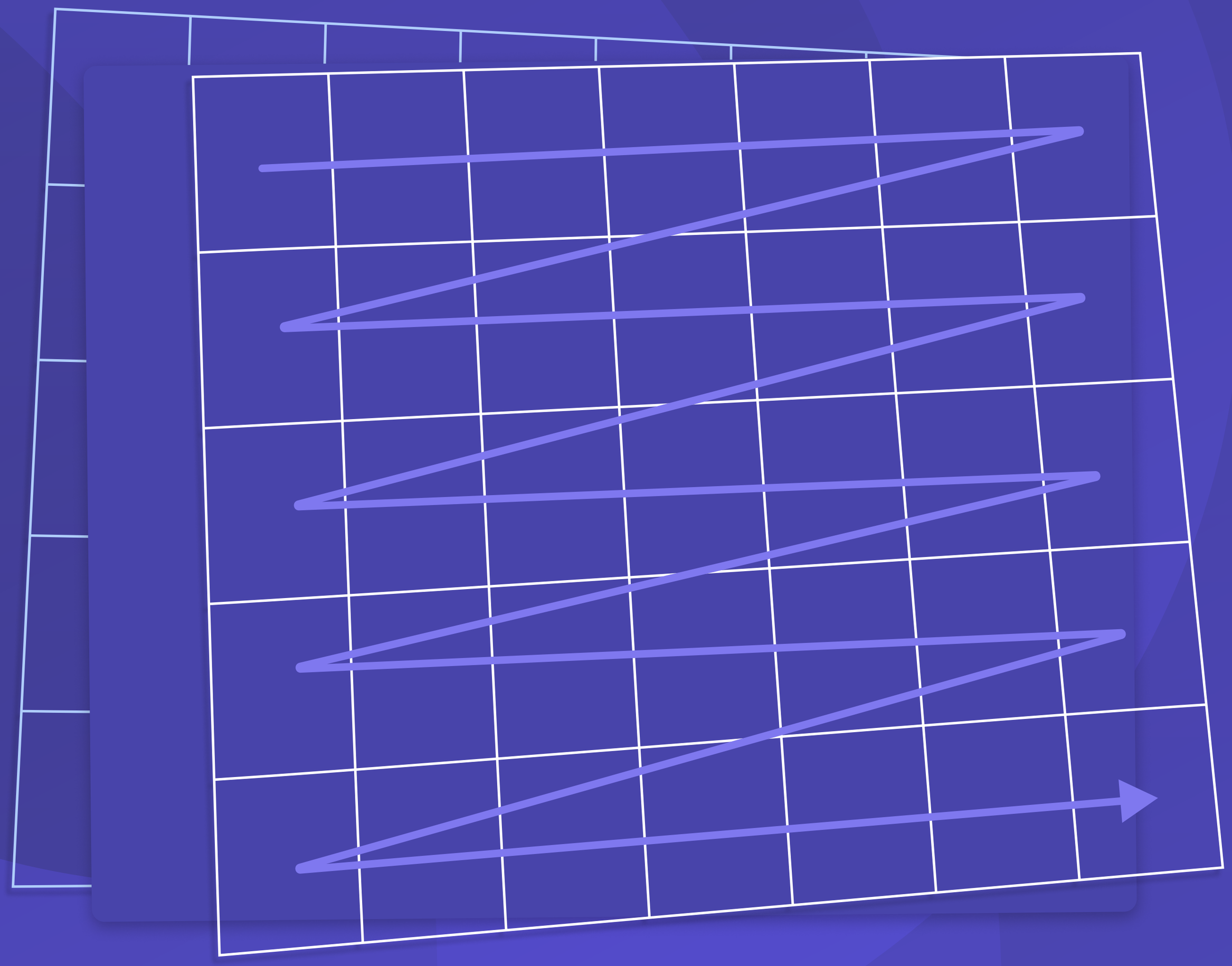

# Why Scheduling Matters

## Improve your resource efficiency and due-date performance

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# Contents

# Summary

## Enhancing Project Management Performance through Advanced Scheduling Strategies

### Introduction:

Resource conflicts in project management pose significant challenges, often leading to delays and affecting project success. The scarcity of critical resources, such as skilled personnel and specific equipment, can hinder simultaneous task execution. Identifying and resolving resource conflicts is time-consuming, potentially causing project delays. Therefore, it is crucial for project managers to consider constraint resources early on to meet project deadlines and budgets effectively.

### Critical Path Limitations:

While the critical path identifies the minimum project completion time, it relies on the assumption of sufficient resource availability. Constraints on specific resources can disrupt project timelines. These constraints are often also gradually introduced, due to increasing “Project Binding” of resources during the project. Effective task prioritization and scheduling strategies are vital to minimizing delays caused by resource conflicts.

### Importance of Scheduling Software for addressing Resource Conflicts:

Project scheduling, even for seemingly straightforward projects, becomes complex due to various options. Planning and scheduling software play a critical role in optimizing project timelines, especially when dealing with resource conflicts.

Many scheduling tools try to automatically resolve resource conflicts by adjusting project schedules, with a more even distribution of resources.

### Impact of Scheduling Software:

The choice of task prioritization and scheduling strategy within software tools significantly influences project performance. Algorithms prioritizing the critical path may lead to suboptimal schedules. A comparison of tools like MS Project and LYNX reveals variations in schedule outcomes, impacting resource efficiency and due-date performance.

### Comparing Software Scheduling Performance:

1) Prioritization Based on Float (Critical Path):
   - Tasks are sequenced based on float, resulting in a project completion time of 115 days, indicating a 45-day delay.

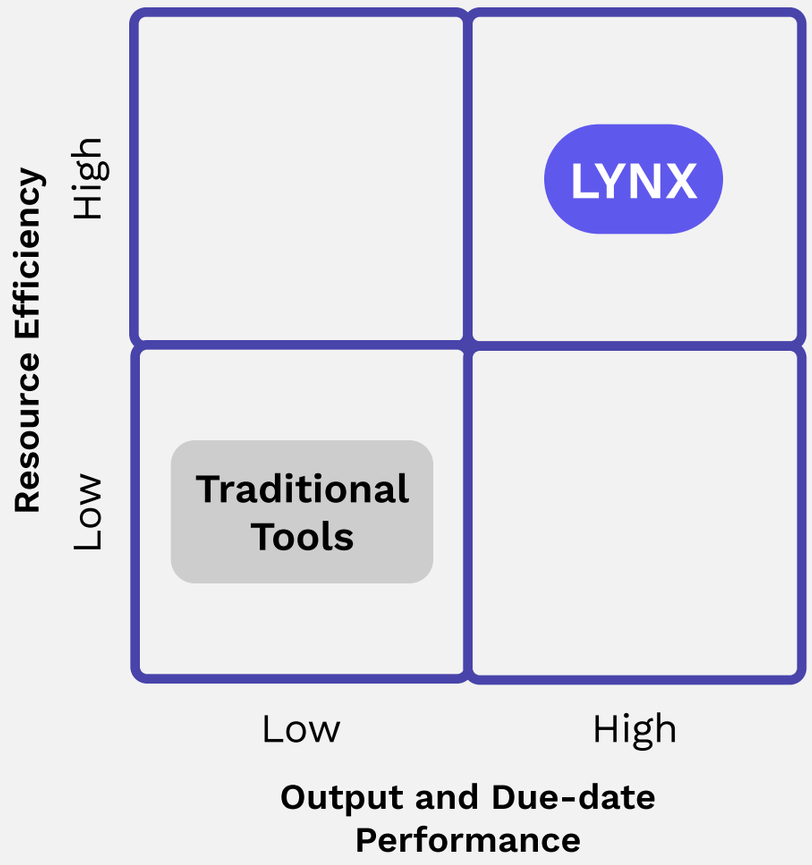
2) MS Project Leveling Solution:
   - MS Project proposes a leveling solution requiring 110 days, indicating a 40-day delay.

3) LYNX Scheduling Solution:
   - LYNX's scheduling engine calculates a solution 4 weeks faster (20 days / 22% improvement) than MS Project, impacting resource efficiency positively by 20%.

# Summary

**Conclusion:**

LYNX demonstrates superior performance in advanced scheduling, outperforming traditional tools. Project managers and Resource Managers benefit from improved due-date performance, visibility on resource conflicts, and enhanced resource efficiency. LYNX provides a competitive edge by efficiently addressing complex project scheduling challenges and resource conflicts.



# The Resource Conflict Resolution Challenge

Resource Conflicts[1] in project management are often inevitable and can delay projects and impact project success significantly.

Resource conflicts occur when multiple processes or tasks require the same resource, but the availability of the resource is limited or constraint to do all of them simultaneously. “Constraint” resources include skilled personnel, specific equipment, or any other critical resources[2].

At the same time resource managers and project managers are often struggling to identify and resolving resource conflicts[3]. This can also be time consuming and even lead to (more) project delays.

As any project manager wants to complete his or her project on time and within budget, the impact of “constraint” resources must be considered early and continuously. This is essential when committing realistic due-dates and avoid unexpected delays during the execution of the project.

If resource conflicts cannot be avoided, project managers also need to be supported by the right task prioritization and scheduling strategy, in order to minimize the impact on the duration of their project(s) and prevent unnecessary (extra) delay.

And this is why scheduling matters!

## Critical Path is Not Enough to Forecast the Project Duration

The critical path in project management is the sequence of tasks that determines the minimum amount of time required to complete a project. It identifies the longest-duration path through a network of dependent tasks, and any delay in the critical path will directly affect the project's overall timeline.

In the example below, the Critical Path is 70 days (A10  A20  D10):


1. In this document, we use the term “Resource Conflict” interchangeably with “Resource Contention”, as this term is more common
2. Resource Conflicts also occur across projects and are resolved in the most optimal through the same LYNX Scheduling Engine and the LYNX Scenario Wizard. However, this topic is outside the scope of this article.
3. LYNX assists resource managers and project managers to quickly identify the impact of resource conflicts, see the example on page 10.

# The Resource Conflict Resolution Challenge

In this example, the Critical Path of 70 days does forecast the duration of the project, provided there are sufficient resources available to work on several tasks in parallel.

A completion date after 70 days is possible provided the Blue team availability = 2, the Green Team availability = 2, and the Red team availability = 1.

But what if the availability of the Green is a “constraint”, with only 1 resource? This means that only one task requiring a Green resource can be worked on at the time, and it will not be possible to complete the project in 70 days anymore.

Also, the question arises regarding how to sequence or prioritize the task to minimize the amount of extra days required for resolving the Green resource conflict.

In other words: What task prioritization and scheduling strategy, delivers the shortest project cycle time and best results?

Even if project schedules are relatively “straightforward”, the number of options becomes quickly very large, making it impossible to answer the question above without the use of planning and scheduling software, like LYNX, MS Project, or others.

Even if projects begin with ideal resource availability to adhere to the Critical Path, the reality is that the availability of crucial resources can change or decrease as the project progresses. As such, the expected remaining duration of a project to increase suddenly as well.

The background is often ongoing “Project Binding” or “Resource Continuity” across different phases of a project, for instance, if a designer participates in the high-level design phase and is also favored for the detailed design due to their accumulated project knowledge.

We see this happening frequently within many projects among our client base. Timely and easy identification of resource conflicts introduced during the execution of the project is therefore crucial for any project manager to keep a grip on the timeline and due date.

## Resolving Resource Conflicts with Software

Many planning software tools can resolve resource conflicts automatically.

The primary goal is to avoid peaks and valleys in resource utilization, ensuring a more even and efficient allocation of resources throughout the project timeline.

This process involves adjusting the project schedule to smooth out resource demand, address resource constraints, and prevent overloading (under-staffing) or under-utilization (over-staffing) of critical resources.

For example, this process is referred to as resolving over-allocation through “Resource Leveling” within MS Project.

## Can Scheduling Software Make a Difference?

The task prioritization and scheduling strategy followed by the algorithms within the various software tools represent a significant difference in performance when comparing best and worst-case solutions. For instance, software algorithms prioritizing the critical path can produce the worst possible schedule.

In the next paragraph we have compared the performance of the following tools and solutions:

- Prioritization based on Float (Critical Path)
- Leveling with MS Project
- Scheduling using the LYNX Scheduling Engine

The performance of each of the solutions also impacts resource utilization or “Resource Efficiency”.

# Comparing Scheduling Performance

## About the LYNX Scheduling Engine

As A-dato we believe scheduling matters and makes a difference. Therefore, we are investing continuously in improving and optimizing the LYNX Scheduling Engine.

Our objective with LYNX is to deliver valid and optimal project schedules, regardless the complexity and size of a project, considering:

- Variations in resource availability (considering “Resource starting from” or “Available until”)
- Availability limitations due to vacation, training, or illness
- The ISA 95 (Multi-)Skill/Resource model for considering special skills and competencies of resources
- Dynamically include any change to the original plan occurring during the execution of the projects

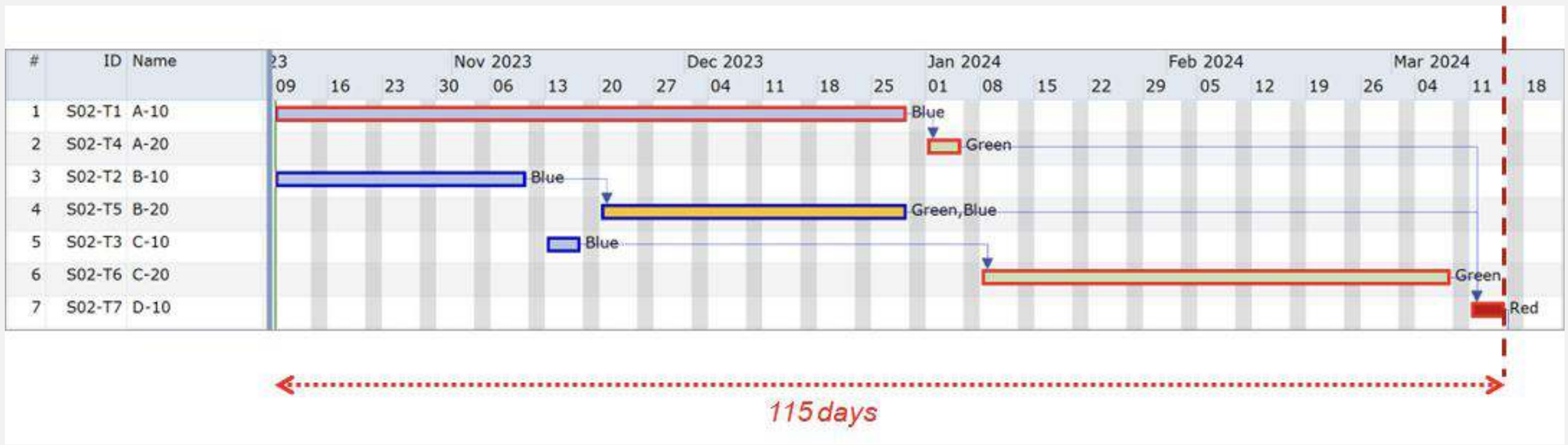
The LYNX Scheduling Engine includes algorithms from the “Queuing Theory” and automatically balances the resource load across multiple projects.

## Prioritization based on Float

In project management, Float (also known as slack) is the amount of time that a task can be delayed without delaying the project's completion date.

Tasks on the critical path have zero float, meaning any delay in these tasks will directly impact the project's timeline. Tasks that are not on the critical path have float, indicating some flexibility in their start and finish dates.

Therefore, a common rule is prioritize tasks that have less or the smallest float. This gives the following task sequence:  A10 → B10 → C10.

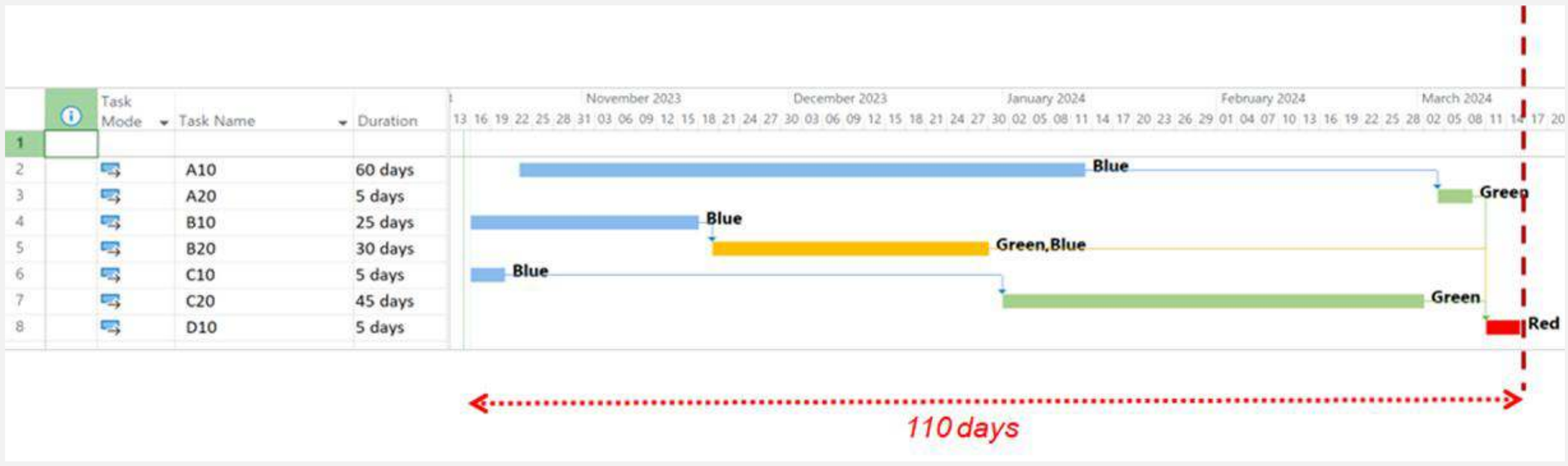



If tasks are prioritized by Float, 115 days are required to complete the example projects (+45 days).

# Comparing Scheduling Performance

## Leveling solution as proposed by MS Project (“Level All”):

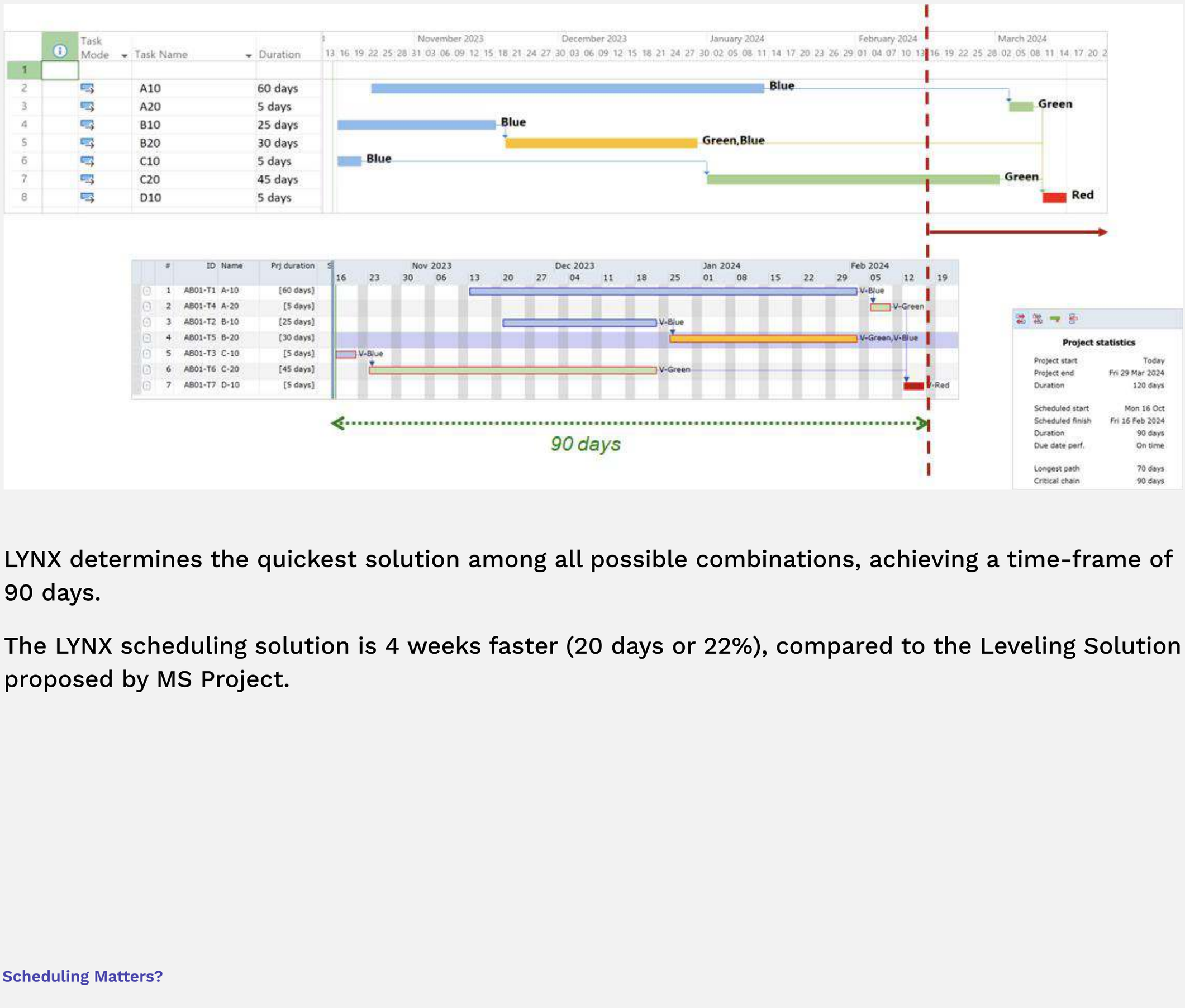
MS Project proposes the following leveling solution to address the overallocation:




To complete our example project, MS Project needs 110 days (+40 days).

## Scheduling Solution proposed by LYNX (4 Weeks faster)

In the picture below, the solution proposed by MS Project (110 days) is offset against the scheduling solution calculated by the LYNX Scheduling Engine.



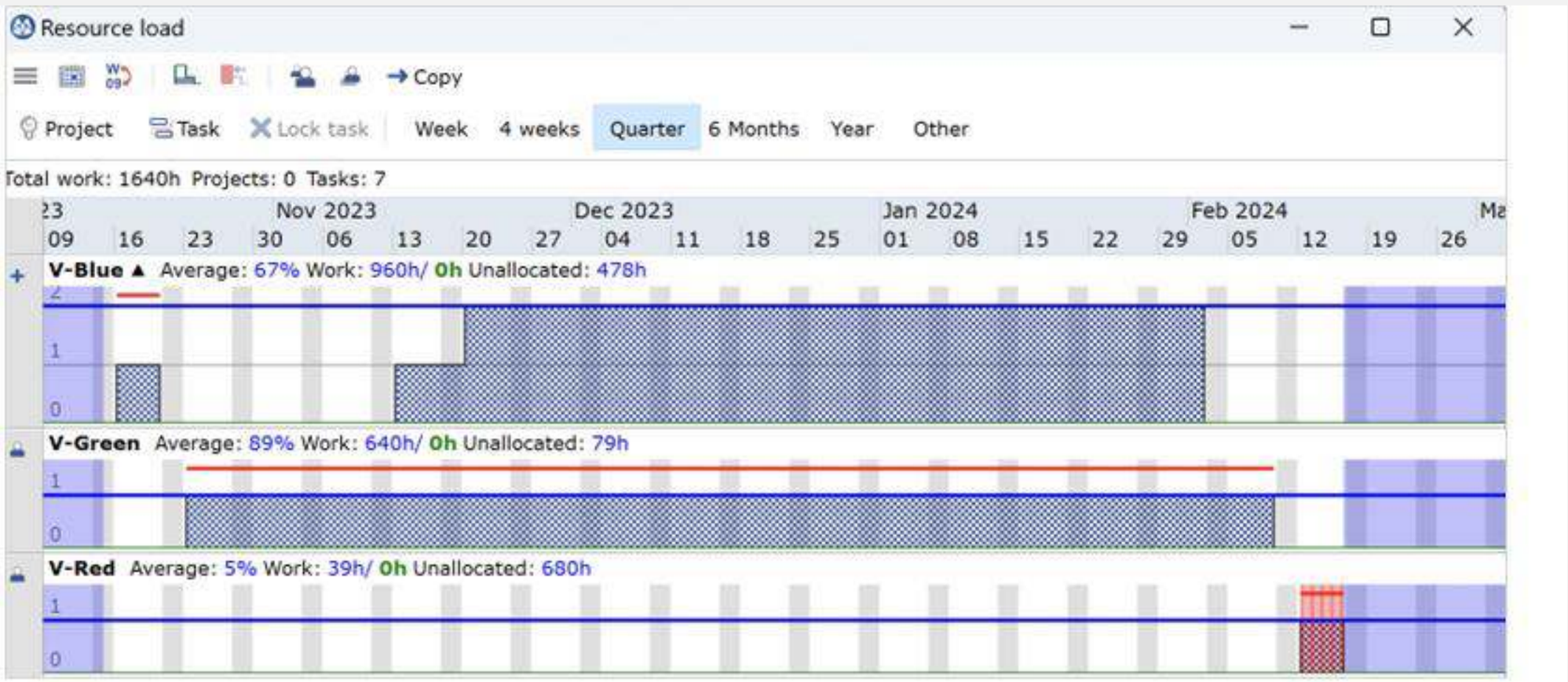

LYNX determines the quickest solution among all possible combinations, achieving a time-frame of 90 days.

The LYNX scheduling solution is 4 weeks faster (20 days or 22%), compared to the Leveling Solution proposed by MS Project.

# Comparing Scheduling Performance

## Impact on Resource Efficiency

As the project schedule is more compact, there is a better utilization of the available resources, also called “Resource Efficiency”. The total load for the Blue Resources of 960 hours can be produced within the timespan of 90 days:




**Comparing Resource Utilization over time (duration):**

| | | |
|---|---|---|
| LYNX: | 90 days duration * 8 * 2 = 1.440 Hours | 960 Resource Load / 1.440 = 67 % Utilization |
| MS Project: | 110 days duration * 8 * 2 = 1.760 Hours | 960 Resource Load / 1.760 = 54 % Utilization |

In this example LYNX performs 20 % better in “Resource Efficiency”, compared to the result from MS Project.

# Conclusion

## Faster Project Schedules through LYNX

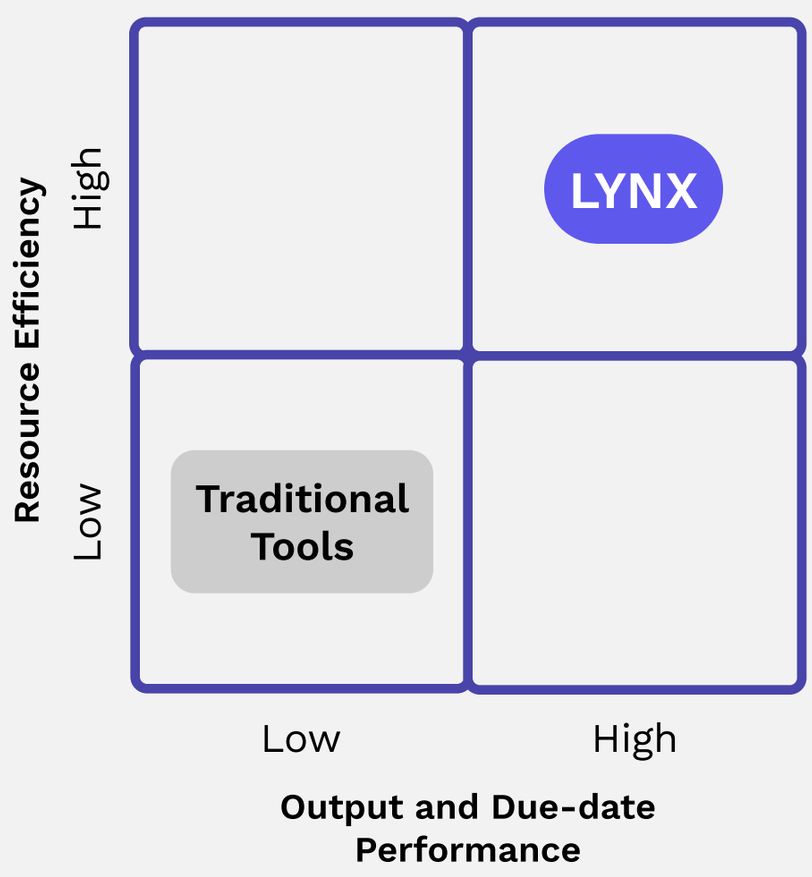
In addition to the simplified scheduling example above, we have compared the leveling and scheduling results for many other, and much more complex, project schedules, including the ones mentioned in the table below:

| | | | LYNX | MS Project | | LYNX |
|---|---|---|---|---|---|---|
| Project Examples | | Critical Path | Scheduling Result | Leveling Result | Delay Days | Delta Performance |
| D02 | Example Project D02 | 68 Days | 88d | 105d | 299d | +19% |
| S01 | Example Project S01 | 40 Days | 58d | 64d | 299d | +10% |
| S03 | Customer Example Project | 256 Days | 299d | 343d | 299d | +15% |

The table clearly shows that the capability of LYNX to identify the fastest possible schedule, clearly outperforms the results from “traditional” tools, like MS Project.

## LYNX Improves the Due-Date Performance and Resource Efficiency in Project Management

As project managers have visibility on the impact of resource conflicts when committing due dates, and LYNX also improves the Resource Utilization over time, the following matrix visualizes the position of LYNX compared to traditional tools:

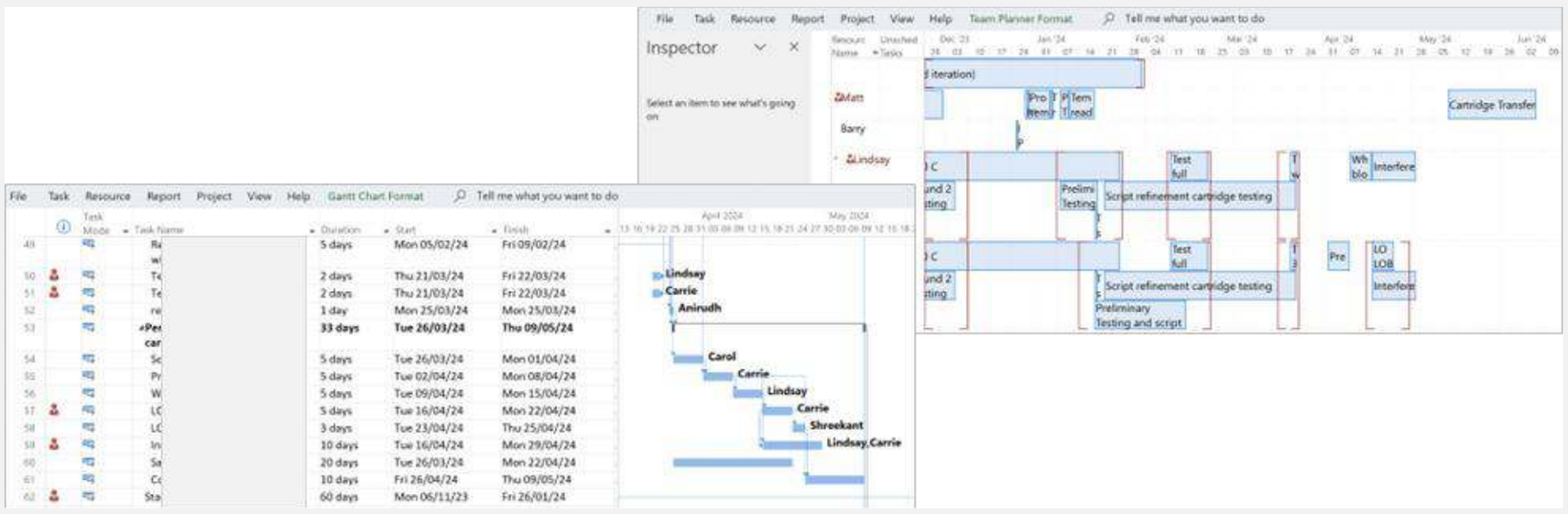



In other words, both project managers and resource managers experience the scheduling advantages through LYNX.

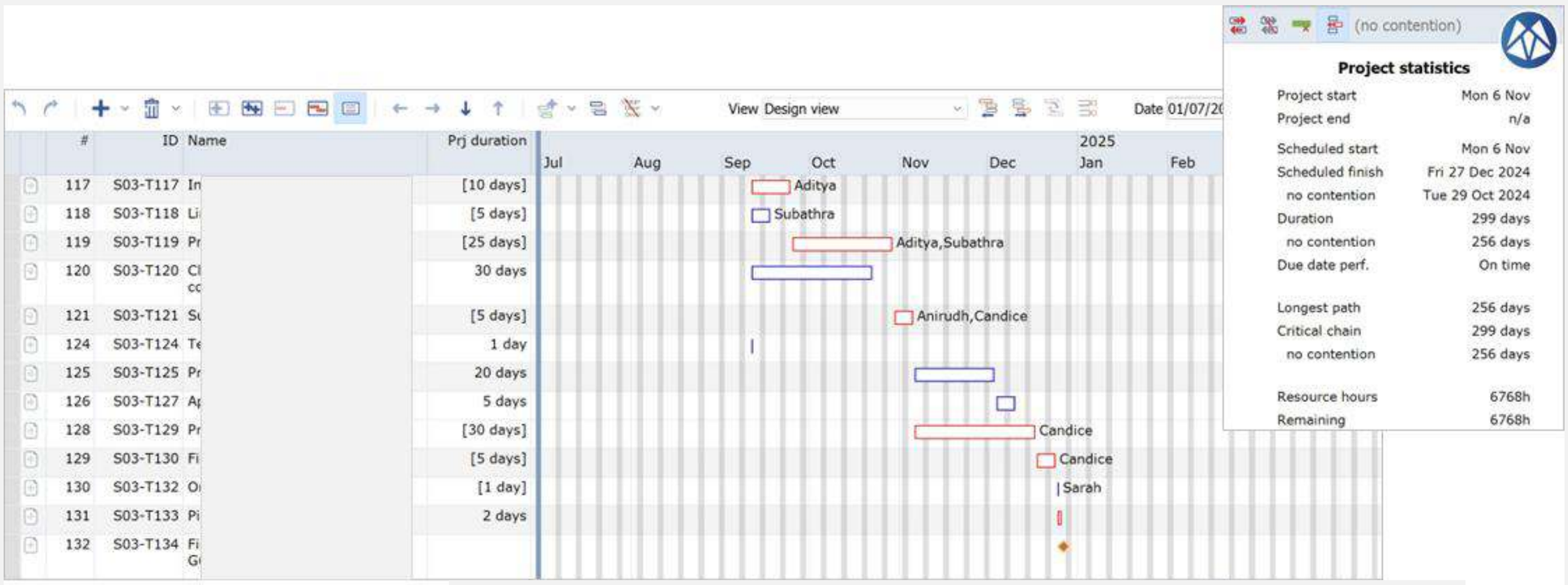
# Attachments

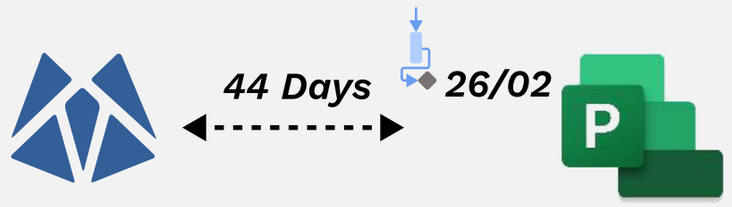
## S03 Customer Example Project

This example is based on a real customer project, of which a snapshot in the “Critical Path” mode from MS Project is shown in the picture below. Resource conflicts are indicated in the Gannt view and also while using the “Inspector” (see the red “brackets). The Critical Path has a duration of 256 days.




To resolve the resolve conflict, MS Project proposes a leveled duration of 343 days, while the LYNX scheduling result (see below) is 299 days, which is 44 days faster.



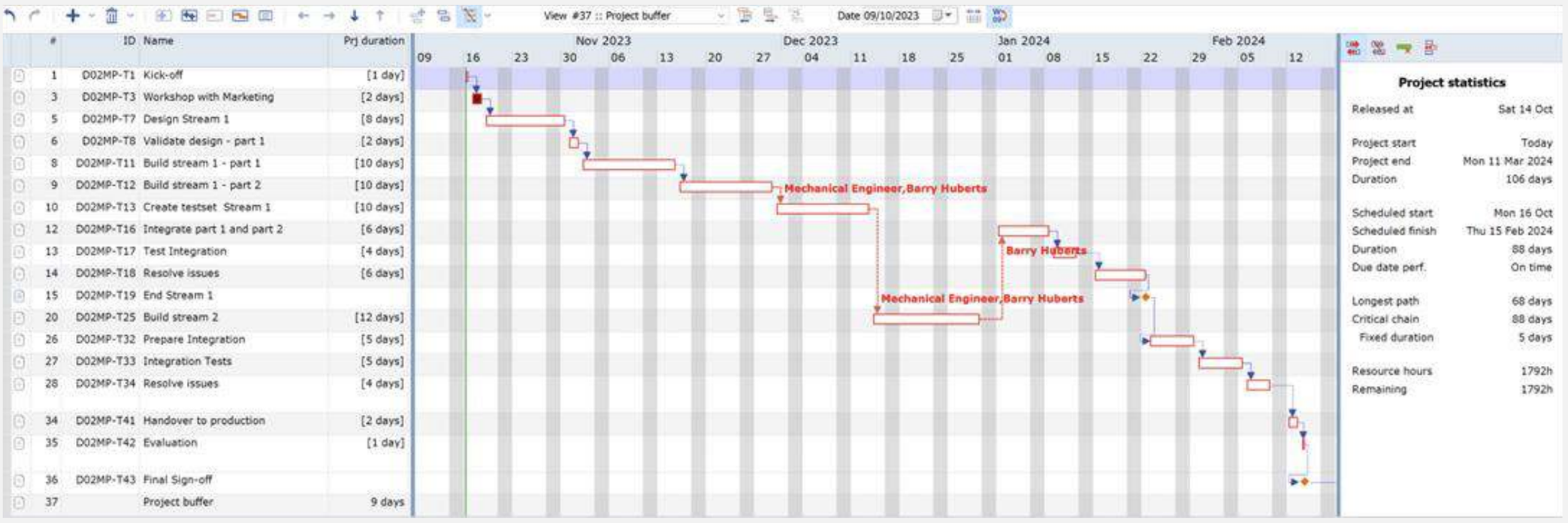
# Attachments

## 002 Project Example: Revealing Hidden Resource Dependancies

Resource Managers and Project Managers are often struggling to identify and resolve resource conflicts. This process is often time consuming and even lead to (more) project delays.

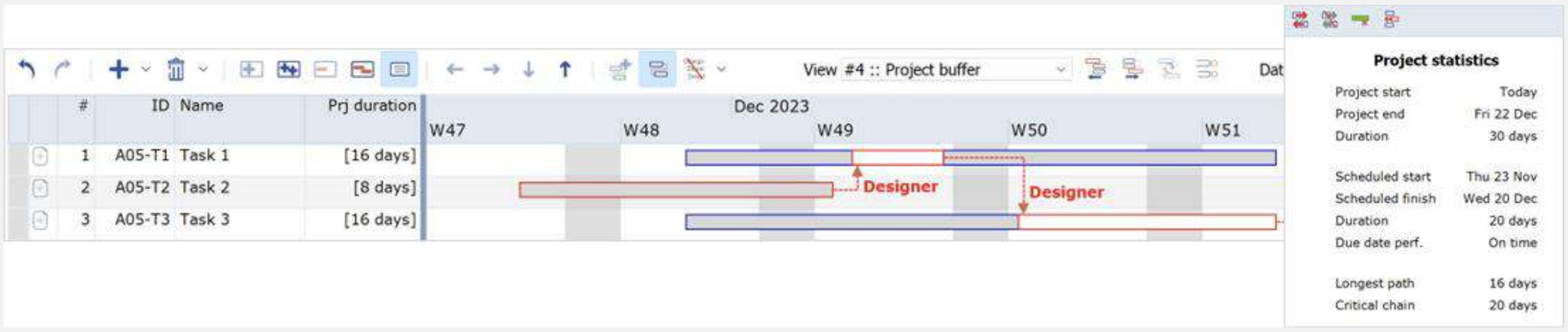
To address this challenge LYNX assist both Project Managers and Resource Managers in their dialogue to quickly address possible resource conflicts and prevent the “cost” of under-staffing of over-staffing.

The Feeding Chain filter within LYNX reveals where the project schedule is expanding due to “constraint resources”:

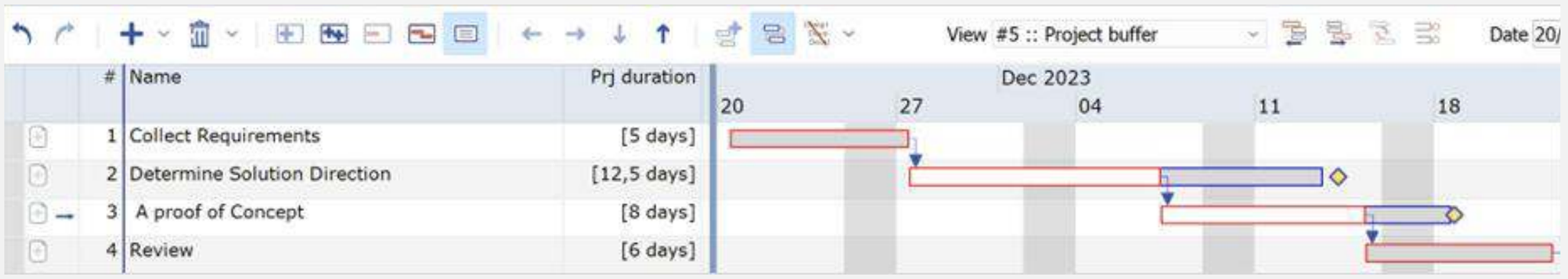



## LYNX Scheduling Flexibility - Split of Longest Chain

Within several projects across among our client base, multiple chains may overlap. In this case LYNX tries to identify as well the fastest path, avoiding a resource conflict:




Another example occurs when a project has multiple separate and overlapping chains, where each have their own deadline (or milestone):




Through the flexibility of the LYNX Schedule Engine, project managers are always informed correctly about the (fastest) duration or make span of their projects.

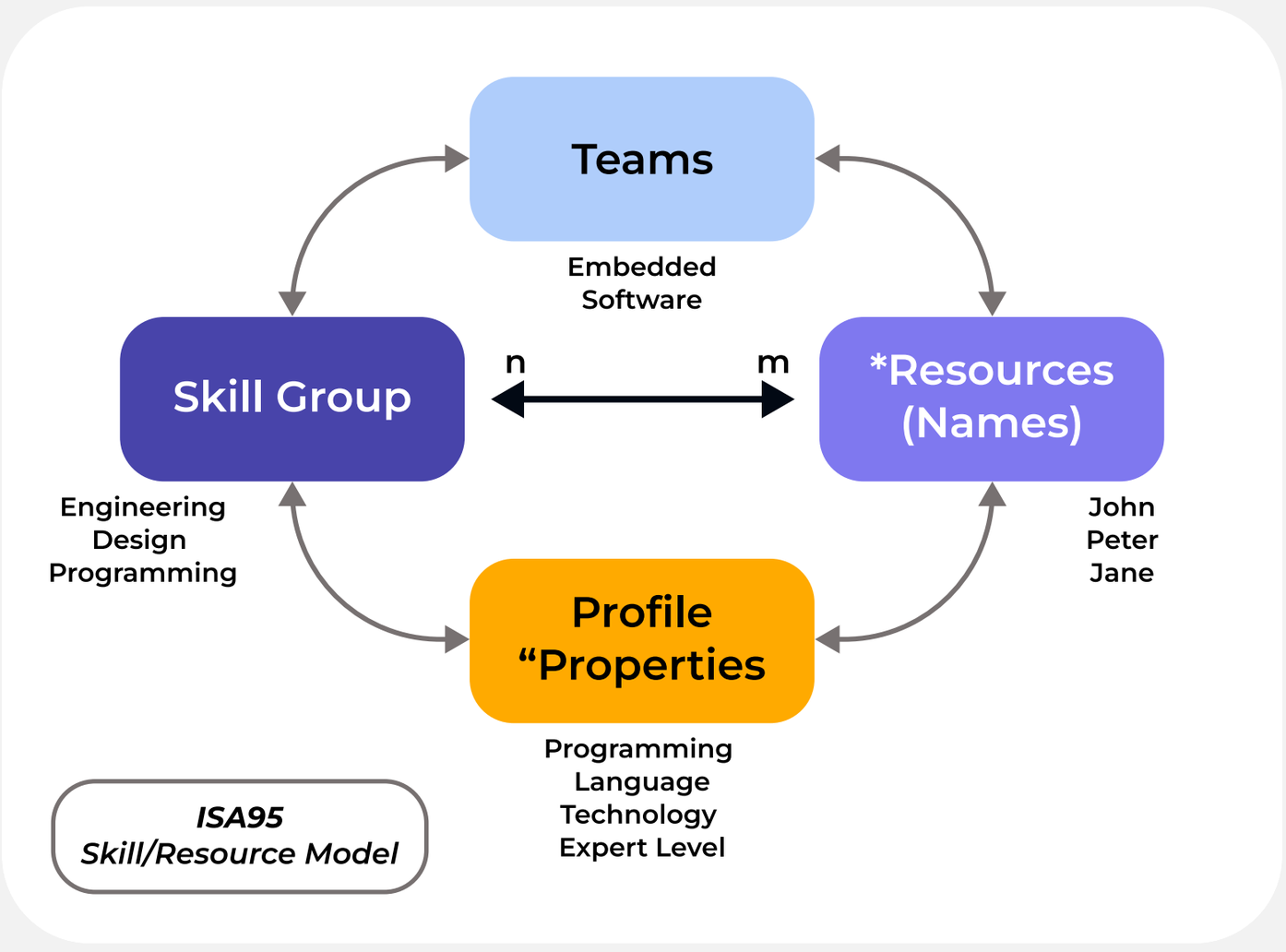
## Resource Conflicts or Resource Contention:

In project management, resource contention and resource conflict are related concepts that refer to challenges associated with the allocation and utilization of resources. However, they have distinct meanings and implications.

Resource contention is more about the competition for shared resources, resource conflict involves a more explicit clash or struggle over the use of a resource. Both situations can disrupt project timelines, increase costs, and affect overall project success.

## Skills, Resources, and Profiles (ISA 95 (Multi-)Skill / Resource Model)

LYNX recognizes the importance of skills, resources, and profiles in the resource allocation process with the ISA- 95 Resource Management Model.




**Skills**: LYNX allows you to categorize and assign skills to your team members, ensuring that the right people are assigned to the right tasks.

**Resources**: Resources encompass everything from team members, equipment to physical spaces. LYNX enables you to manage all your resources efficiently, preventing bottlenecks and ensuring that your projects run smoothly.

**Profiles**: Profiles define the criteria that are used to match skills with resources. LYNX lets you create and manage profiles, ensuring that your resource allocation process is precise and efficient.

**Availability**: The LYNX Scheduling Engine takes into account any pattern or variation in skill or resource availability, like “Resource starting from” or “Available until”, vacations, training periods, (individual) workday calendars and even shifts.

# Get Started Today

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