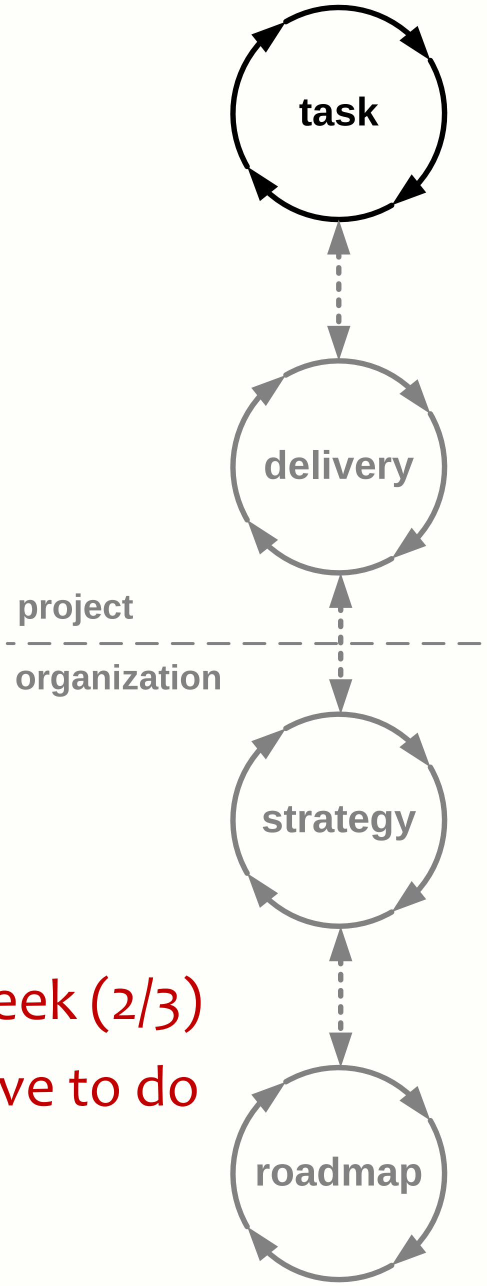
Efficiency
of what we do

Effectiveness
of what we do

Right Time

What will happen
and what will we
do about it ?

Weekly TaskCycle



- Are we *doing* the right things,
  in the right order,
  to the right level of detail for now
- Optimizing estimation, planning and tracking abilities to better predict the future
- Select highest priority tasks, never do any lower priority tasks, never do undefined tasks
- There are only about 26 plannable hours in a week (2/3)
- In the remaining time: do whatever else you have to do
- Tasks are always done, 100% done

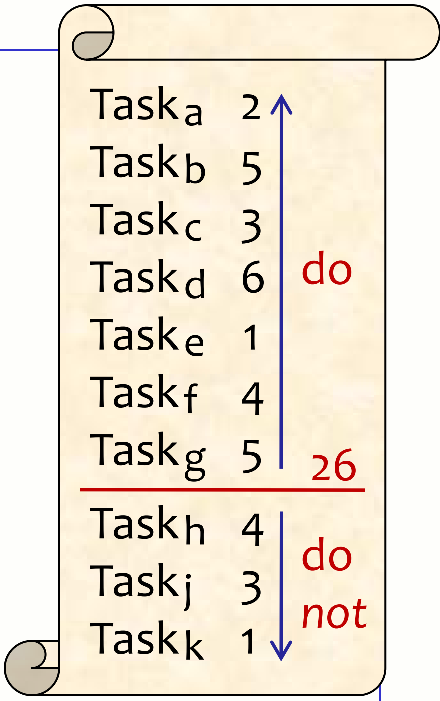
Weekly planning

- Individual preparation
  - Conclude current tasks
  - What to do next
  - Estimations
  - How much time available

Systems Engineer / Team Lead

- Modulation with / coaching by Project Management (1-on-1)
  - Status (all tasks done, completely done, not to think about it any more ?)
  - Priority check (are these really the most important things ?)
  - Feasibility (will it be done by the end of the week ?)
  - Commitment and decision
- Synchronization with group (team meeting)
  - Formal confirmation (this is what we plan to do)
  - Concurrency (do we have to synchronize ?)
  - Learning
  - Helping
  - Socializing

Weekly Plan

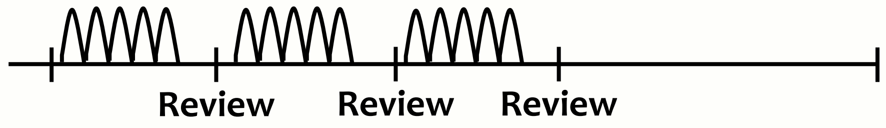


Task$_a$	2
Task$_b$	5
Task$_c$	3
Task$_d$	6
Task$_e$	1
Task$_f$	4
Task$_g$	5
Task$_h$	4
Task$_j$	3
Task$_k$	1

- How much time do we have available
- 2/3 of available time is net plannable time
- What is most important to do
- Estimate effort needed to do these things
- Which most important things fit in the net available time (default 26 hr per week)
- What can, and are we going to do
- What are we *not* going to do

2/3 is default start value
this value works well in development projects

Awful schedule pressure !



- Meeting with sub-contractors in three weeks
- Many documents to review
- Impossible deadline

- How many documents to review ?
- How much time per document ?

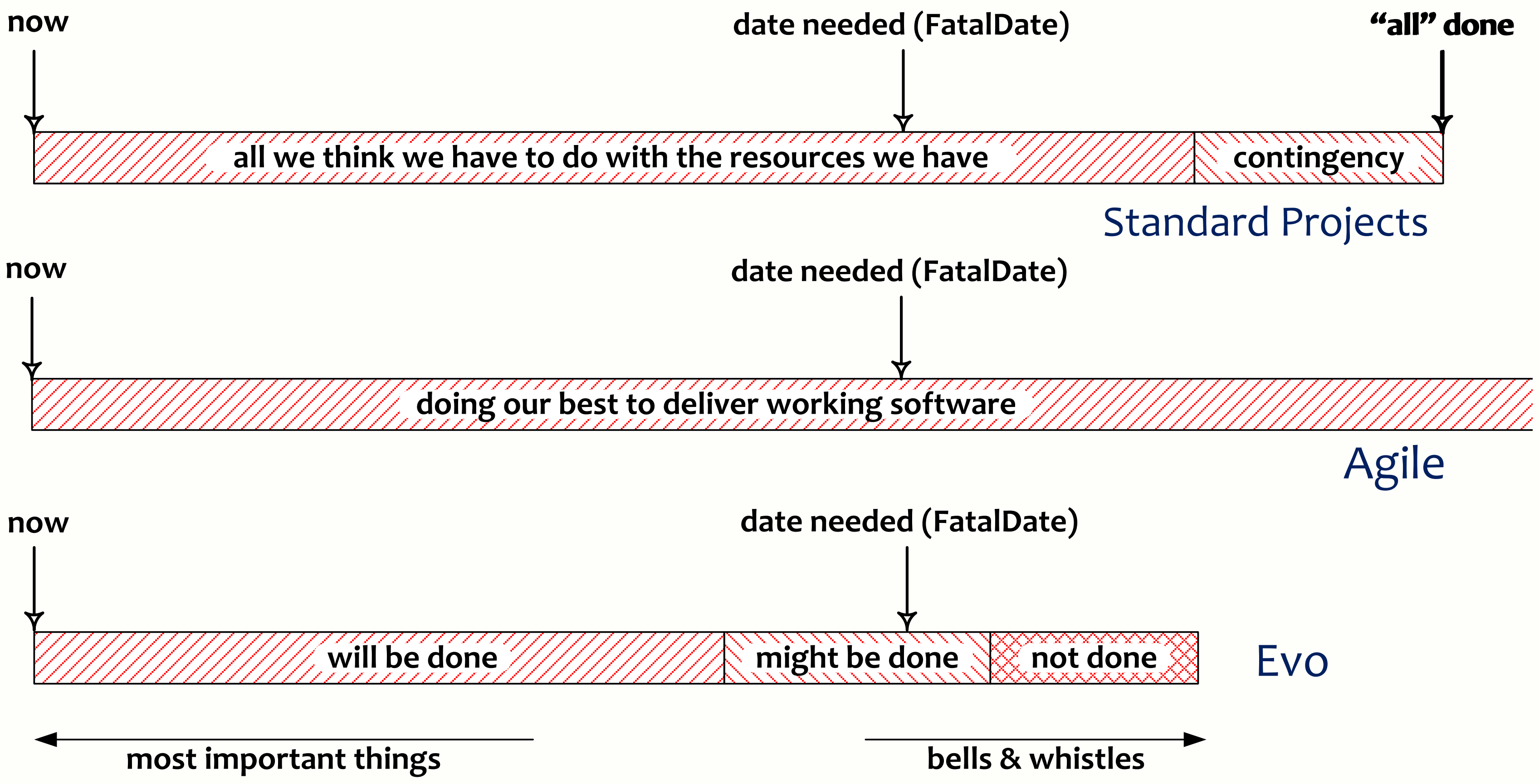
	per doc	hr
4 heavy	15	60
3 easy	2	6
	total	66
other work		33
	total	99

available	2 x 26	52

- Some suggestions …
- Result: well reviewed, great meeting, everyone satisfied

TimeLine

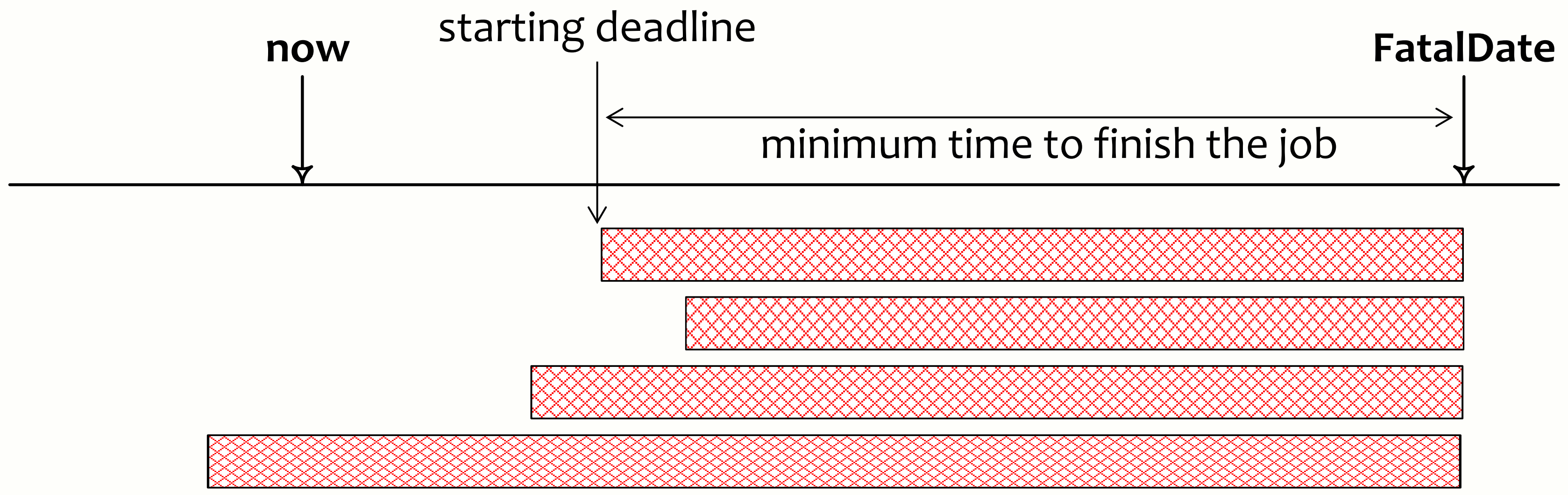
How do we know that we do, and get *what* is needed, *when* it's needed ?



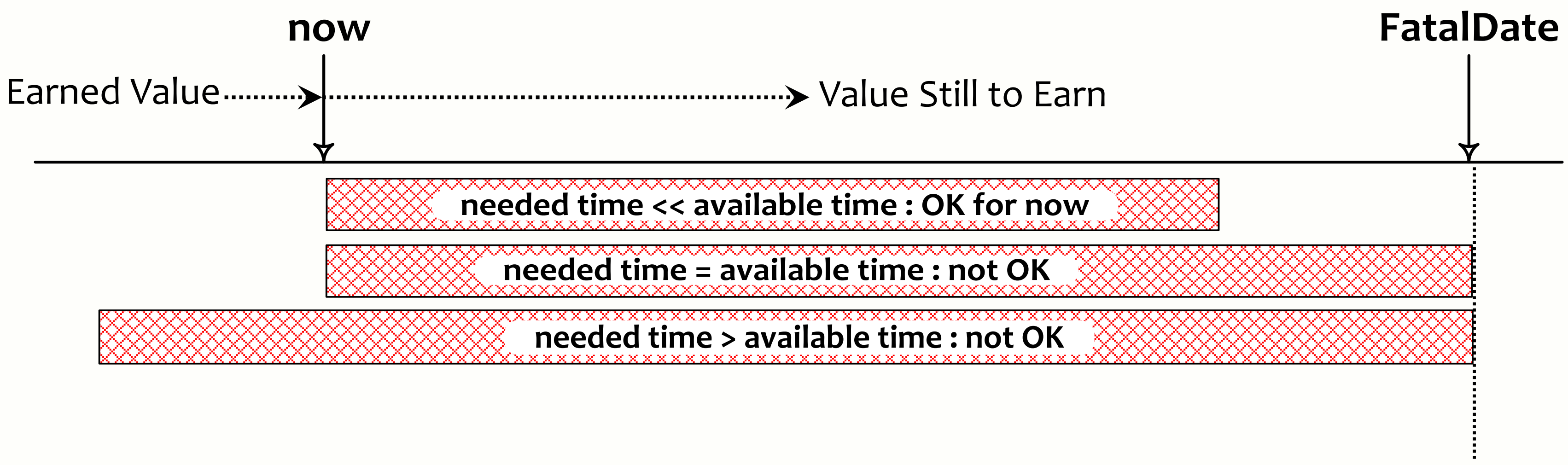
- Better 80% 100% done, than 100% 80% done
- Let it be the most important 80%

Even more important: *Starting Deadlines*

- Starting deadline
  - Last day to start to make the finish deadline
  - Every day we start later, we will end later



What do we do if we see we won't make it on time ?


now
FatalDate
Earned Value
Value Still to Earn
needed time << available time : OK for now
needed time = available time : not OK
needed time > available time : not OK

- Value Still to Earn

versus

- Time Still Available

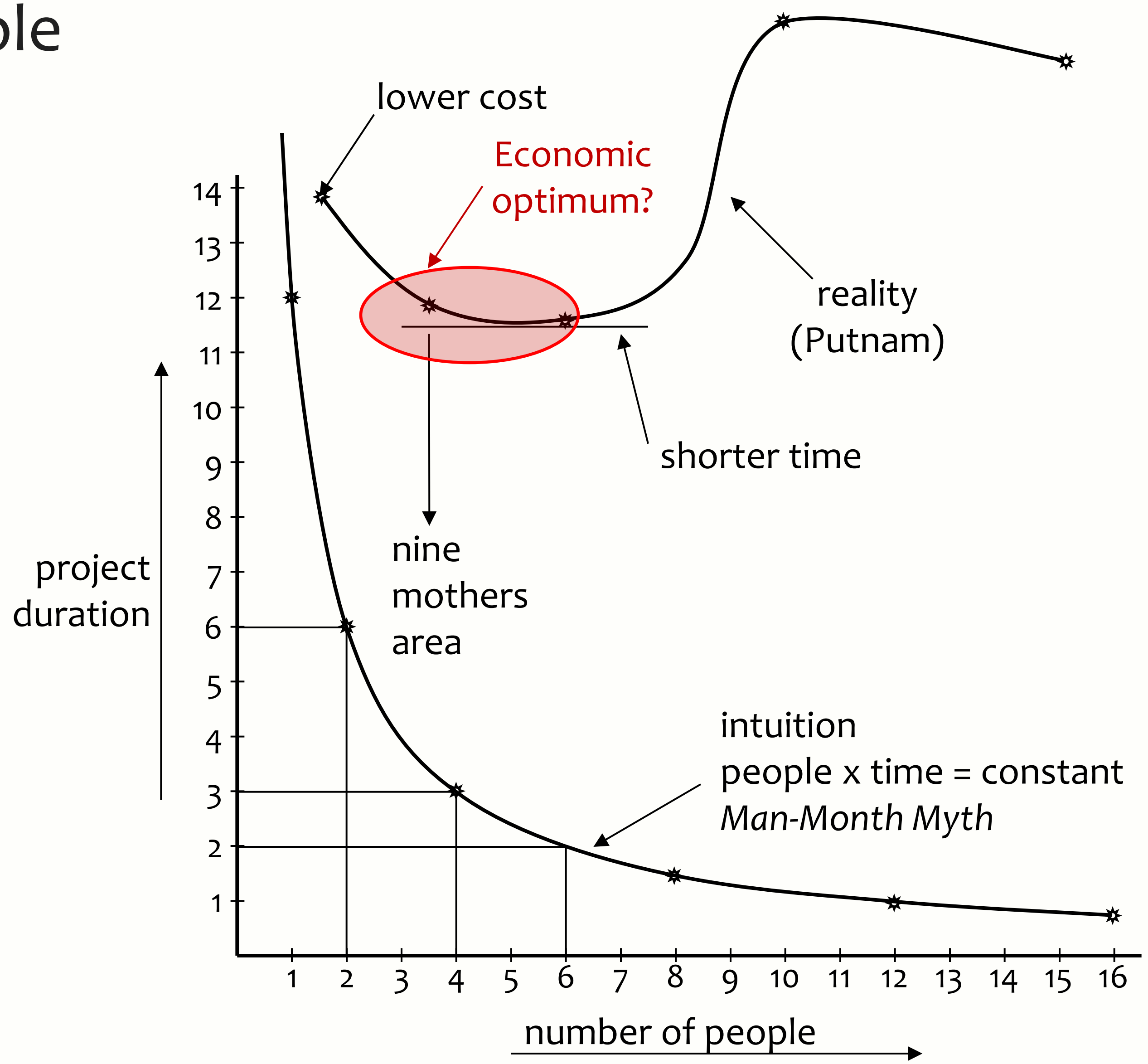
If the match is over, we cannot score a goal

Deceptive options

- Hoping for the best (fatalistic)
- Going for it (macho)
- Working overtime (fooling ourselves)
- Moving the deadline
    - Parkinson’s Law
        - Work expands to fill the time for its completion
    - Student Syndrome
        - Starting as late as possible,
          only when the pressure of the FatalDate is really felt

Intuition often guides us in the wrong direction

Adding people



Brooks' Law (1975)
Adding people
to a late project
makes it later

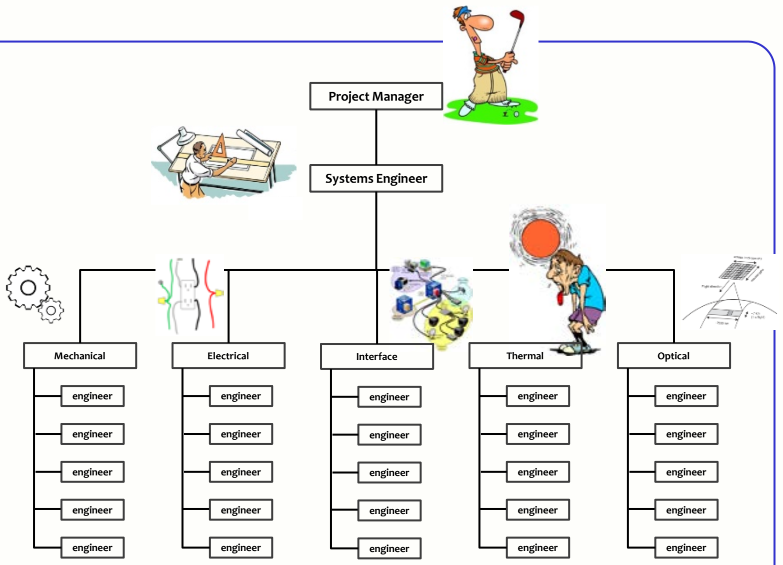
Saving time

Continuous elimination of waste

We don't have enough time, but we can save time *without negatively affecting the Result !*

- Efficiency in *what* (*why*, for *whom*) we do - doing the right things
  - *Not* doing what later proves to be superfluous
- Efficiency in *how* we do it - doing things differently
  - The product
    - Using proper and most efficient solution, instead of the solution we always used
  - The project
    - Doing the same in less time, instead of immediately doing it the way we always did
  - Continuous improvement and prevention processes
    - Constantly learning doing things better and overcoming bad tendencies
- Efficiency in *when* we do it - right time, in the right order
- TimeBoxing - much more efficient than FeatureBoxing

Did it work for this project ?



- 2 months needed
  to get the process in full swing
- All Engineering docs in PDR and CDR data packages on time
- Stress level in team greatly reduced
- More supervisory work for Systems Engineer -
  can effectively handle up to 8 people
- People not in the Evo swing lag behind
- So, we need everyone to follow
- Good enough to become company standard ? I say YES

Ref Project Systems Engineer

Why is the satellite still not launched ?

- The launch is delayed caused by issues you cannot predict even with Evo:
  - <some geopolitcal problems>
    By now the problems seem to have been solved and the launch is planned for March/April (currently expected: September)
- Coincidentally I just today introduced our Evo way of working to a new team member of our current project
- I'm curious to find out how quickly she'll really get the idea

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More

www.malotaux.nl/Booklets

1 Evolutionary Project Management Methods (2001)
Issues to solve, and first experience with the Evo Planning approach

2 How Quality is Assured by Evolutionary Methods (2004)
After a lot more experience: rather mature Evo Planning process

3 Optimizing the Contribution of Testing to Project Success (2005)
How Testing fits in

3a Optimizing Quality Assurance for Better Results (2005)
Same as Booklet 3, but for non-software projects

4 Controlling Project Risk by Design (2006)
How the Evo approach solves Risk by Design (by process)

5 TimeLine: How to Get and Keep Control over Longer Periods of Time (2007)
Replaced by Booklet 7, except for the step-by-step TimeLine procedure

6 Human Behavior in Projects (APCOSE 2008)
Human Behavioral aspects of Projects

7 How to Achieve the Most Important Requirement (2008)
Planning of longer periods of time, what to do if you don't have enough time

8 Help ! We have a QA Problem ! (2009)
Use of TimeLine technique: How we solved a 6 month backlog in 9 weeks

RS Measurable Value with Agile (Ryan Shriver - 2009)
Use of Evo Requirements and Prioritizing principles

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Inspection pages