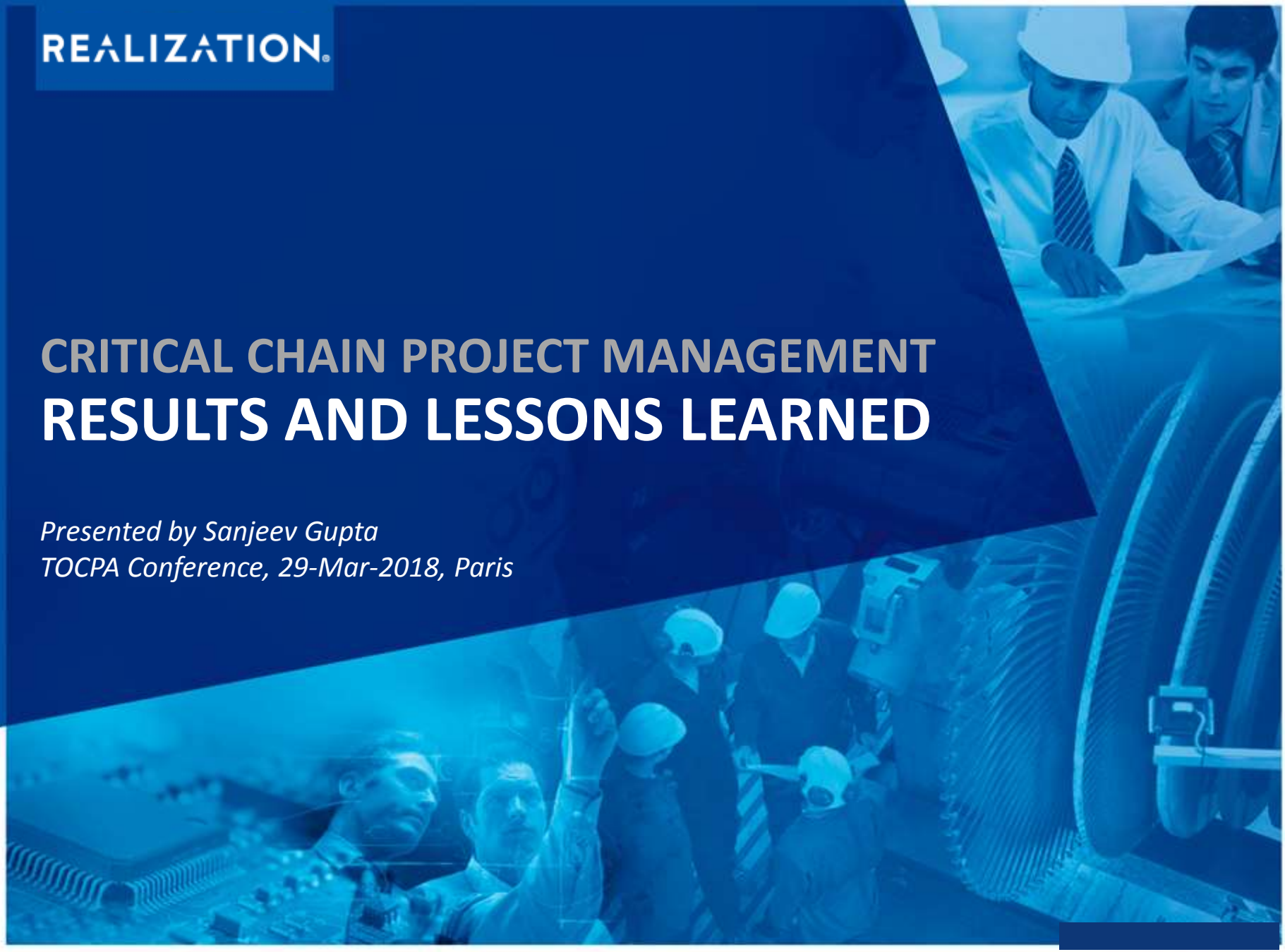
REALIZATION

CRITICAL CHAIN PROJECT MANAGEMENT
RESULTS AND LESSONS LEARNED

Presented by Sanjeev Gupta
TOCPA Conference, 29-Mar-2018, Paris



REALIZATION'S EXPERIENCE

400+
Customers

$6.5+B
Bottom Line Impact

10%-30%
Productivity Gain

20%-50%
Faster Completion

Awards

- Shingo Gold
- Franz Edelman (a.k.a. Super Bowl of Operations Research)
- Air Force Chief of Staff Excellence

- MRO (Aircraft, Ship, Land Vehicles MRO)
- STO (Steel Mills and Refineries)
- Engineer-to-Order Manufacturing
- Engineering and Product Development
- Biopharma R&D
- Infrastructure and Construction
- Software and IT
- Miscellaneous

REALIZATION.

AGENDA

AGGREGATION OF SAFETIES

ROADRUNNER

BUFFERS

LEAN SOURCE OF BENEFITS

WIP CONTROL

THE CCPM BREAKTHROUGH

BUFFER MANAGEMENT

PITFALLS TO AVOID

NO BAD MULTITASKING

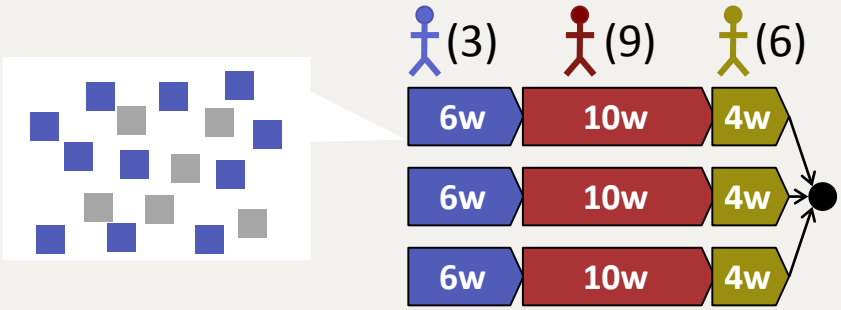
ROLE OF SOFTWARE

OBJECTIVE DRIVEN PLANS

FULL KITTING

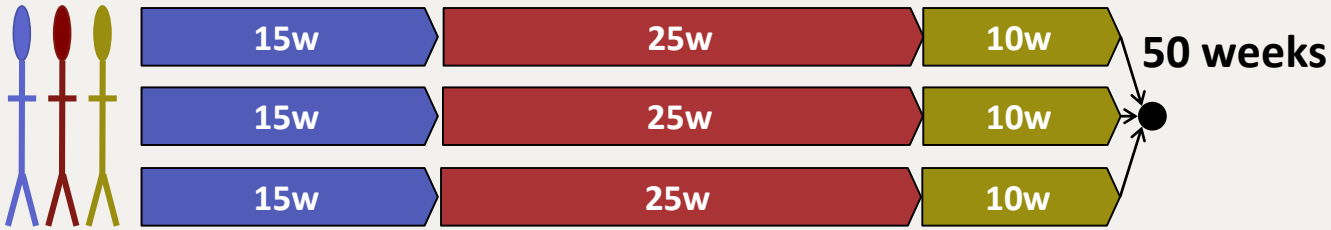
FLOW BASED PLANS

SOURCE OF BENEFITS: A SIMPLE ILLUSTRATION

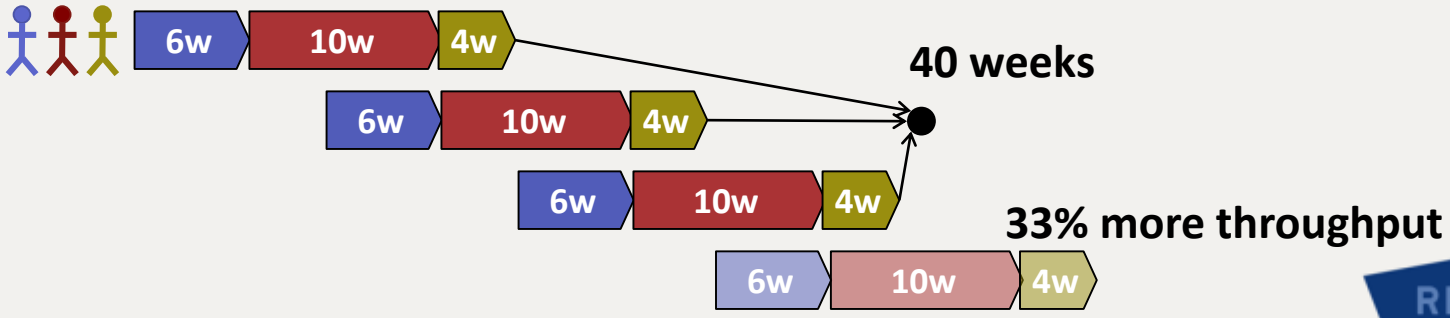


Durations include interruptions

LOCAL OPTIMIZATION: KEEP BUSY, SHOW PROGRESS EVERYWHERE (SPREAD THIN)

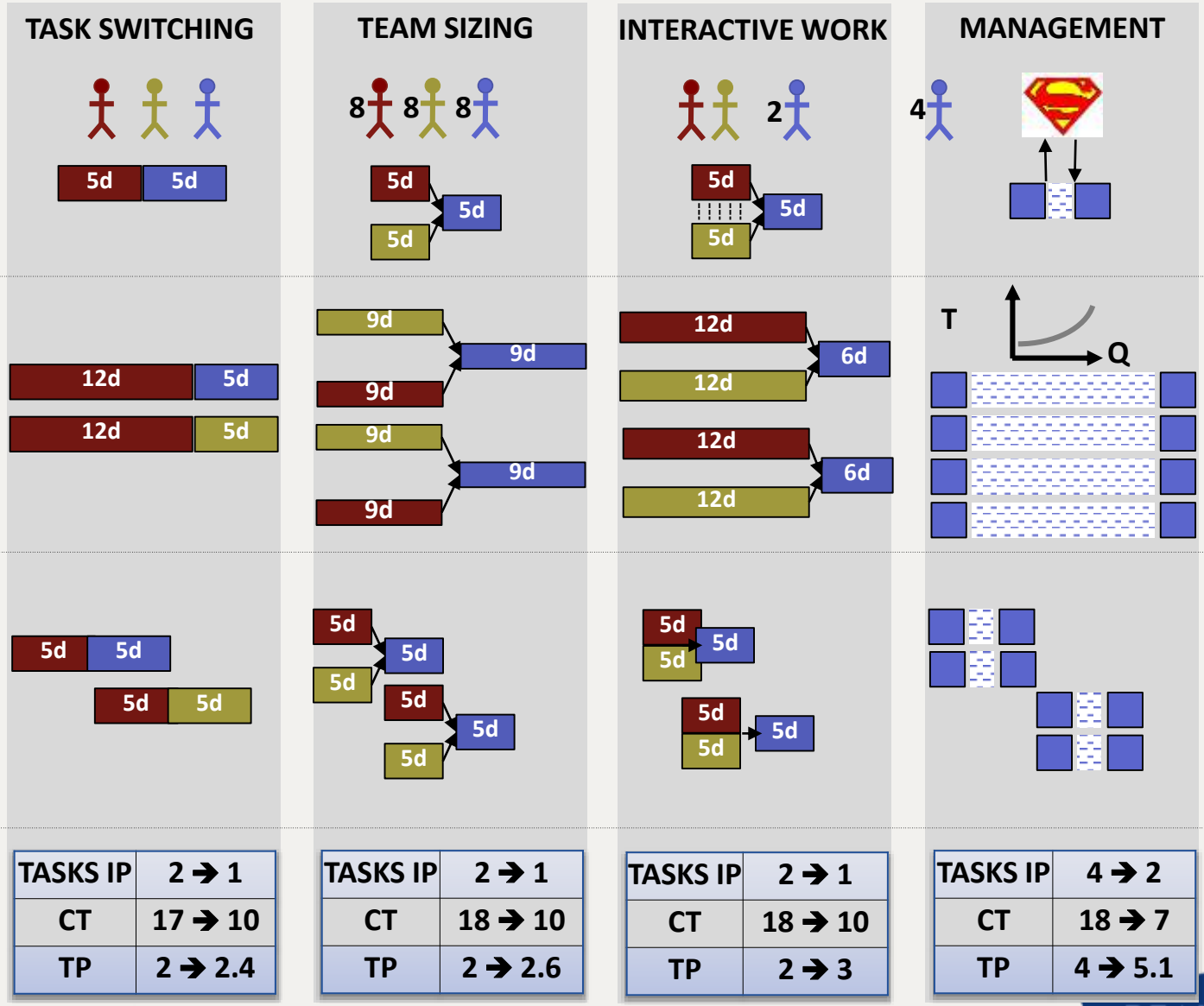


GLOBAL OPTIMIZATION: FOCUS AND FINISH



REALIZATION.

EXAMPLES OF 'SPREAD THIN' VS. 'FOCUS & FINISH'



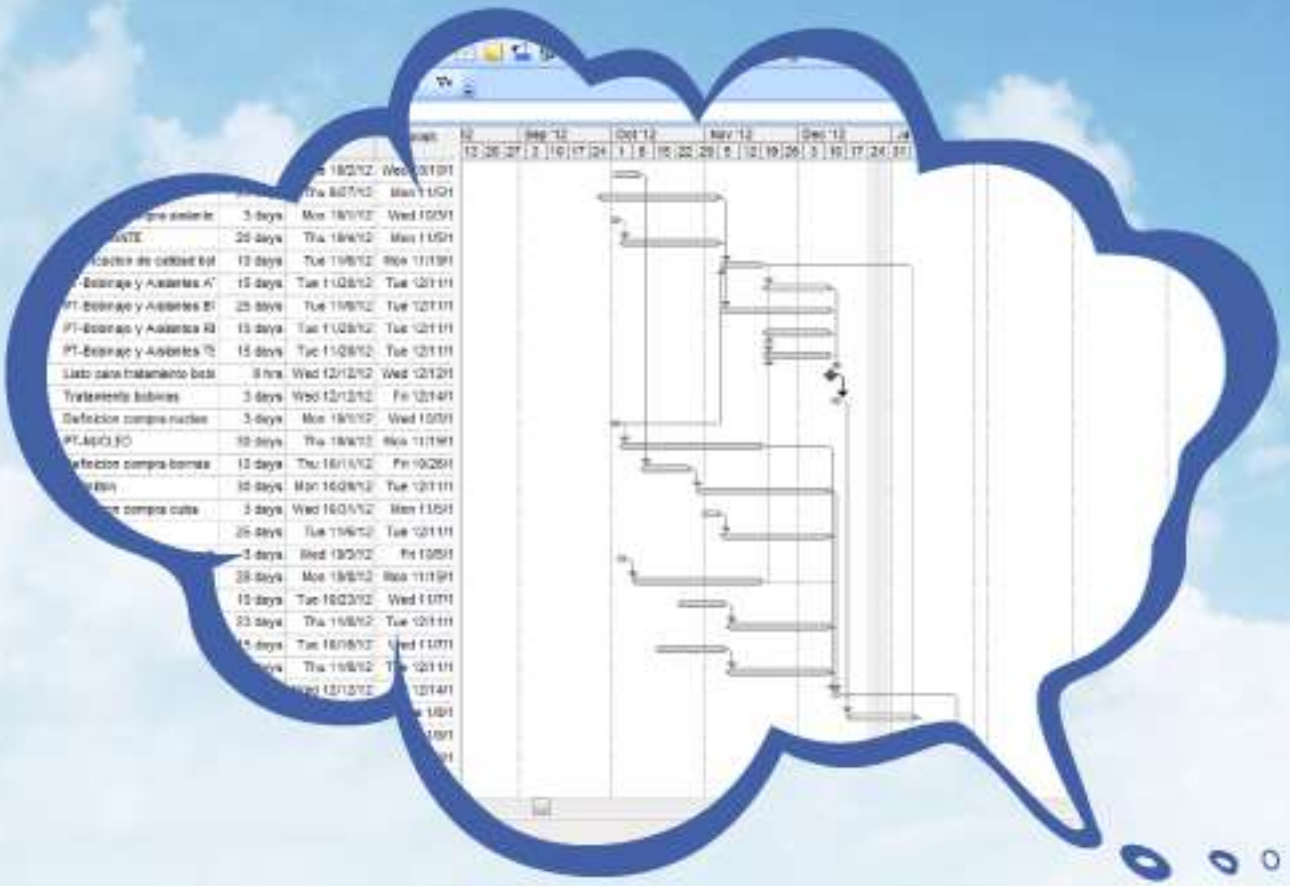
"FOCUS AND FINISH" BEST PRACTICES

BEST PRACTICE	WHY NEEDED
PIPELINING (WIP CONTROL)	Minimize opportunities for spreading thin Improve availability of managers and experts
FULL KITTING	Prevent task switching due to lack of inputs Facilitate "focus and finish" in managing inputs
CHUNKING OF RELATED WORK	Keep interrelated activities together in execution Facilitate "focus and finish" in managing

REALIZATION.

LIMITATION REMOVED BY CCPM

EVEN THE BEST PLANS…



… CANNOT BE USED IN EXECUTION

Task sequence had to change

Work took longer than estimated

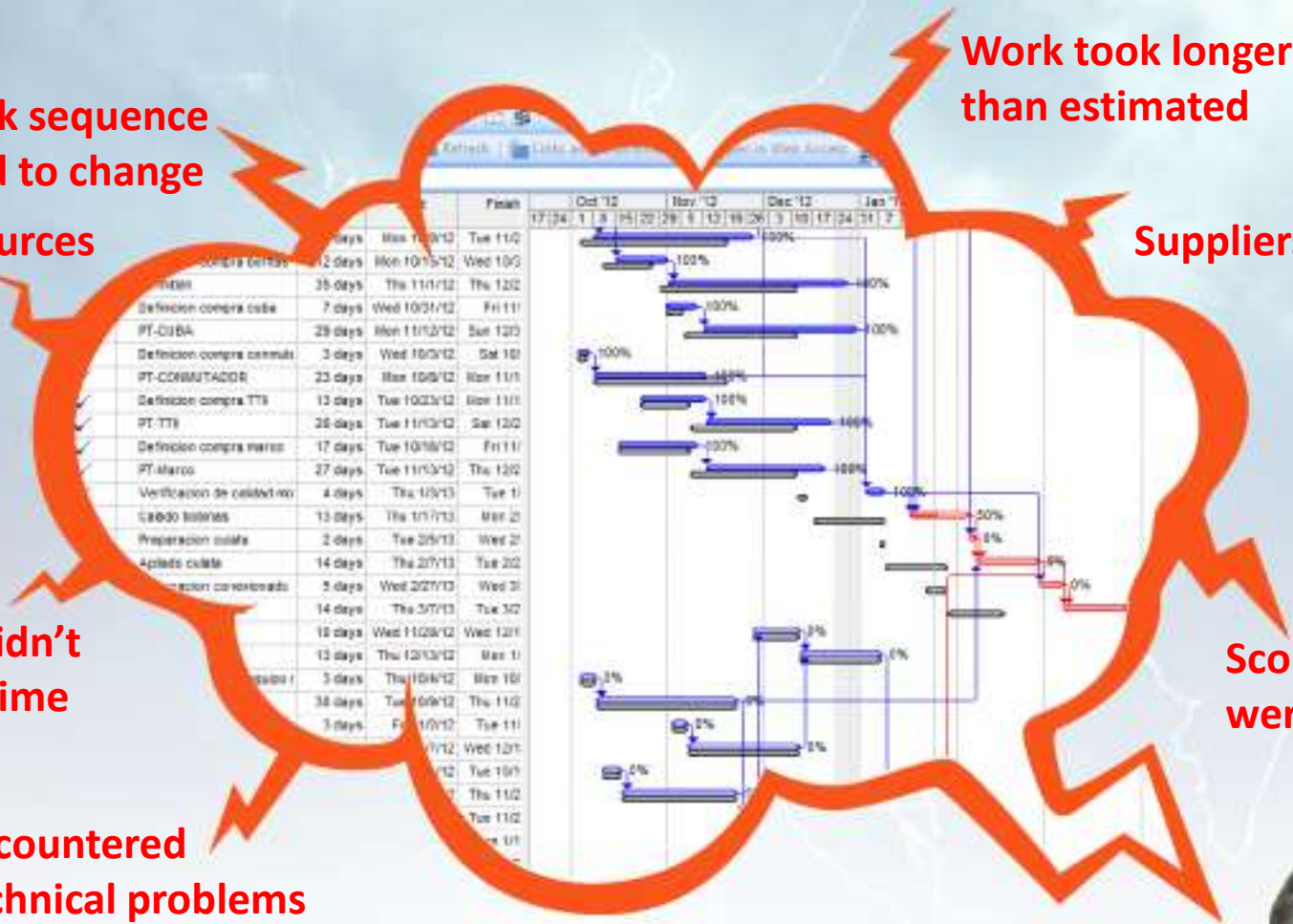
Planned resources not available

Suppliers were late

Approvals didn't happen on time

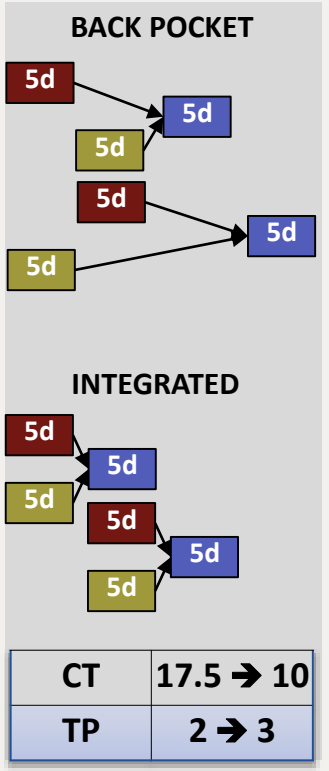
Scope and specs were changed

Encountered technical problems

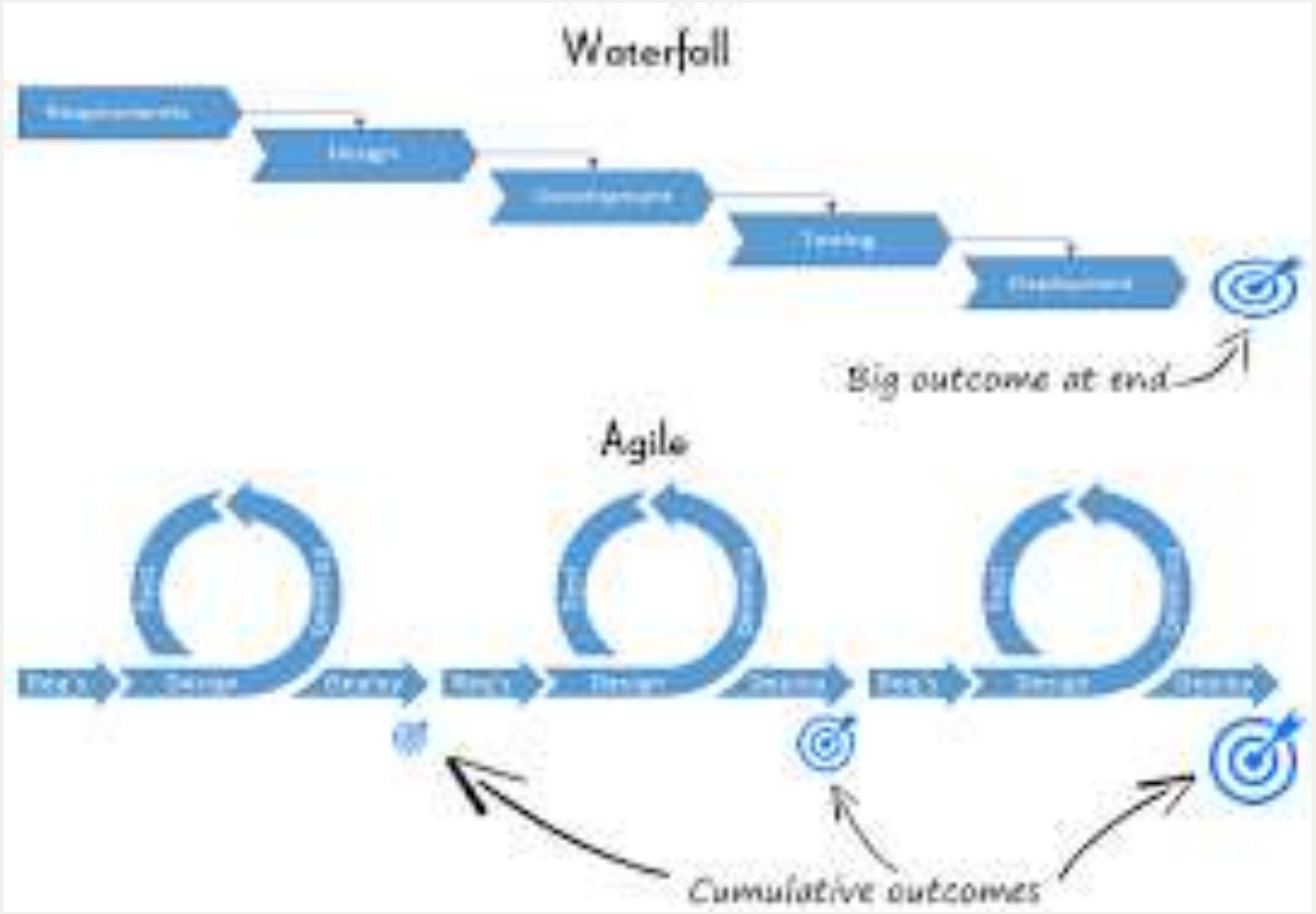


IMPLICATIONS FOR LARGE PROJECTS, MULTI-PROJECTS

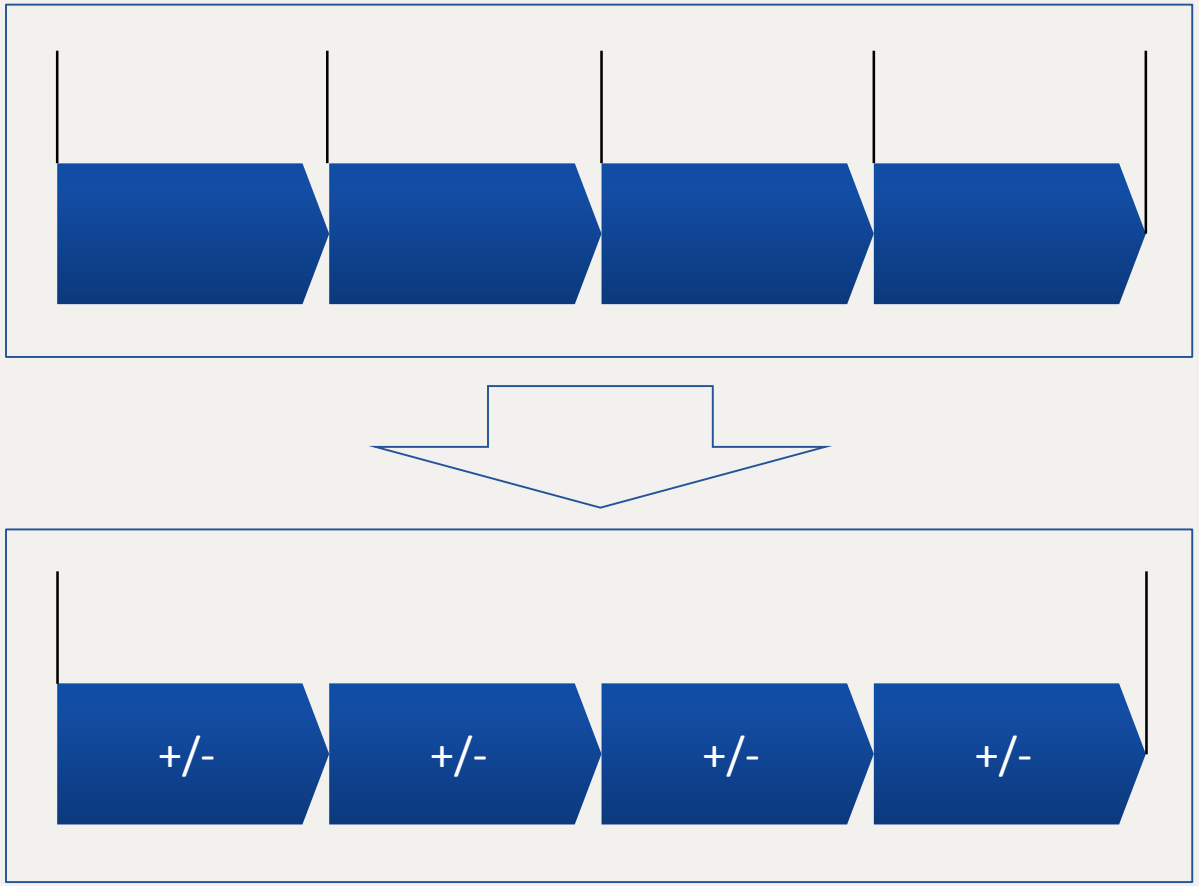
- Back-pocket schedules replace an integrated plan
- Spreading thin becomes the main mode of execution
- Task updates are just a bunch of random numbers
- Converting updates into project status becomes an art
- Status reports cannot be forward-looking



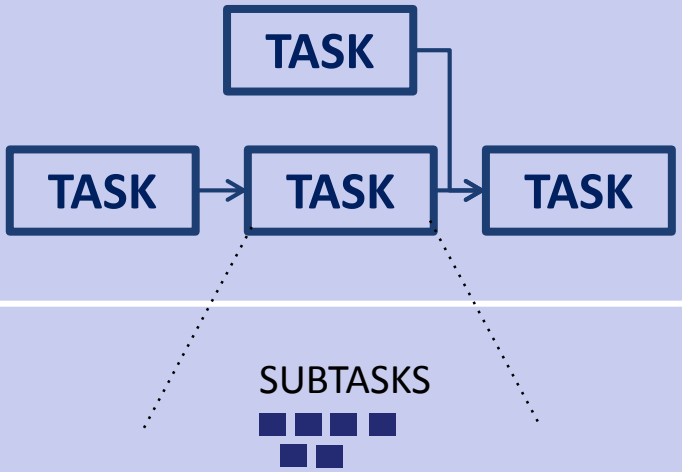
AGILE BREAKTHROUGH: RISK REDUCTION



CCPM BREAKTHROUGH: FLEXIBLE TASK SCHEDULES



MISSING IDEA: TWO-TIERED TASKS



TIER 1 (TASKS)
- Work package to be finished
- Tasks/dependencies are stable
- Makes templates possible

TIER 2 (SUBTASKS)
- Individual activities
- Gives flexibility to the frontline
- Makes re-planning easy
- Facilitates chunking

- ***Traditional PERT is always at the lowest level of tasks***
  - *Critical Path/ Critical Chain/ Buffer Management runs at the lowest level*
  - *Causes frequent re-planning*
  - *Causes frequent changes in priorities and spreading thin*
- ***2-Tier PERT is one level above the lowest level of tasks (Tier 1)***
  - *It is not the same as defining summary tasks*
  - *Critical Path/ Critical Chain/ Buffer Management runs at Tier 1*
  - *Keeps plans and priorities stable*
  - *Maintains focus, while enabling more detailed tasks*

PITFALLS TO AVOID

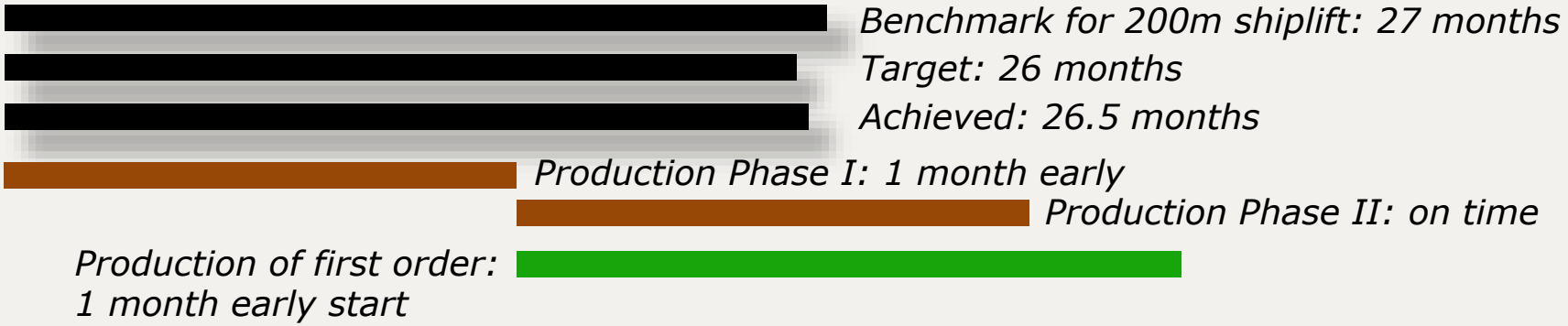
- ✕ Time-boxing of Agile sprints
- ✕ Fixation on buffers (size, colors…)
- ✕ Parallelization under time pressure

REALIZATION.

SHIPYARD CONSTRUCTION PROJECT

- **Located 40 km away from city, 7 km from the main port**
- **Total investment of $450 million**
- **Objective: Build necessary infrastructure for**
  - Defense shipbuilding (including submarines)
  - Defense and commercial ship repair
- **Overall infrastructure includes**
  - A 200 m long ship-lift with a capacity of 12,000 tons, 3 repair berths
  - 19 production and repair shops, 2 open assembly areas (180 m)
  - 3.35 km of breakwater
  - 22 million cubic meters of dredging (10-18 m depth) and raising land (5 m)
  - Over 4 km of roads, fresh water, sewerage, fire-fighting and electrical lines
  - Main receiving station and 6 sub-stations
  - 1 sewage treatment plant, fresh water and fire-fighting reservoirs

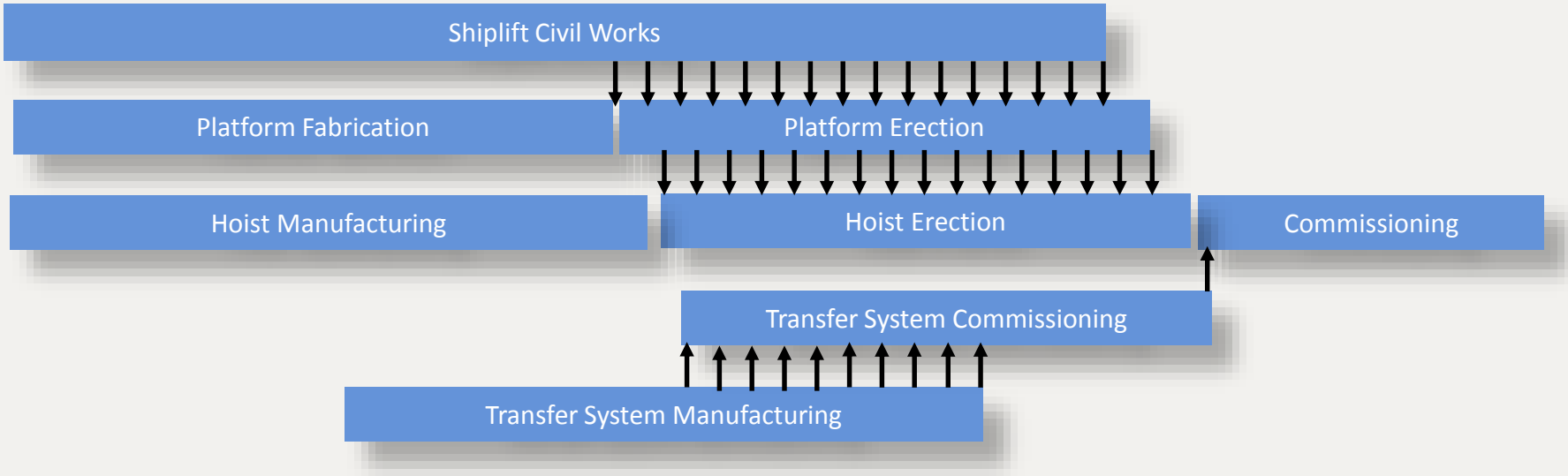
SHIPLIFT SUB-PROJECT



- **Complexity of shiplift**
  - This was the first Shiplift by an Indian company
  - Syncrolift has 90% market share
  - L&T had no prior experience
  - Every component had to be designed and manufactured in-house
  - Simultaneous on-shore infrastructure development in 640 acres
  - Land alienation, R&R of Kattupalli village before start of work
  - Delay of 8 months in supplies of plates and bought-outs
- **Results**
  - Beat the industry benchmark despite risks and delays
  - Phase I of production infrastructure ahead of schedule by 1 month
  - All production shops and utilities completed on schedule

REALIZATION.

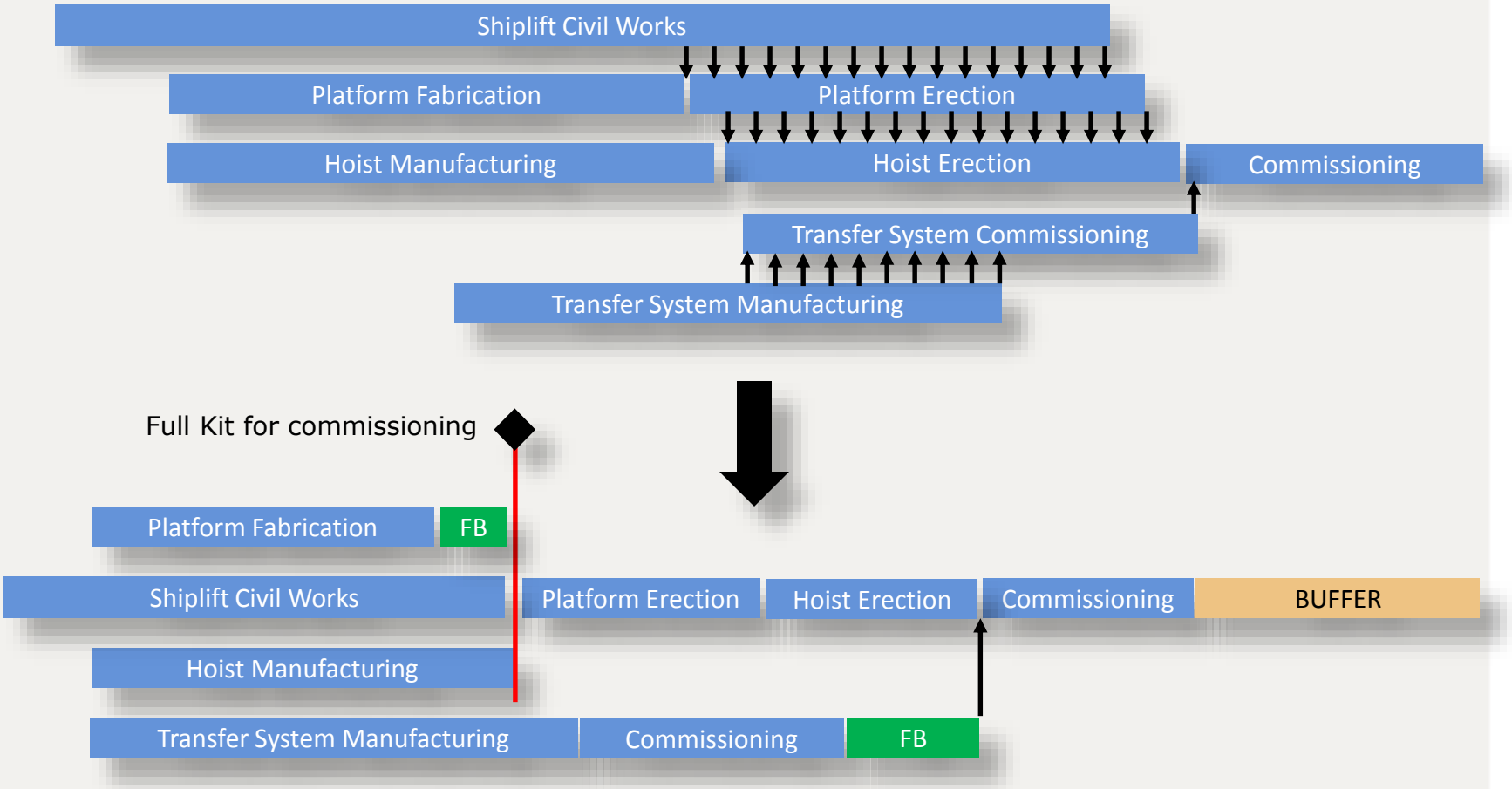
SHIPLIFT: INITIAL PLAN



- **Target of 26 months set by management – no real buy-in from execution team**
- **Durations not investigated – complete dependence on estimates of technical consultant**
- **Every component was critical – risks not addressed**
- **Too many integrations – any delay anywhere was going to be critical**
- **Management would be multi-tasking throughout the project life cycle**

REALIZATION.

SHIPLIFT: MODIFIED PLAN



Low WIP plan with buffers for risk mitigation

REALIZATION.

ADJUSTMENTS DURING EXECUTION

- **Re-planning of Platform Fabrication to recover major delay**
  - Platform Dimension: 200m x 46m x 5m (16 modules)
  - Transporter declared bankruptcy mid-sea
  - Legal process to extract consignment – Delay in Supply : 5 months
  - Critical Path moved to Platform Fabrication
  - Fabrication Target was reduced from 480 days to 240 days
- **Continuous De-bottlenecking of unplanned bottlenecks**
  - Marine piling
  - Module fabrication and assembly
  - Load testing
  - Civil works (delays caused by slow mobilization of labor)

ROLE OF SOFTWARE

Automate

- Scheduling Algorithms
- Best Practices
- Management Reports

Institutionalize

- Work Process Standardization
- Integration w/ Transaction Systems

Analyze

- Process Improvement
- Improvement of Plans

REALIZATION.