Uwe Techt
PROJECTS that FLOW

More Projects in Less Time
QuiStain®able Business Solutions

A-dato

LYNX *TameFlow*

LYNX *TameFlow* is a powerful dynamic scheduling and planning solution for (Multi-)Project Execution and Portfolio Management.

LYNX *TameFlow* is certified for the QuiStain®able Business Solution Framework developed by VISTEM.

VISTEM
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VISTEM Preface by Uwe Techt

With this publication we aim to help managers in multi project environments to improve processes for planning and managing projects and resources. In my book “Projects that Flow” I have provided a full description of how a multi project environment should be managed. This concept is called “ProjectsFlow®”.

This concept in combination with a suitable CCPM-able software tool offers a holistic approach to dramatically increase the performance of multi-project environments. Projects Flow/CCPM adds closed loop corrective cycles to manage the work-in-progress (WIP) in a way that the constraint is never overloaded. Additionally Projects Flow/CCPM aggregates the buffers in all work packages at the end of the project and/or integration points. Based on this buffer, the execution management focuses on progress to buffer consumption.

As a management consultancy with many years of experience in the field of drastically and sustainably improving business performances we are often asked which Project Management software supports CCPM. This publication includes extracts of the book 'Projects that Flow' describing functionalities which a CPPM software should be able to perform plus an extensive list of additional functionalities which we consider important, nice to have and where we would like to see an optional switch off. We have termed this the *QuiStain®able Business Solution Framework.* Our focus hereby is on whether the software includes the desired functionalities; it does not include information on usability, design, control, cost, support etc.

Whilst we do not recommend any particular software or claim that this publication is a complete guide to choosing a software tool we have aimed for providing a starting base for evaluating CCPM-able Project Management software tools in order to:

- Create project plans
- Stagger project plan to control resource load and to offer reliable due dates
- Manage execution in a way, that the promises are met

By applying the principles described in 'Projects that Flow' in combination with a suitable software tool capable of supporting the *QuiStain®able Business Solution Framework*, the business and its stakeholders will benefit in the following ways:

Business	• Determine reliable due dates • Deliver projects reliable (in time, in budget, in content) • Shorten lead times: deliver faster than any competitor
Top Manager	• Always knows the status of all projects – and the probability of each project meeting its promises • Focus management attention to those projects that really need management support
Project Manager	• Plan and control projects • Minimum planning effort • Always in control • No effort to get the right resources

Team Manager	• Clear priorities for resources • Project Managers do not interfere with priorities

Ultimately this will lead to more projects in less time with the same resources, continuous increase in profits and a sustainable flourishing organisation.

VISTEM Collaboration with A-dato LYNX *TameFlow*

For this edition we have teamed up with the company A-dato to evaluate their scheduling and planning solution tool LYNX *TameFlow*. The book 'Projects that Flow' and our additional list of functionalities builds the *QuiStain®able Business Solution Framework*. Ad Vermeulen from A-dato has provided information and screenshots on how LYNX supports the processes described in this framework. Only software-tools which include all functionalities and offer the switch off options for unnecessary functionalities are deemed as certified for the *QuiStain®able Business Solution framework* developed by us.

Projects that Flow Introduction

Projects can go over budget, exceed deadlines, or deliver restricted features and quality. This can result in economic damage for companies and their clients.

The difficulties arise at source. Established metrics and management methods slow projects down by creating conflicts in operations and decision-making.

A radically new approach is needed; one that features:

- Simple, constraint-oriented management
- Clear, robust priorities
- Company-wide, rather than locally focused optimization
- A focus on speed, on ProjectsFlow®

Discover in the book 'Projects that Flow' how you can:

- complete more projects with the same amount of resources;
- reliably deliver all projects to specs; and
- significantly shorten project lead times.

For this publication we will go straight into the relevant chapters of 'Projects that Flow' which are part of the fore mentioned *QuiStain®able Business Solution Framework.*

VISTEM Projects that Flow Chapter 12.3: Virtual Drum

In multi-project environments, the organization's ability to manage and implement the integration phases is the constraint. Heightened management attention during this phase speeds up projects considerably, and therefore increases the business's throughput. It has shown to be very useful to have the integration phase (or part of it) set the beat of the project instead of a resource constraint, thus turning it into a virtual constraint. It becomes the "Virtual Drum." To do this, management first decides how many integration phases the business can handle simultaneously. The capacity of the Virtual Drum is set in such a way that:

- any management support required during the integration phases can occur immediately; and
- it actually constitutes the capacity constraint of the organization.

As we have illustrated previously for the example of a resource constraint, the various integration phases are staggered across all projects and this determines the launch dates of the projects. To plan this staggering, three basic parameters are estimated for each new project:

- the duration of the integration phase;
- the duration of the project before it reaches the integration phase; and
- the remaining project run time after the end of the integration phase.

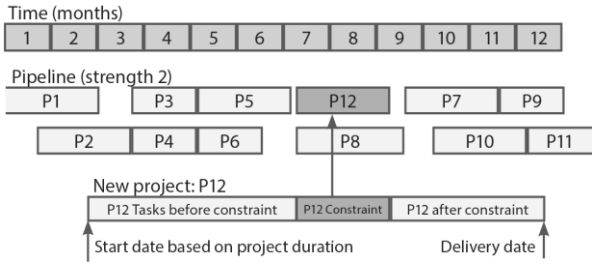
These estimations are based either on a sensible project plan (→ Phase 3: Transforming Planning) or—if the projects are sufficiently similar—on the template for that particular project type. With the help of these estimates the project manager can then determine:

- when there is space for the integration phase in the overall work schedule of the Virtual Drum;
- when the project launch must be scheduled based on this;

and

- when the project will be completed with these dates, i.e., the delivery dates that can be given.

The following diagram illustrates the situation for a multi-project organization that can handle a maximum of two integration phases at a time. Project P12 is planned such that its integration **phase** falls into Months 7 and 8. This determines the project launch in Month 2 and the delivery in Month 12.



The Virtual Drum determines whether the new project finds a place in the pipeline

If the delivery date determined this way (see arrow) does not satisfy the requirements of the client or of management, the multiproject manager can work out the potential effects of inserting the new project with a higher priority (i.e., at the expense of other projects).

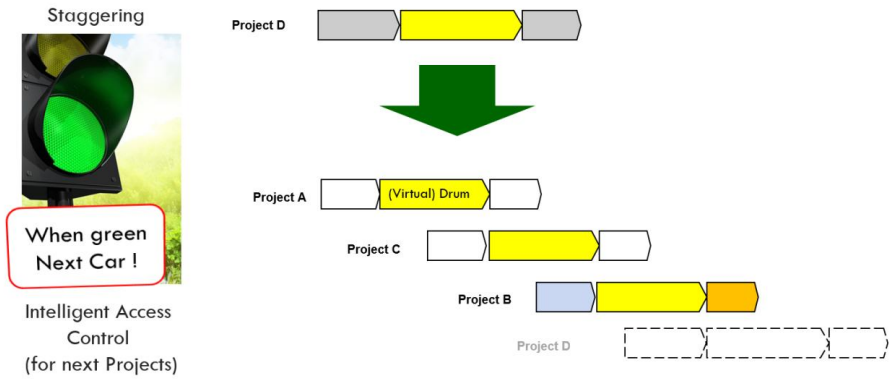
Benefits

Staggering the projects based on the constraint gives the business three distinct advantages:

- Projects become faster and more reliable.
- The business knows its "project capacity": planning the portfolio becomes much easier.
- Planning and management of resources also becomes considerably easier.

The working of this process can be compared with Intelligent Access Control, which controls the frequency and amount of additional traffic (e.g. additional projects) entering the main road (e.g. the pipeline), to ensure that traffic on the main road keeps flowing and traffic jams are prevented.

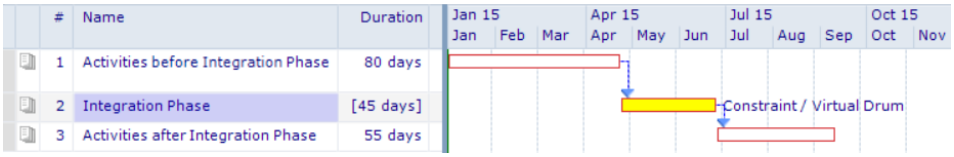
LYNX Virtual Drum



If the Virtual Drum has a capacity of one project in the Integration Phase at the same time, Project D should start after completion of the (yellow) Integration Phase of Project B, to prevent delays of Project A, C and B.

The LYNX Release Wizard process is taking care of fitting in new projects using a virtual drum. This process is illustrated below, where "Project P12" is to be added to the pipeline, with 11 projects active already .

LYNX Release Wizard

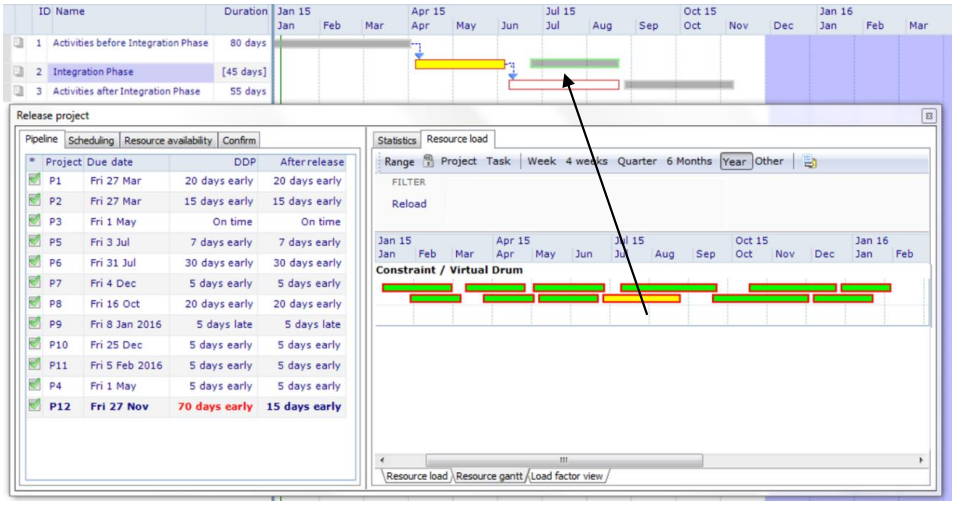


Line Item 2 of project P12 represents the Integration Phase, which has an expected start of 23rd of April (after completion of all activities before the Integration Phase)

The LYNX Release Wizard calculates a new Start Date for Integration Phase of Project P12, assuming that the Virtual Drum has a capacity of 2 Projects and given 11 active projects in the pipeline

The start date is calculated at 22nd of June, which means that the Start date for the project needs to be set 2 months later, in order to fit Project P12 into the pipeline, without "overloading" the Virtual Drum.

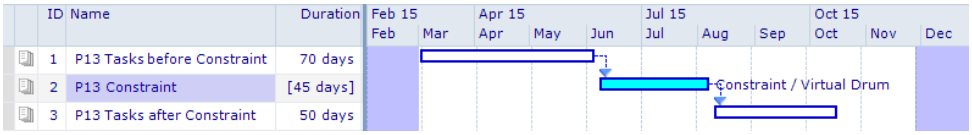
Release Wizard decision Process for fitting the next Project P12 into the Pipeline



LYNX provides a visual recommendation as to when the Pipeline has room for the Integration Phase of Project P12. The integration phase (yellow bar) gets a "grey" equivalent with a target start of 22nd of June. This position is also visualised in the Gantt view. The pipeline window shows the list with all 11 Active Projects and Project P12 at the bottom.

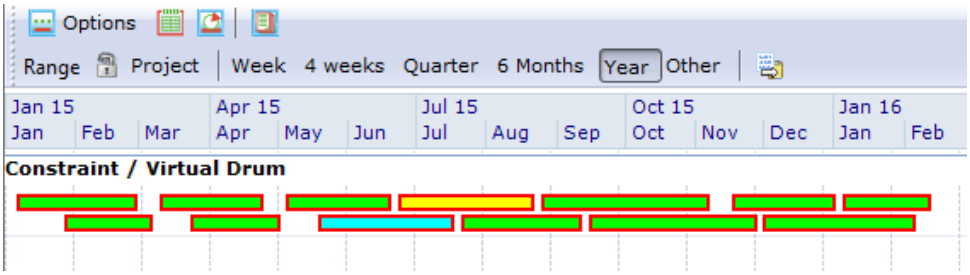
When also Project P13 is added to the pipeline, the new pipeline has the initial 11 projects plus Project 12 (yellow) and Project 13 (blue).

Project 13 Gantt Chart



The Integration Phase of Project P13 is represented in blue

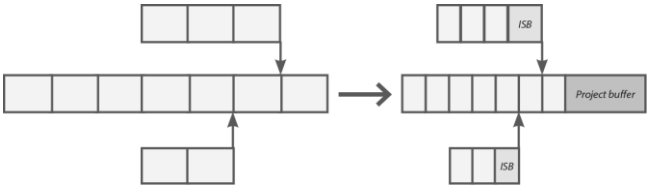
Pipeline with a Virtual Drum Capacity of two Projects



New Pipeline after adding Project 12 and Project 13

VISTEM Projects that Flow Chapter 13.4: Project and Integration Buffer

This system of explicit safety buffers will not only be applied to the project as a whole—i.e., the longest chain (longest path) of the project—but also to the shorter, parallel paths:

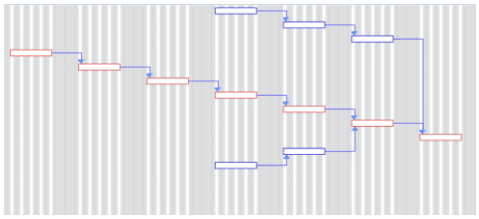


Project and integration buffers

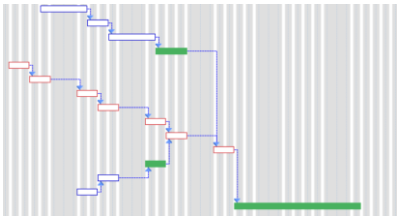
This creates intermediate safety buffers (ISBs) at the project's points of integration; these fulfil two functions:

- Ensuring that a delay on a parallel chain does not automatically lead to a delay on the longest chain.
- In case of early completion of tasks on the longest chain, there is a good chance that the tasks on the parallel chain will be ready as well, so both can be used to shorten the entire project's lead time.

LYNX Project with two integration points



Example Project with one Longest Path and two parallel paths created in the LYNX project editor

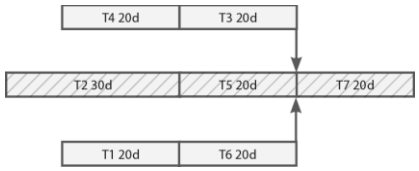


LYNX has automatically reduced the task time, added two Integration Buffers to protect the two parallel paths (feeding chains) and added the Project Buffer.

VISTEM Projects that Flow Chapter 13.4: Critical Path and Critical Chain

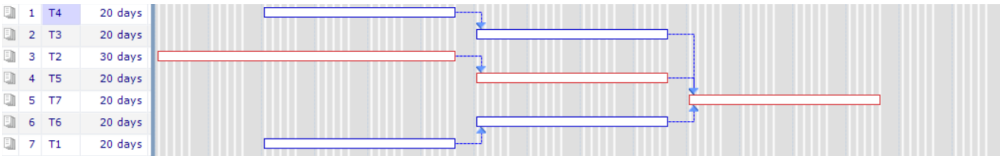
In the above, the term "longest chain" was used for what is generally known as the "critical path." The term "critical chain" was coined by Dr. Eliyahu M. Goldratt to point out that the longest chain in a project is not just determined by how the various tasks are interlinked in terms of their content. Rather, the fact that the same resource cannot process two tasks at the same time is also an important consideration.

For example: The project detailed below consists of seven tasks. The way they are interlinked and their respective durations can be made out in the diagram. The longest chain (the so-called "critical path") consists of the tasks T2 (30 days), T5 (20 days), and T7 (20 days); thus the project can presumably be completed within 70 days.



Critical path

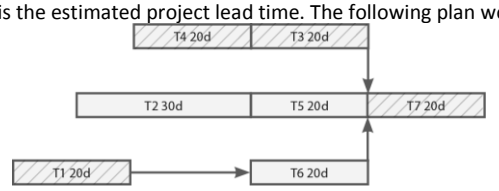
LYNX Project Editor View



The longest chain (or shortest path) has a duration of 70 days (T2 + T5 +T7)

VISTEM Projects that Flow - Critical Chain

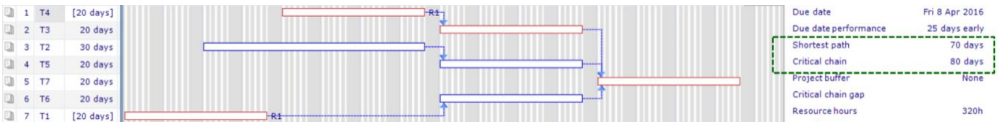
If, however, the tasks T4 and T1 have to be completed by one and the same resource, then the above plan is not workable—and neither is the estimated project lead time. The following plan would be workable:



Critical chain

In this case, T1 (20 days), T4 (20 days), T3 (20 days), and T7 (20 days) make up the longest chain (or "critical chain"); the estimated project lead time is 80 days. Project management software should be able to calculate the critical path as well as the critical chain.

LYNX Project Editor View



LYNX has calculated a shortest path (Critical Path) of 70 days and a Critical Chain of 80 days. These statistics are displayed in a statistics window at the right side of the screen.

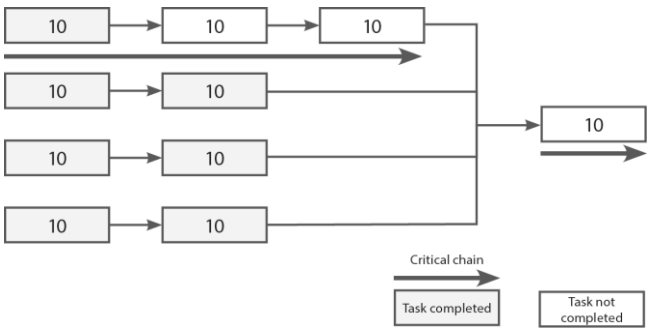
VISTEM Projects that Flow Chapter 14.3: Identifying Tactical Priorities

Identifying Tactical Priorities

For projects to be reliable, the business has to ensure that each project uses up no more than the planned safety buffer at the end of the critical chain. A project which is progressing well and has not yet used much of its safety buffer is more secure (and therefore has a lower tactical priority) than a project which is progressing slowly and has used up much of its buffer. To define tactical priorities we must, therefore, be aware of **project progress** and **safety buffer consumption** (also called penetration).

Project progress

How do you determine the progress of a project? Often this is done by measuring the resources used or the percentage of tasks completed. Both of these can be misleading. If a project plan has scheduled 1,000 days of labor and 500 days have been used after 3 months, this neither means that half of the work is done, nor that the project will be completed in another 3 months. Measuring the progress of a project by way of the percentage of tasks completed is equally misleading. For example:



Project progress

The numbers in the above diagram are working days. The project comprised 10 tasks of 10 working days each. The tasks marked in gray are completed. Is this project 70% done? Or is the progress 25%? If the progress of a project is measured by way of the resources used or the tasks completed, this leads to the well-known phenomenon of the last 10% of a project taking as long as the first 90%. A reasonable and effective metric for project progress is the proportion of tasks completed on the critical chain. Following this calculation, project progress in the above example is 25%. Thus, it becomes clear that the project is likely to take three times as much time as has already elapsed since project launch.

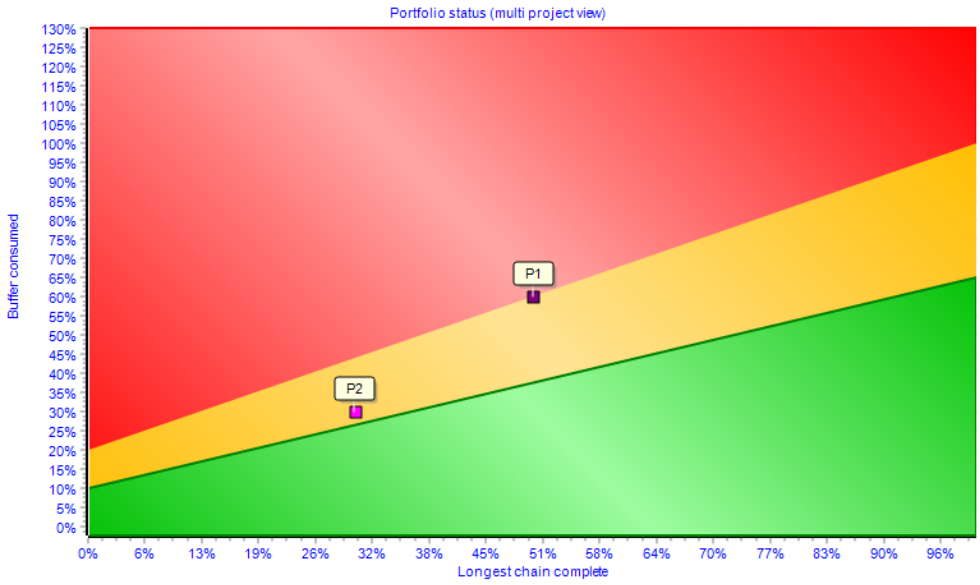
Safety buffer consumption and recovery

The safety buffer is used up when a task takes longer than scheduled in the project plan. It is gained (or recovered) when a task is completed faster than scheduled in the plan.

Project status/buffer index
A project which is progressing speedily and has used up very little safety buffer will have a lower tactical priority than a project which is progressing very slowly and has used much of its safety buffer. To clarify: In the following example, two projects compete for a resource (X). Each of the projects comprises six tasks with a planned duration of 5 days each and an explicit safety buffer of 15 days. (Note: In this simplified example, we are showing only the critical chain.) The project which can "claim" resource X can progress further; the other project must pause until it obtains the resource.

The ratio between project progress and safety buffer consumption or penetration—also known as project status or buffer index— determines the priority of the task. The higher the buffer index, the higher the priority. The project status can be easily represented in a diagram, where the *x*-axis shows project progress (progress on the critical chain) and the *y*-axis shows buffer consumption.

LYNX Multi-Project Progress or Fever Chart

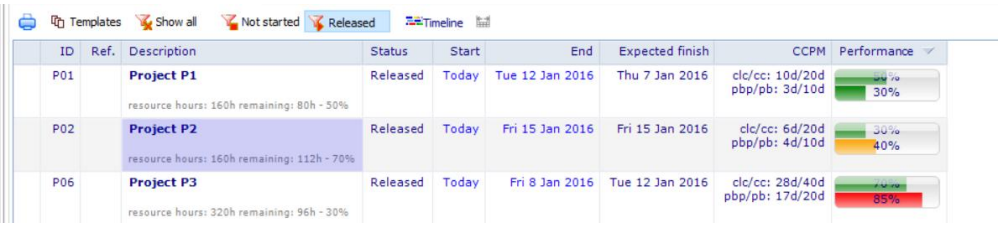


The X-axis shows the Project Progress and the Y-axis shows the buffer penetration. Project P1 has 50 % progress and a buffer penetration of 60 %.

VISTEM Projects that Flow - Task priorities
The tactical priority of a project is also automatically the tactical priority of the active (or upcoming) task on the longest chain of the project. This is the task which currently determines when the project will be completed. If this task can be completed one day sooner, the project will be completed one day sooner. If the task is delayed by one day, the project will be delayed by one day.

The tasks on the project's parallel chains (where there is an ISB before their integration into the longest chain) are "safer." Accordingly, their tactical priority will be lower.

LYNX Project Portfolio view with Performance Indicators



LYNX calculates for each project in the pipeline the buffer index. Any task on the Critical Chain of a project inherits the operational priority of the buffer index of the project it belongs to.

VISTEM Projects that Flow Chapter 14.4: Task Management

Task management
It is the task manager's job to ensure that tasks from the various projects that are to be processed in their area (department, team) are completed as fast as possible according to their priorities. To this end:

- they fully prepare upcoming tasks so that they can be processed
- quickly and without disruption;
- they optimally supply the tasks with resources;
- they shield their employees from interruptions while they

are working on a task; and

- they support their employees' work by assisting them in overcoming any difficulties that may arise and by taking corrective action if necessary. By doing this, task managers can accelerate projects and are utilizing their resources in the best possible manner for the business.

Task lists
To be able to do their jobs, task managers daily receive a task list split into three parts:

IP—In Process
The IP list (In Process) shows the tasks that are currently being worked on. These should not be interrupted and should be completed as fast as possible. Task managers use the IP list to discuss the tasks in process with their employees or teams, to determine if there is any need for action or support, and to estimate how much longer they will take. After these discussions they note the remaining duration and arrange any necessary support activities. This way, task managers can ensure delays do not happen and can catch up any delays that may still have occurred.

NS—Not Started
The NS (Not Started) list shows tasks that fulfil formal launch requirements (all preceding tasks completed), but have not yet been started—either because they cannot be optimally supplied with resources, or because preparations are not yet complete. These tasks can be immediately started as soon as the resources become available; they are in wait status until then. Task managers use the NS list to prepare tasks according to their priority. They do this by ensuring all necessary requirements for the task launch are fulfilled. These include:

- Any necessary preparation (even if not listed as such in the project plan—e.g., necessary approvals).
- Resources that can be optimally allocated and will be available without interruption.

As soon as the necessary resources are available for the task of the next highest priority, and as soon as the preparations for the task are complete, the task manager will hand the task over to their staff, discuss it with them, and establish an initial time estimate with them (regardless of the duration listed in the project plan).

NTBS—Not To Be Started
The NTBS (Not To Be Started) list shows approaching tasks where the launch requirements (tasks that need to be completed first) are currently being worked on, along with their tactical priority and the estimated handover date. Within these three lists, tasks are listed according to their current priority.

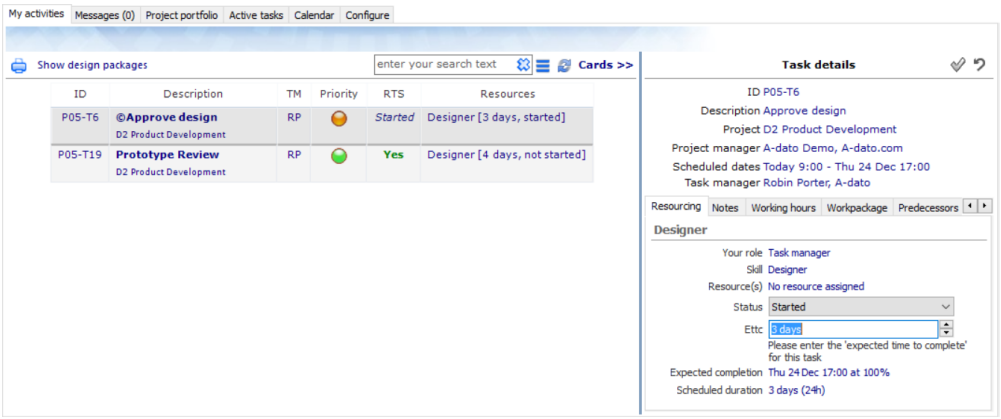
LYNX Task Management – grouped by section and sorted by priority

	ID	Description	Priority	RTS	Resources
IP	6	**©Approve design** D2 Product Development		*Started*	Designer [2 days, started]
NS	19	**Prototype Review** D2 Product Development		Yes	Designer [4 days, not started] Marketing [4 days, not started]
	1	**©Validation of Concept** D3 Product development		Yes	Designer [4 days, not started]
NTBS	8	**©Hardware Design** D1 Product Development		No	Designer [6 days, not started]
	7	**©Firmware Design** D1 Product Development		No	Designer [8 days, not started]
	27	**Design stream 2** D2 Product Development		No	Designer [8 days, not started]

Task list for the resource group "Designer" grouped by section In Process (IP), Not Started (NS) and Not-To-Be-Started (NTBS) and sorted by priority

LYNX identifies the RTS (Ready-to-Start) status of a task: if all predecessors have been completed the RTS status is switched to Yes. Within these three lists, tasks are listed according to their current priority. The responsibility for starting, reporting progress and manage the task until completion is typically with the "Task Manager". His tasks are presented via the My activities task list in LYNX.

LYNX My activities for the Task Manager



My activities Screen in LYNX shows all tasks for task manager Robin Porter with status IP (In Process) and NS (Not Started, but RTS = Yes (Ready-to-Start). He can easily change status and/or update the Expected-Time-To-Complete (ETTC)

VISTEM Projects that Flow Chapter 14.5: Project Management

Project management
One of the essential tasks of a project manager during project implementation so far was to make sure resources were actually working on their project. This now becomes unnecessary. No longer do project managers have to chase resources, as the newly established procedures ensure that the right resources are processing the various projects in the right order.

Project managers use their newly gained free time to concentrate on their actual job: If there are actions to be taken for task acceleration that lie outside the authority of task managers, project managers can often be of assistance, e.g., by communicating with clients or other business areas. Perhaps there are issues that need to be clarified with the respective client contacts, or other areas need to perform support actions. This is where project managers spring into action.
But it is just as important for project managers to know what they should *not* get involved with, as their intervention would be likely to cause **circumvent** disruption How can project managers know which of the project tasks to get involved with and which ones to stay out of?

Task lists
Just like the task managers, and pulled from the same data, project managers receive a daily task list split into three parts.

IP—In Process
The IP list shows which active task is currently determining the project's completion date. This task can be found on the (currently) longest chain of its project and will be at the very top of the list.
Below this the other active tasks are listed in the order of their tactical priority (calculated based on buffer index). These tasks will be on parallel chains of the project. This list helps project managers to work out where their support may currently be needed.
NS—Not Started
The NS list shows which tasks are waiting to be started in the various resource areas. Project managers can assist with the preparation of these tasks so that—once started—they may be processed uninterrupted.
NTBS—Not To Be Started
The NTBS list shows approaching tasks where the launch requirements are currently being worked on—those are tasks found in the IP list. The NTBS list further shows the tactical priorities of the tasks and the estimated handover date. With the help of the NS and NTBS lists, the project manager can support resource and task managers in their efforts to fulfill all requirements necessary for the launch of the task.

Status	Prio	Project	Task	Remaining duration (days)	Expected
IP		KO	Construct enclosure	12	
		KO	Construct framework	5	
		SWE	Design management SW	3	
		SWE	Define interface	4	
NS		...	...		
NTBS					18.03.
					19.03.
					23.03.
					27.03.

Task List for Project Manager

LYNX Complete Task list of Project D2

	ID	Description	Priority	RTS	Resources
IP	6	**©Approve design** D2 Product Development		*Started*	Designer [2 days, started]
	10	**Create testset** D2 Product Development		*Started*	Tester [9 days, started]
NS	19	**Prototype Review** D2 Product Development		**Yes**	Designer [4 days, not started] Marketing [4 days, not started]
	8	**Receive Materials** D2 Product Development		**Yes**	Supplier [6 days, not started]
	28	**Prepare Manual** D2 Product Development		**Yes**	Tester [10 days, not started] Trainer [10 days, not started]
NTBS	7	**©Build stream 1 - part 1** D2 Product Development		No	Product Engineer [11 days, not started]
	9	**©Build stream 1 - part 2** D2 Product Development		No	Product Engineer [10 days, not started]
	27	**Design stream 2** D2 Product Development		No	Designer [8 days, not started]

The Project Manager of Project D2 has access to the complete task list of Project D2 and can monitor status and progress of each task within his project.

VISTEM Projects that Flow - Project manager interventions

With these targeted interventions in issues that cannot be resolved by task management, project managers ensure that the project's safety buffer is not wasted unnecessarily, or even that lost time is recovered. Project managers daily check the list of tasks that are using up most of the buffer and verify if counter measures are necessary or have already been taken to make the project progress as fast as possible.

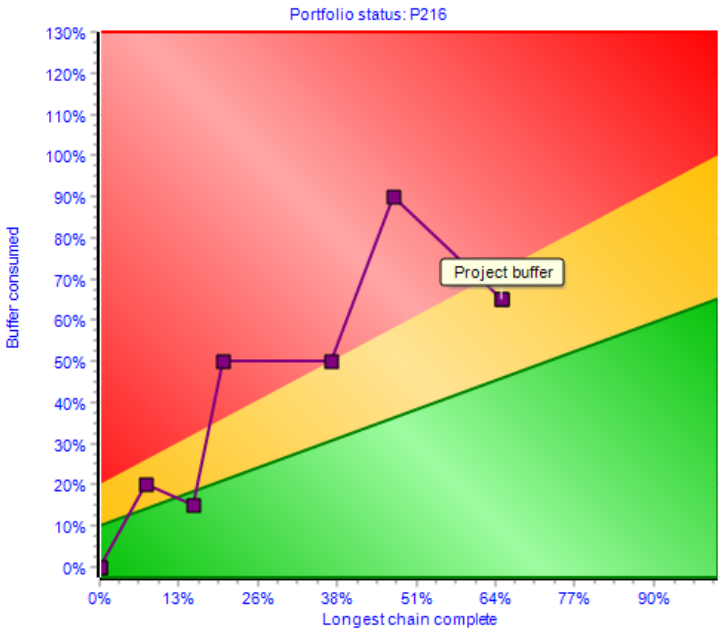
Fever chart

Some project management systems provide a so-called "fever chart."

This chart displays the development of the project in predefined intervals (weeks, months), showing whether the project has used more or less safety buffer in a given time frame than it has progressed:

- If the curve is "steeper" than 45 degrees, the project has used more safety buffer than it has made progress: it has become less secure and its tactical priority has gone up. If the curve is "flatter" than 45 degrees, the project has used up less buffer than it has progressed: it has become more secure and its tactical priority has gone down.
- If the curve is heading down, the project has progressed faster than even the project plan (with task durations cut by half) suggested. The project has actually gained back safety buffer. Using the fever chart, project managers can retrospectively analyze what has proved useful for the project and what has slowed it down. This is helpful for future projects and helps with focused improvement measures.

LYNX Fever Chart



Project Fever Chart with Trend line

LYNX Tame Flow

Fever Chart with

Trend line

VISTEM Projects that Flow Chapter 14.8: Project Status

Project status

How well a project is getting on (in relation to the project plan) can be inferred from the ratio between project progress and buffer consumption. This ratio is called "project status."An overview of all projects sorted by status, indicating the task which currently drives each project's progress, helps top management concentrate on those tasks (and only those) where a management intervention will have a positive effect on the progress of the project.

It has proven useful for top management to have a weekly meeting where the status of all projects is discussed, focusing on any projects where progress is below expectations. The corresponding project managers can then be asked to suggest potential improvement measures that can be assessed and implemented if considered viable.

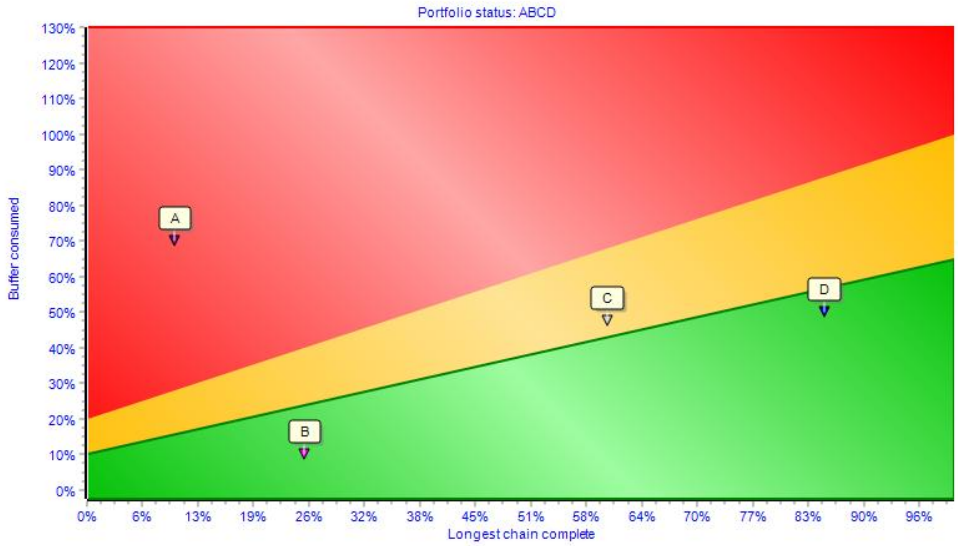
VISTEM

Projects that Flow

Chapter 14.8

Project Status

LYNX Multi-Project Fever Chart with 4 Projects



Progress of Project A is below expectations

VISTEM Projects that Flow Chapter 14.8.2: Flow Trend

Flow Trend

From the same data we can generate a further report—the so-called "Flow Trend." This shows how many tasks are "In Process" in each group of resources, and how many are waiting to be started.

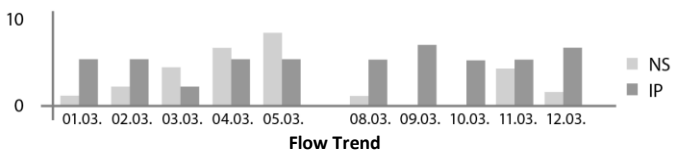
This report can give top management helpful pointers. If the number of NS (Not Started) tasks goes up in a specific area, it can mean one of the following:

- The area (department) has an acute shortage of resources (either temporary or beginning to become chronic).
- There are a few "stuck" tasks in the area which cannot be completed, preventing any further tasks from being started.

If on the other hand the number of IP (In Process) tasks goes up, it can mean one of the following:

- Employees are resorting more and more to (bad) multitasking.
- Resources are being spread more thinly across tasks.

The top manager will not be able to see the actual cause of events from the Flow Trend, but they will know which resource groups to ask to find the answer. The top manager is highly motivated to ask questions, as they know: If the number of IP or NS tasks in a department goes up, the affected projects will take longer than they need to.



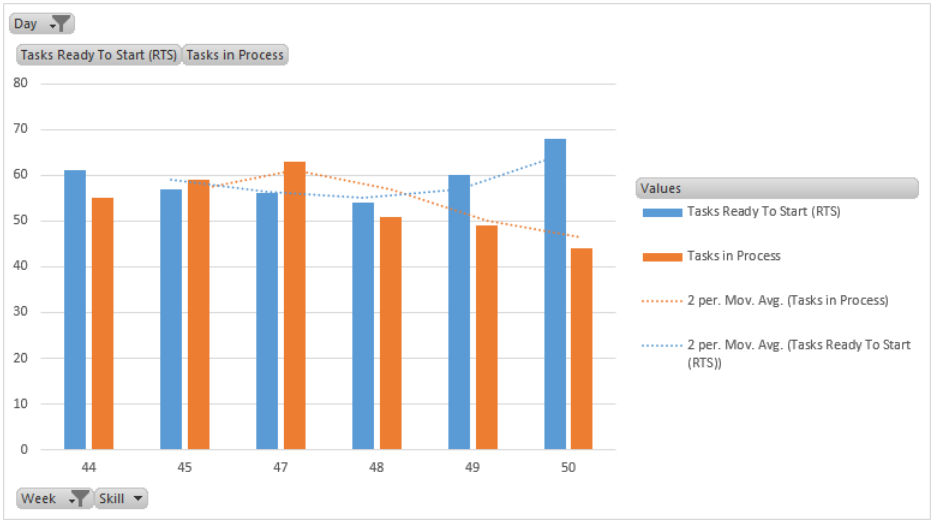
Flow Trend

LYNX Reporting Capabilities

Through the LYNX Reporting Capabilities and the integration with Excel Powerpivot possibilities, the key-reports (and many others) are standard available, including:

- Flow Trend reports (by skill and by week)
- Cumulative Flow Diagrams
- Most Penetrating Tasks Report (see above: listing each task currently driving project progress, sorted by buffer index)
- Portfolio Performance reports

Flow Trend by week



Flow-Trend Report with tasks Ready to Start and Tasks in Process

VISTEM Projects that Flow Chapter 19: Reducing WIP

Reducing WIP

If too many projects are being processed at the same time, they compete for resources and attention. The consequences are:

- Bad multitasking among employees and management
- Thin spread of resources across projects (alternatively, suboptimal resource allocation to projects)
- Desynchronization
- Defocusing

Each of these effects considerably increases the duration of all projects

Further negative effects of this situation are:

- High stress among employees and management
- Managers compete with each other rather than supporting each other
- More reports and control systems are continually established

Objective

FLOW becomes the overriding principle of the organization. This means: The focus is on completing projects (rather than on beginning projects).

Path (how to reach the objective)
The business reduces the WIP and keeps it at a level that makes sense for the business (The amount of active projects will be reduced to less than 75% of previous WIP).

Predicted effect (the specific effect that will be created by the change)
The remaining duration of currently active projects is reduced. This improves the reliability of those projects. Project throughput increases, i.e., more projects are completed per time unit (month, quarter, year). At the same time, the working climate and level of cooperation in the business is expected to noticeably improve.

Caution
The pressure to start each project ASAP will put the WIP back up. Therefore, there must be a mechanism in place to keep the WIP at the reduced level. The attempt to find a more precise or "more correct" value than 25% for one's organization will only delay implementation (and thus the effects of the change) without producing any benefits.

Path how to reach the objective of reducing WIP (described in detail in the book Projects that Flow, Chapter 19)

Freezing projects
A sufficient number of active project are effectively halted (top manager decides which ones). The executive determines the relative priorities of projects (after discussing it with the employees involved). Within a CCPM Software there need to be options to set **project priorities and halt projects.**

Accelerating projects
Optimal resource numbers: For each task/each project there is an optimal number of resources. CCPM Software -> The freed resources are used to optimally accelerate active tasks (and projects). Tasks that have not started yet are launched with optimal resource allocation. This means, the task manager determines the optimal resource number for each immediately upcoming task and starts the task with that number of resources—even if it means another task will not be able to start because of this. For the currently frozen projects which will soon be resumed, the optimal resource number is determined for all upcoming tasks.

Re-launching frozen projects. The frozen projects will be defrosted at the rate required to maintain the reduced WIP level.

Complete one, defrost one. One simple approach consists of resuming a frozen project every time an active project is completed, as this will keep the WIP at more or less the same level.

This approach is entirely sufficient if we are satisfied with the improvements achieved so far and not interested in shaping and securing the future of the organization. So the question is: What would a mechanism look like that is aimed at further improving performance while maintaining the reduced WIP level?
Integration: For most multi-project organizations, the following is true: It is not a specific resource limiting the rate of project completion, but rather its "integration capacity."

If there are too many projects in the integration phase at the same time, the focus on completing projects according to their priorities is lost. If this happens, resources are withdrawn from one project to assist with resolving another project's urgent problems. The integration phase requires a lot of management support.

Focusing management attention on Vitual Drum (Projects that Flow page 283): If the business defrosts a frozen project every time an active project completes the integration phase, this automatically focuses the attention of top management on the integration phase.
With this increased management attention—this has been shown again and again (not just in the project business)—difficulties and risks are recognized and resolved sooner: For one thing, employees want to be seen in the best possible light and avoid awkward questions. Additionally, top management can intervene at exactly those points in a project where it is most beneficial and where it has a significant accelerating effect.

Conclusion: The integration capacity is what limits the progress of the project portfolio most noticeably. Having more simultaneous integration phases than the business (active resources as well as support and management roles) can handle leads to a loss of focus, multitasking, and a sinking PCR. This manifests itself in repeated delays during the integration phase while waiting for help or decisions from resources, support, or management roles.

Path of how to reach the objective of re-launching frozen projects at the rate required

Define the virtual drum: The business decides that the project integration phase (or part of it) will determine the beat or pace of the multi-project organization. This is called the "Virtual Drum."

Strength of the Virtual Drum: If the Virtual Drum is to set the pace of the organization, we must determine how many projects can be in that phase at the same time. To obtain a reduction in WIP (and thus an acceleration) even during integration, it is determined that at most 75% of projects can be in the integration phase compared to the number we had in the integration phase before Step 1.1. If necessary, we will freeze further projects (currently in the integration phase) to achieve this WIP reduction.

Defrosting projects: When an active project completes the integration phase, a frozen project is resumed, thus maintaining the amount of projects in the integration phase. An active project will only enter the integration phase once another project has completed it.
Priorities: The order in which the frozen projects are resumed is determined by the **prioritization set initially**.

Management is focused on supporting the integration phases of projects.

As a result of this, integration phases become very much shorter, the PCR increases, and the time until the first new project can be started approaches faster.

Starting new projects: New projects are launched in a way that maintains the reduced level of WIP.

Different path lengths: For most projects, the individual paths are of significantly unequal lengths. Starting work on all these paths at the same time will increase the WIP unnecessarily; starting individual paths too late on the other hand will delay the project. Therefore, their varying lengths must be taken into account when launching the individual project paths. This is not a trivial task, however, as there are a number of big challenges:

Complexity: For most (larger) projects (and even more so in multi-project organizations) it would be too time-consuming to manually calculate the best starting points of the different paths. This is one of the reasons why in many projects, every task is started ASAP.
Resource capacity: One of the things the duration of the different project paths depends on is the capacity of the various resources. The planned duration depends on the planned capacity of resources; the actual duration on their actual capacity. Most project organizations and even most commercially available project management software systems do not take these dependencies into account, or barely do. This is one of the reasons why projects and tasks are started as early as possible and why project managers are expected to estimate and negotiate early on how much they will require of each resource for their project.

Safety buffers: The duration of a project and of the different paths is highly influenced by the way safety buffers are planned. Most project organizations (and most software systems) assume— implicitly or explicitly—that safety buffers are included in individual project tasks and that completing each project step on time will complete the entire project on time. New developments show, however, that safety buffers on the task level draw out project lead times unnecessarily, thus preventing timely project delivery. This requires fewer safety buffers, project lead times can be planned significantly shorter, and projects become far more reliable.

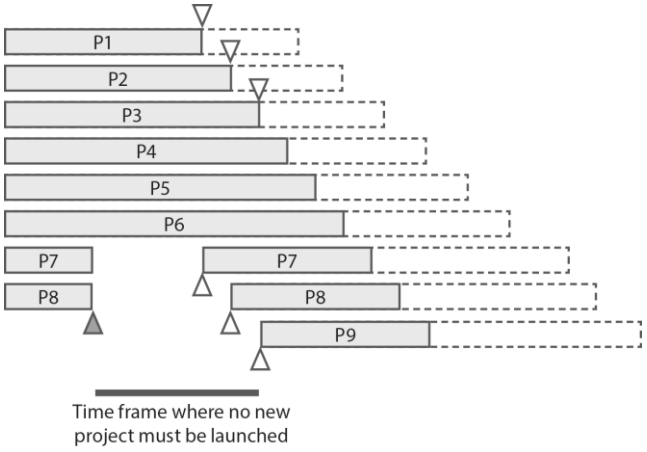
Only a few project management systems currently offer this principle of **bundling and explicitly using safety buffers**, though that number is constantly growing.

These three challenges must be overcome before new projects can be launched; at least if the aim is to realize further performance enhancements for the business, rather than staying at the level already achieved.

Window of time: The steps described above (freezing projects, accelerating projects, resuming projects) put the organization in a great starting position: We have created a time window several weeks long where no new projects are launched.

The project managers of upcoming projects use the time frame where no new projects are launched to carefully prepare (Phase 2) and soundly plan their projects—taking into account the challenges just mentioned.

The business as a whole uses this window of time to build the framework for highly improved project and multi-project planning and management.



Window of time

FLOW becomes the overriding principle of the organization. This means, the focus is on completing projects (rather than on beginning projects).

LYNX supports initial WIP reduction

LYNX Pipeline Planning and Simulation supports the decision making process to achieve WIP reduction. It helps deciding which projects need to be completed first and which projects should or can be temporarily put on-hold and for how long.

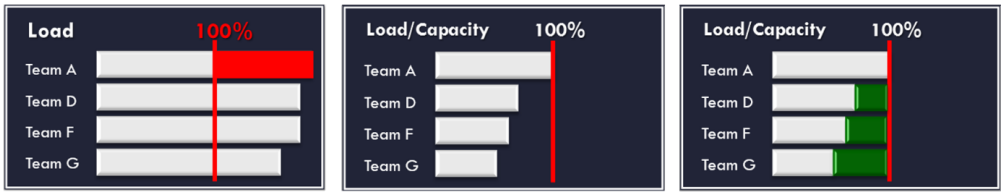
The input for this process exists of:

- The list with current projects and required due date of each project
- The amount of “due-date tolerance” allowed for a particular project (e.g. deadlines for Internal Projects are probably less strict, compared to deadlines for customer projects)
- The relative Strategic Priority of each project and associated Throughput validation of each project

LYNX accepts a Project Plan or Profile in various data formats and level of detail. For example for some projects only an Excel file may be available with only an resource requirement estimate by month or by week and by role. For other projects a detailed project plan may already be available, which can easily be imported or set-up in LYNX.

The picture below illustrates the main steps within LYNX in the process of WIP reduction:

Load versus Capacity Analysis



Identification of most loaded ("Constraint") team and target for WIP reduction. Team A is clearly the most loaded team.

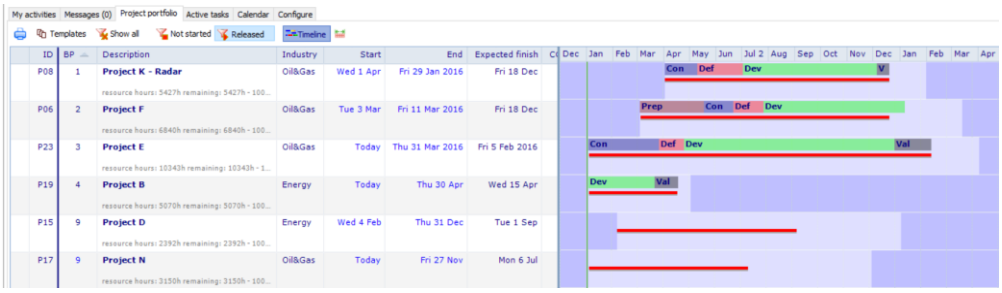
LYNX WIP Reduction Example – Portfolio with High-Tech Engineering Projects

The example described below includes a sample multi-project portfolio consisting of 17 Projects. The resources are grouped by team or role (this is called "Skill" in LYNX), like:

- System Engineer Team
- Mechanical Engineer Team
- Test Engineer Team

Furthermore, each project has a **Strategic Priority** or ranking (this is the column BP, which stands for Business Priority) and optional additional attributes, like the "Industry", if a project serves a particular "Industry" or business unit. The list with project is presented in the LYNX Project Portfolio view, as is shown in the picture below.

Project Portfolio Overview with 17 Projects



List with Projects is sorted by Strategic Priority (BP Column). Project K - Radar has the highest priority (1) compared to the others.

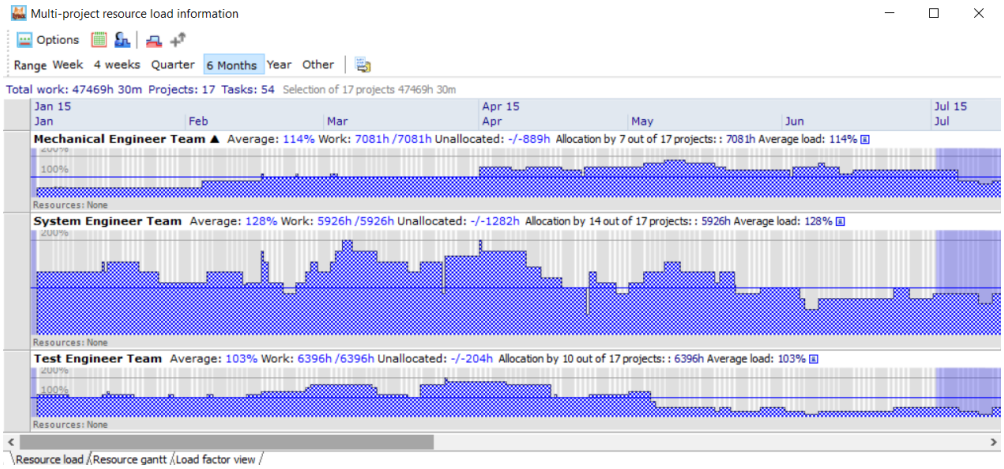
WIP Reduction – Main Steps

The steps in the analysis and WIP reduction process are as follows:

1. Identify the Resource (over-)load by Team, including ALL projects to be done
2. Decide which team you would consider as your most "Constraint" team
3. Develop one or multiple scenario's for WIP Reduction (Freezing) by simulation
4. Implement the preferred scenario

Step 1: Identify the Resource (over-)load by Team

The "Multi-project resource load" graph provides the possibility to monitor the Resource Load by selected default planning horizon from "today" (week, 4 weeks, Quarter, 6 Months, Year) and quickly identify the Resource (over-)load by team. The horizon may also be defined by the user. Furthermore this graph has many filtering and advanced drill-down possibilities, for example to identify consumption of capacity by "location" or by any (user defined) project characteristic like Strategic Priority or Industry.



LYNX has calculated the Resource Load by team across 17 Projects within a time-span of 6 months

In this example the System Engineer Team has the highest overload during the defined planning horizon of 6 months:

- the System Engineer Team has an expected work volume (Load) of 5.926 hours
- the average load percentage during the 6 months is 128 % (28 % overload)

Note also that the System Engineering Team is used in 14 of the 17 projects. The Test Engineer Team is used in 10 out of 17 projects and the Mechanical Engineer Team is only used in 7 out of 17 projects.

The other teams are also showing an overload, but less (114 % and 103 %).

Step 2: Decide which team to consider as the "Constraint" Team

In this example the System Engineer Team clearly jumps out as the most "Constraint" team and in addition it is required in the most projects (14 out of 17 projects).

Therefore the System Engineer Team is selected first as the "Constraint" team, for which we want to define a scenario, which reduces the Resource Load to the 100 % level.

Step 3: Develop scenario(s) for WIP Reduction

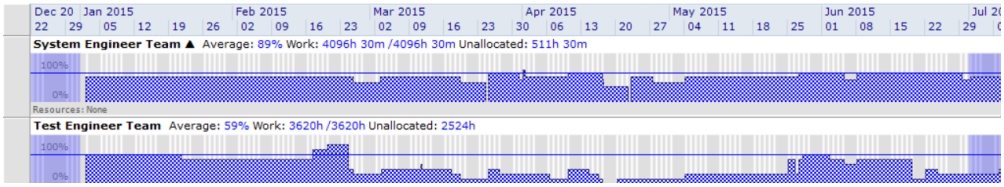
LYNX has already all inputs for calculating the first scenario automatically:

- The System Engineer Team is considered to be the "Constraint" team, for which the resource load should not exceed the 100% level
- Each project has a "Strategic Priority". LYNX will schedule the projects with the highest priority first

After triggering the "Calculate Scenario" function, LYNX presents the following solution for reducing the WIP:

- The Resource Load is reduced to 89 % for the System Engineer Team
- Projects with a lower priority are pushed out in time to continue or start later

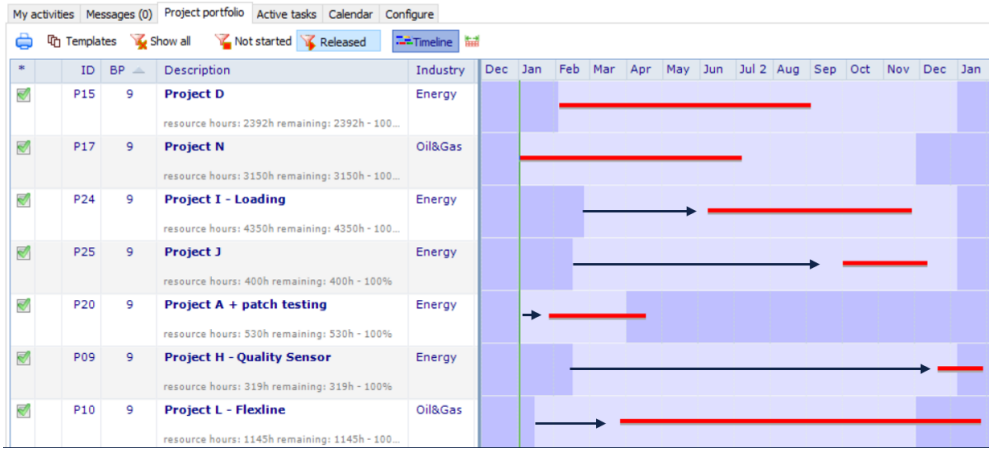
Team Resource Load overview after re-planning all projects



The load of the System Engineer Team has been reduced to below 100 %. Due to the re-planning, with the System Engineer Team as constraint, also the resource load for the other teams have been reduced. The estimated load for the Test Engineer Team is now 59 %.

In the picture below LYNX shows which projects have been pushed-out and are the first candidates for "Freezing".

Portfolio view after re-planning



In this scenario LYNX recommends to push out for example Project I, Project J and several others, in order to reduce the WIP for the System Engineer Team.

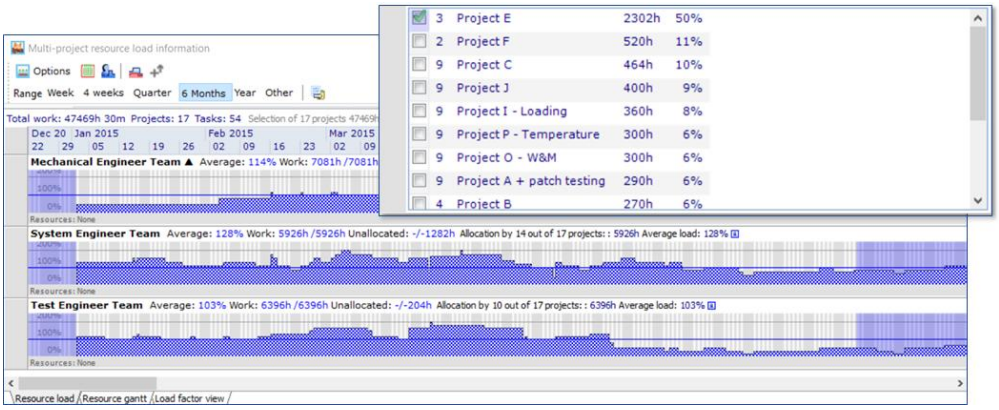
If this new scenario is adopted, the new start and/or end dates for each project can be confirmed easily in LYNX. These dates can also be communicated to the "Project Stakeholders" as an "outlook" regarding how long a project is likely to be postponed and by when it is likely to be completed.

Development of additional scenarios

LYNX has many features for additional analysis to help developing multiple scenarios. For example:

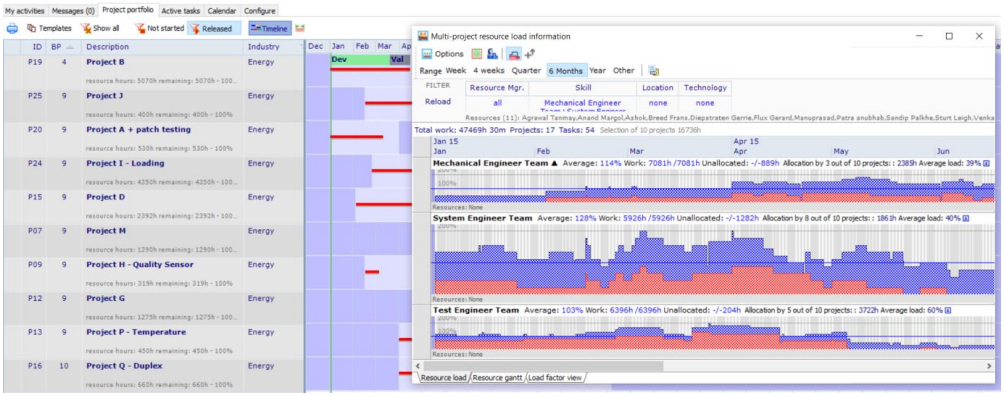
- Overview of which projects is consuming most capacity for the constraint team
- Which industry is demanding most of the capacity of the constraint team
- What-ifs, for example through varying the relative business priority of projects

Overview of Projects consuming most Capacity by Team



Project E is clearly consuming most of the capacity of the System Engineer Team, during the next 6 months

Resource Load by Team and by Industry



The "Energy" Projects demand 40 % of the System Engineer Capacity

Step 4: Implement the preferred scenario

The implementation of the preferred WIP reduction scenario is in LYNX very easy. But obviously the biggest challenge is having stakeholders, management and/or customers accept the fact that some projects will be "frozen" for a certain period.
LYNX does provide a best possible outlook, which can be communicated to help acceptation process of the new project dates (if this project is to be frozen, by when is it expected to continue again and completed?)

Lynx supports focusing management attention on Virtual Drum:

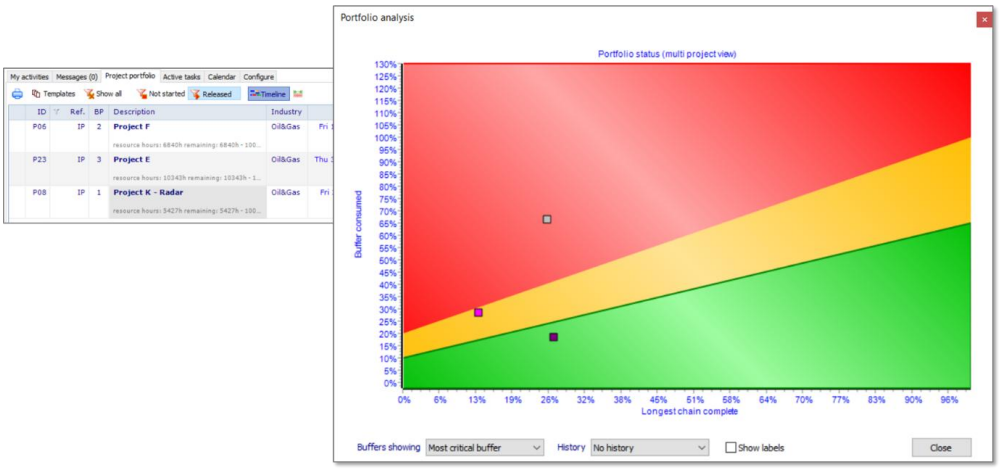
LYNX is focussing management attention on the Virtual Drum, through the following possibilities:

- Portfolio Gantt Chart view, with visualisation of Integration Phase and filtered by Integration phase
- Multi-Project Fever Chart showing projects in the Integration Phase only
- Task List showing (upcoming) activities in the Integration Phase, across all projects
- Load-analysis and Load-monitoring for the Virtual Drum by planning horizon
- LYNX Release Wizard for fitting in next projects, applying staggering by using the Virtual Drum

Projects in the Integration Phase in the Project Portfolio view

Integration Phase started for Project E and is about to start for Project F and Project K

Multi-Project Fever Chart with projects currently in the Integration Phase



The fever chart shows the buffer index for Project F, E and K

The figure below shows all (upcoming) activities in the Integration Phase, across all projects, allowing management to focus on completing the already started Integration Phases and ensuring the preparation for upcoming integration phases.

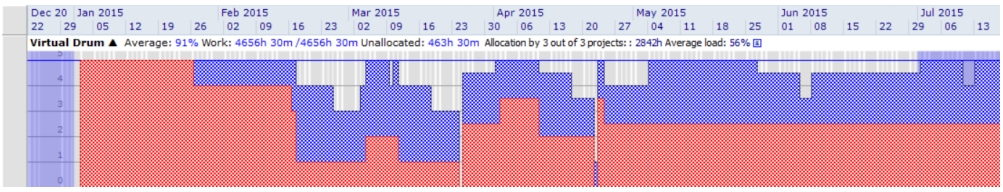
Integration Phase Pipeline

Description	Start date	RTS	Resources
Integration Phase P2	Mon 26 Jan 2015 9:00 [w5]	*Started*	Constraint / Virtual Drum [30 days, started]
Integration Phase P1	Mon 5 Jan 2015 9:00 [w2]	*Started*	Constraint / Virtual Drum [40 days, started]
Integration Phase P4	Mon 9 Mar 2015 9:00 [w11]	**No**	Constraint / Virtual Drum [35 days, started]
Integration Phase P3	Mon 23 Mar 2015 9:00 [w13]	**Yes**	Constraint / Virtual Drum [30 days, not started]
Integration Phase P5	Thu 30 Apr 2015 9:00 [w18]	**Yes**	Constraint / Virtual Drum [40 days, not started]
Integration Phase P6	Mon 4 May 2015 9:00 [w19]	No	Constraint / Virtual Drum [35 days, not started]
Integration Phase P7	Mon 14 Sep 2015 9:00 [w38]	No	Constraint / Virtual Drum [55 days, not started]

Activity list for the Integration phase incl. expected start dates to allow in time preparation for the Integration Phase

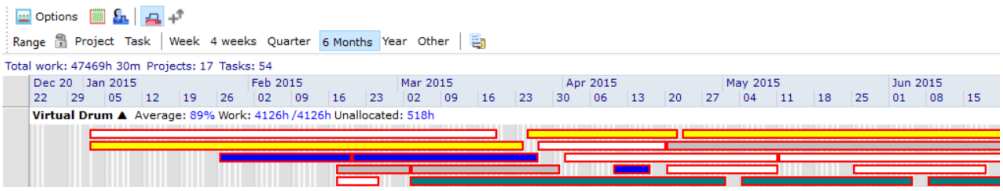
By monitoring the load on the Virtual Drum, management can easily detect whether capacity of the Virtual Drum is still sufficient.

Load-Monitoring on the Virtual Drum



In this example the Virtual Drum has a capacity of five. Five projects can be in the integration phase at the same time.

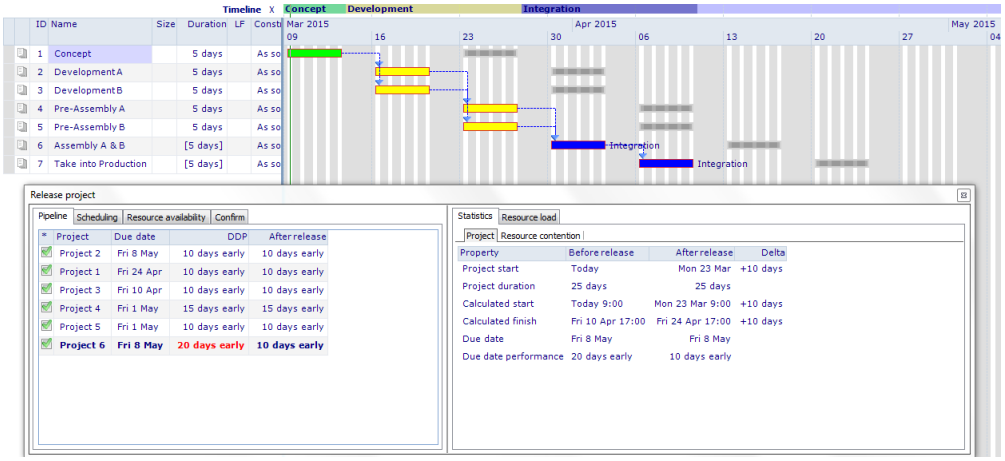
Virtual Drum Planning in Gantt format



Visual Presentation of Project activities in the Integration Phase. The number of projects in the Integration Phase can easily be counted (e.g. 5).

When fitting new projects into the pipeline, using the LYNX Release Wizard, the capacity of the Virtual Drum will be checked and new projects should start when the Virtual Drum has sufficient capacity.

LYNX Release Wizard for fitting next projects into the pipeline



The LYNX Release Wizard optimises the load on the Virtual Drum, and prevents overloading of the Virtual Drum. In this example Project 6 is added to the pipeline: LYNX proposes to move the project with 2 weeks, taking into account the current load on the Virtual Drum.

VISTEM Projects that Flow Chapter 20: Good Preparation

Good Preparation

Good preparation is a mandatory prerequisite for fast, smooth, and cost-effective project completion. This is why executive, resource, and project managers fundamentally agree: A project (or project phase) should only begin when it is fully prepared (the "**full kit**" is present). If as project starts before it is sufficiently prepared, there will be delays, processing loops, increased cost, unnecessary interruptions, and other problems.

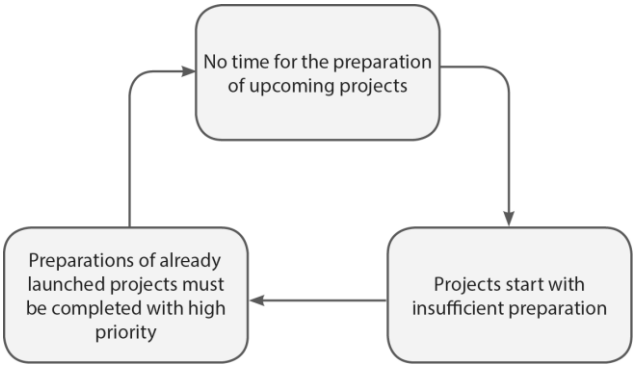
Short project run times are a mandatory requirement for high throughput in a multi-project organization. Missing or poor preparation leads to longer project run times. Therefore, a healthy multi-project organization must observe the following:

- Only projects where all preparations are complete (to the greatest possible extent) are launched.
- If preparations are incomplete, these are first completed; then the project is allowed to launch.

Despite a general consensus that projects should only be launched once they are fully prepared, this rule is violated almost constantly:
Delays and extra work caused by missing or poor preparation are some of the most prevalent undesired effects (negative symptoms) in the project business. Almost every single project in almost every multi-project organization suffers from this. Every manager working in a project environment can name countless examples of negative effects caused by poor preparation. In short, the intention to thoroughly prepare projects is repeatedly proclaimed, but is generally pure lip service.

Objective: Projects are only started once all preparations are complete.

Early start: The prevailing pressure to start projects ASAP often leads to projects being launched before all necessary preparations have been completed.
Race to catch up: Resources involved in project preparation forever seem to be playing catch up. Because projects launch before they are fully prepared, the missing preparations for these—already active—projects have to be completed with the highest priority. As a result, there is no time to make or complete (!) the preparations of upcoming projects—leading to yet more projects needing additional preparation after launch, and so on. A vicious circle:



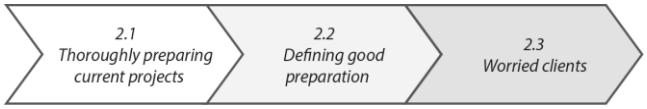
Missing preparation vicious circle

Time frame where no new project must be launched:
Thanks to the measures already taken, we have created the ideal circumstances:
During a short window of time, we will have free capacities specifically among the resources involved in project preparation.

The business will use this window of time where no new project must be launched to:

- complete the missing preparations for all active, frozen, and upcoming projects; and
- introduce a robust "full kit procedure" which ensures that in future a project will only be launched if it has been fully prepared.

The individual steps are described in detail in the book Projects that Flow:



Caution: Good preparation must not be misused to increase WIP.

LYNX full-kit procedures

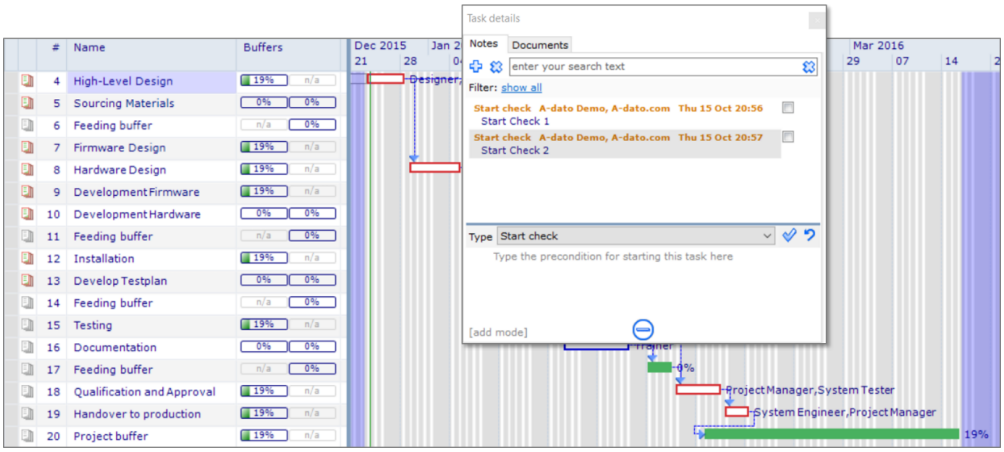
LYNX provides several possibilities to support standard or more customized full-kit procedures. The possibilities include:

- Possibility to define lists with conditions that must be met before a task is to be started , called "Start checks"
- Possibility to define lists with conditions that must be met before a task can be completed, called "End checks"

These checklists can also be defined together with a project template. At the moment a new project is created from a template, the default checklists are available as well.

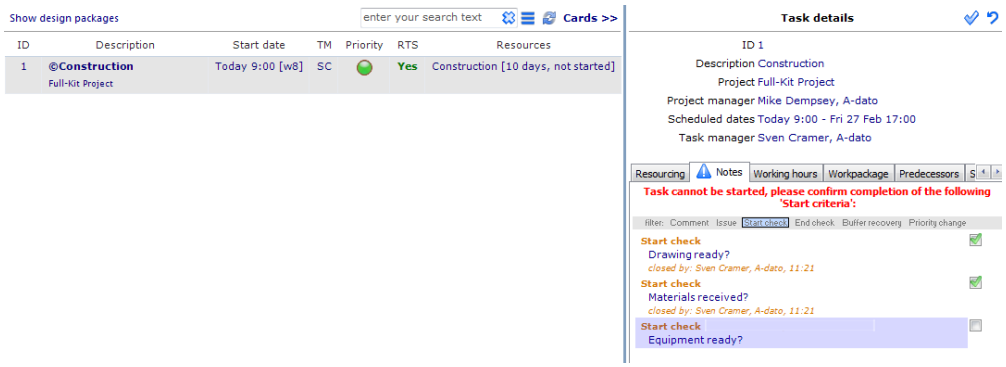
The checklist system prevents tasks are started that have insufficient preparation or that tasks are completed, which actually parts that are still missing.

Adding Start checks to a task



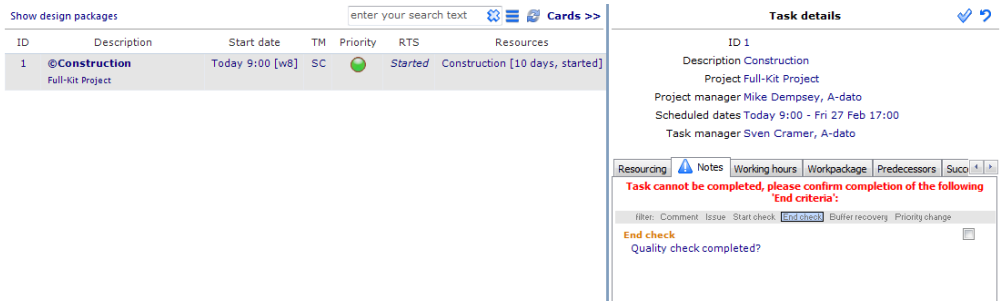
Task 4 "High-Level Design" has two Start checks defined. More Start checks (or End checks) can be added.

Confirmation of Start checks



The tasks manager is asked to confirm the Start checks before starting a task. Obviously the preferred procedure is to review upcoming tasks and ensure Start checks are met well in advance.

Confirmation of End checks



In order to complete task #1, the task manager is requested to confirm the pre-defined End checks.

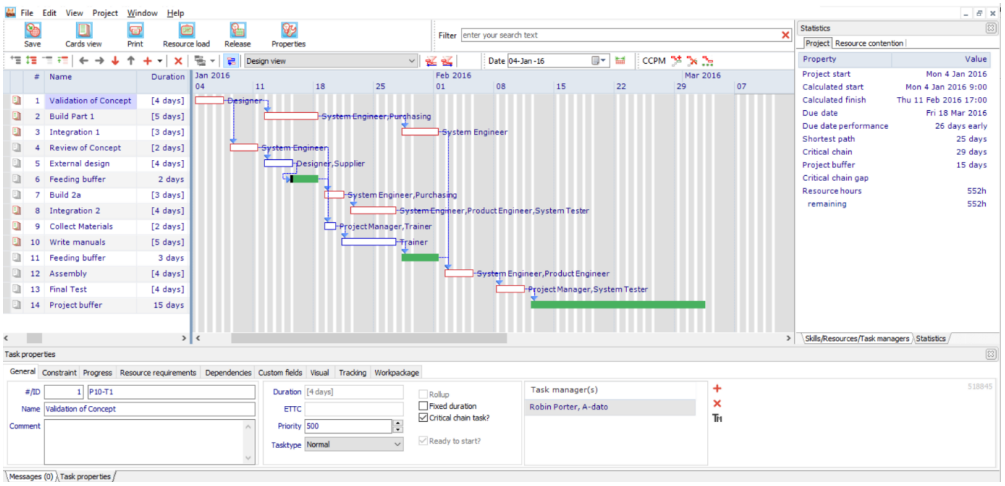
VISTEM Projects that Flow Chapter 21.1: Creating Project Network Plans

Plans are necessary: It is generally acknowledged that managing projects without formal planning is not or hardly doable. Without a project plan you have to improvise; misunderstandings and mistakes abound. No one knows which resource will be needed at what point or what needs to be completed before the next thing can be started. As a result, projects take longer and cost more than necessary. This is why project managers create a plan before the project launches which—based on the project targets—aims to answer the following questions:

- What needs to be done? What tasks and processes are necessary for this?
- What dependencies exist between these processes?
- Which resource is necessary to complete which task?
- How long does each task take? How long will the project take?

Objective: For each currently relevant project, there exists a sensibly detailed network plan suitable for good manageability.

LYNX Project Editor for creating a network plan



The LYNX Project Editor is an user-friendly and complete tool for creating network plans and applying the complete set of required CCPM controls, inserting project buffers, feeding buffers and task time reduction.

VISTEM Projects that Flow Chapter 21.1. Creating Network Plans

Templates: In most multi-project organizations, many projects tend to be variations of a few, generic projects. In such a case, it makes sense to create templates (generic project plans) and use them as the basis for planning specific projects. This has the following advantages:

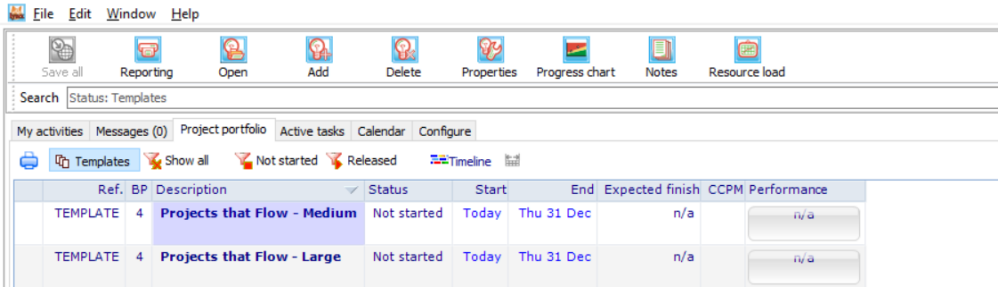
- Those involved in project planning save time and can concentrate on the specific needs of the project.
- Different project plans will use the same terms for similar tasks as well as having the same basic structure, making them easier to understand for everyone involved.
- If the templates use a reasonable level of detail—not too much and not too little—this helps avoiding too much detail in specific project plans too.

Additionally, project templates allow you to verify if a delivery deadline is feasible before the sales department gets back to the client. To do this, you simply test-input the template into the project pipeline instead of the specific project plan

LYNX template section

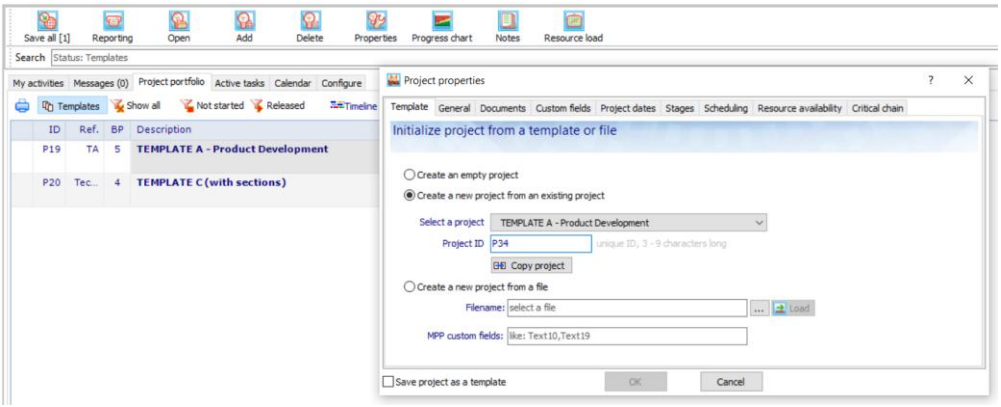
The Portfolio View in LYNX has a separate “Template” section, which holds the pre-defined Templates available for any project manager to select.
A new project can easily be created from a Template. This process is illustrated below.

Section “Templates” within the Project Portfolio view



A template for "large" and a template for "medium" size projects can be selected as a starting point for creating a new project.

Create a new project from a Template



Project P34 is created from Template A – Product Development

VISTEM

Projects that Flow

Chapter 21.2

Explicit Safety Buffers, Critical Chain

VISTEM Projects that Flow Chapter 21.2: Explicit Safety Buffers, Critical Chain

Resources: Most projects will need a specific type of resource (e.g., JAVA developer, electrical engineer) for several different tasks. Not taking the capacity of these resources into account and assuming that the same resource can process several tasks at the same time leads to unrealistic project plans and reinforces bad multitasking.

Safety buffers: Including safety buffers in the individual tasks unnecessarily extends the planned duration of a project without guaranteeing that it will be completed on time

Objective: The business uses project plans with explicit safety buffers and
without resource overlap within projects. In the technical jargon, these are called "Critical Chain Plans."

Work process: Extensive experience has shown that the following approach results in realistic project plans:

- All tasks in the plan are allocated the optimal number of employees; time estimates are adjusted accordingly. The upper limit of the optimal number of employees is set by the number of employees the business has in that particular resource group.
- Tasks in the project plan are arranged in such a way that resource conflicts are avoided (balance of resources).
- The Critical Chain (the longest chain, taking resources into account) is identified.
- The tasks on the Critical Chain are analyzed to determine whether a breakdown of tasks may further reduce the project duration. If so, tasks will be split accordingly.
- Steps (c) and (d) are repeated until the Critical Chain has been optimized.
- All time estimates, with no exception, are reduced by half. Using these reductions, project and supply chain buffers are created. (If there is excessive resistance against this 50% cut, it is still not permissible to compromise. Instead, it is preferable to increase the safety buffers.)

LYNX Tame Flow

Resource planning work process

LYNX supports the resource planning work process

First of all LYNX allows to optimize the resource availability by role (or skill) for the project and define the upper limit, specific for the project. Resource limitations may cause "resource dependencies" resulting in a longer Critical Chain. LYNX will automatically identify the "Critical Chain" based on the defined project network logic and possible resource dependencies.

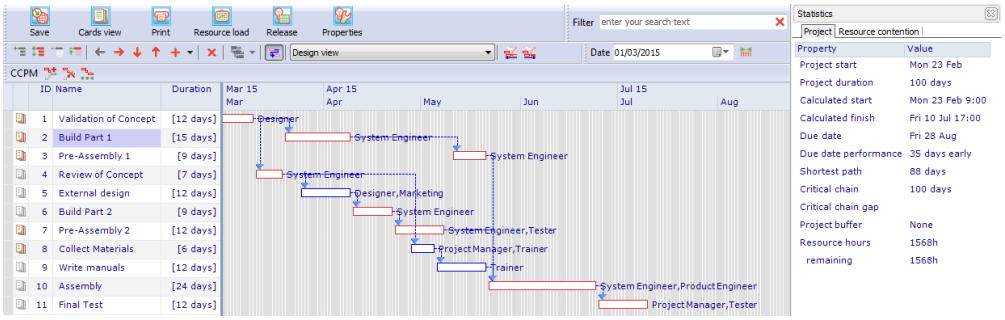
The questions that LYNX will answer are as follows:

- What is the longest chain (or Critical Chain)?
- Can the plan be made faster by adding more resources?
- Can the plan be made faster by a further breakdown of tasks on the Critical Chain?

Once these steps have been completed, the final step is reducing the estimates and inserting integration and project buffers.

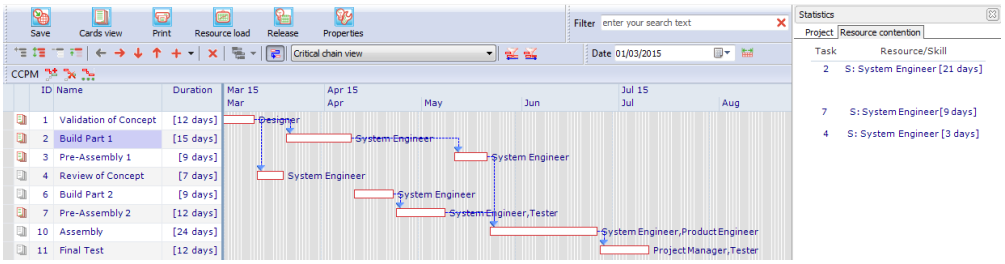
The steps and questions to be answered are illustrated in the example below, with an **initial** Critical Chain of 100 days.

Project Plan with a Critical Chain of 100 days



The Project Statistics shows a "Shortest Path" of 85 days and a "Critical Chain" of 100 days. This difference means resource contention exists between certain tasks.

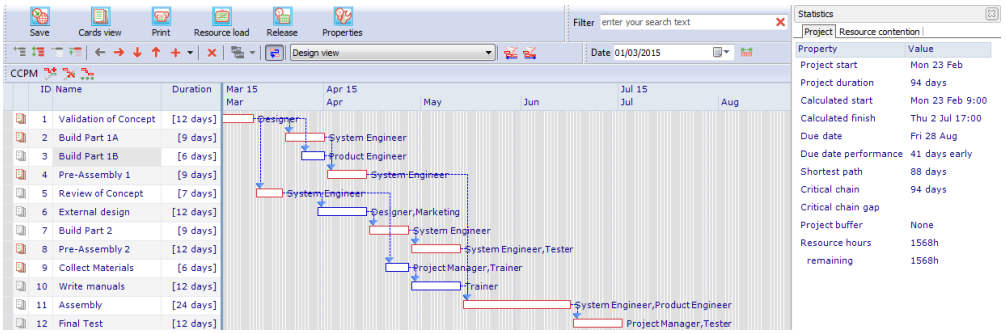
Filter by Critical Chain - Resource Contention



The Critical Chain is also the result of the resource contention on the "Skill" System Engineer of which the capacity is limited. For example task 2 and task 4 could technically be done in parallel, but since they need both System Engineer capacity, these tasks need to be scheduled sequential. If more System Engineer capacity would be made available, the plan will be faster. LYNX will show any resource contention under "Project Statistics", which is a very valuable tool to assess where to focus to make a project faster.

The next step is to determine whether a further breakdown of tasks may further reduce the project duration.

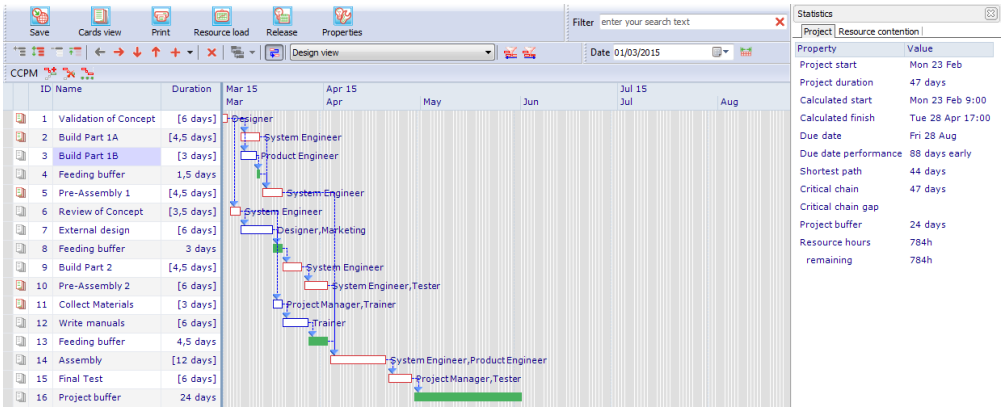
Making the 100 day plan 6 days faster by a further breakdown



The task "Build Part 1" has been split into two tasks (Part 1A and Part 1B). The task Build Part 1B can be done by another, non-critical skill. This allows to gain 6 days on the critical chain, which reduces the project duration to 94 days (see project statistics window).

The final step is the apply task-time reduction (optional) and adding the relevant buffers.

Finalising the Plan - Task time reduction and adding buffers



Through the "CCPM Dialogue" the estimates reduction can be set to 50 % (cut in half) and size of the buffers can be configured and also set at 50 % of the duration of the Critical Chain or Feeding Chains. In this example the resulting Project Buffer has a length of 24 days.

VISTEM Projects that Flow Chapter 22.5: Adjusting Speed

In Projects that Flow chapter 3.3. Staggering projects, the capacity of the virtual constraint (Virtual Drum) is defined, taking into account the already implemented improvements. Projects were then staggered according to the Virtual Drum and project launch dates were determined based on the staggering. Management has been ensuring since then that projects do not launch early.

The additional improvements achieved in Phase 4 (Projects that Flow, Chapter 22: Transforming Management) through

- Progress Reporting
- Task Management
- Project Management
- Top Management control

will soon lead to the Virtual Drum's actual capacity increasing even further. This will become obvious once more projects (per time unit) pass through the Virtual Drum than the schedule allows.

Of course, in the long term it is not possible to complete more projects—per time unit—than are launched. Example: Assuming the capacity of the Virtual Drum was set to an average of six projects/month in Step 3.3. Thanks to the improvements made in Phase 4, the actual completion rate is eight projects/month. But since there are still only six projects being launched per month, the rate will soon drop down to six projects/month. The business would be able to achieve more, but fails to do so by hanging on to the capacity and launch dates determined during Step 3.3. Therefore, unless it adjusts its planned capacity (frequently enough), the business will complete fewer projects than it actually could.

Objective: The Project Completion Rate increases further (reflecting the business's increasing performance).

If the business's performance improves but the rate of project launches is not increased, the number of projects waiting to enter the integration phase will drop. After a while the number of projects that are in the integration phase will (repeatedly) fall below the allowed rate.
Therefore, it is recommended to keep an eye on the number of projects waiting to enter the integration phase and those in the integration phase. If the amount of projects in the Virtual Drum repeatedly sinks below the

amount allowed, the scheduled durations of tasks in the integration phase must be shortened accordingly. (Of course, the opposite can also occur.)

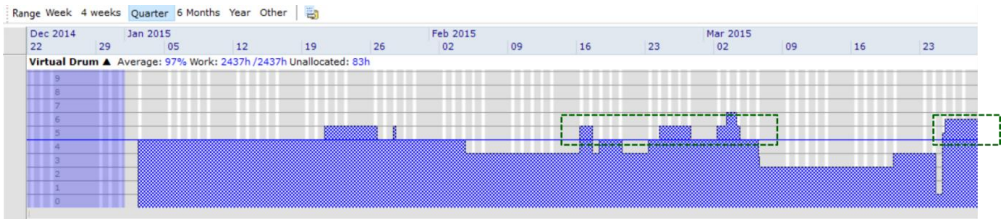
The business constantly monitors the number of projects before and in the integration phase and regularly adjusts the rate of the Virtual Drum to reflect this.

LYNX Pipeline Planning and Simulation

LYNX allows management to continuously monitor the rate or load on the Virtual Drum and review the effect of changes in the size of the Virtual Drum through simulation (LYNX Pipeline Planning and Simulation).
The tools provide include:

- Monitoring the Load on the Virtual Drum
- Monitoring the Virtual Drum "Queue" and Flow Trend

Monitoring the load on the Virtual Drum



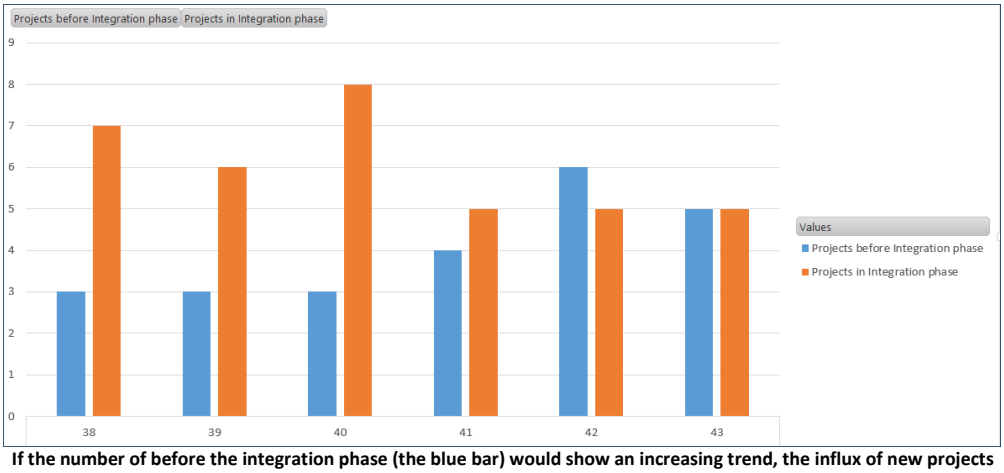
The Virtual Drum has a capacity of 5. Due to delays, but possibly also to early completions there is some overload of the Virtual Drum from end of February. However there is some unused capacity as well from 9th of March and the overall load during the planning horizon is not exceeding the 100 %.

Projects in the Integration Phase

Description	Start date	RTS	Resources
Integration Phase P2	Mon 26 Jan 2015 9:00 [w5]	*Started*	Constraint / Virtual Drum [30 days, started]
Integration Phase P1	Mon 5 Jan 2015 9:00 [w2]	*Started*	Constraint / Virtual Drum [40 days, started]
Integration Phase P4	Mon 9 Mar 2015 9:00 [w11]	**No**	Constraint / Virtual Drum [35 days, started]
Integration Phase P3	Mon 23 Mar 2015 9:00 [w13]	**Yes**	Constraint / Virtual Drum [30 days, not started]
Integration Phase P5	Thu 30 Apr 2015 9:00 [w18]	**Yes**	Constraint / Virtual Drum [40 days, not started]
Integration Phase P6	Mon 4 May 2015 9:00 [w19]	No	Constraint / Virtual Drum [35 days, not started]
Integration Phase P7	Mon 14 Sep 2015 9:00 [w38]	No	Constraint / Virtual Drum [55 days, not started]

For Project P1 and P2 the Integration Phase has started. Project P3 and P5 are waiting for the start of their Integration Phase.

Monitoring the Flow Trend for the Integration Phase



If the number of before the integration phase (the blue bar) would show an increasing trend, the influx of new projects (WIP) may need to be reduced by lowering the capacity of the Virtual Drum. Another approach is to find ways to increase the capacity of the Virtual Drum (corresponding with the Integration phase) as a solution to absorb an increasing queue of projects waiting for entering the integration phase.

VISTEM Projects that Flow Chapter 23.1: Mitigating and reducing harmful client influences

Even if—or especially if—a project is of particular importance for a client, there will always be situations where necessary supplies are not provided on time.

Another frequent reason for delays caused by the client are change requests. The project being very important, the client wants to ensure that it will match their requirements (or those of their own clients) as closely as possible. So it is only natural that there will be change requests.

But with late delivery of supplies as well as with change requests, the client is delaying the project, with negative consequences for all involved. Businesses may no longer be able to deliver within deadline, incurring contractual penalties, and risking their reputation
as an absolutely reliable supplier, while at the same time jeopardizing further projects that receive the necessary supplies too late. The client receives their delivery later than agreed, which may threaten the timely completion of their project—often with nefarious consequences.

Objective: The business remains exceptionally reliable, even if client input
is necessary or change requests about specifications occur.

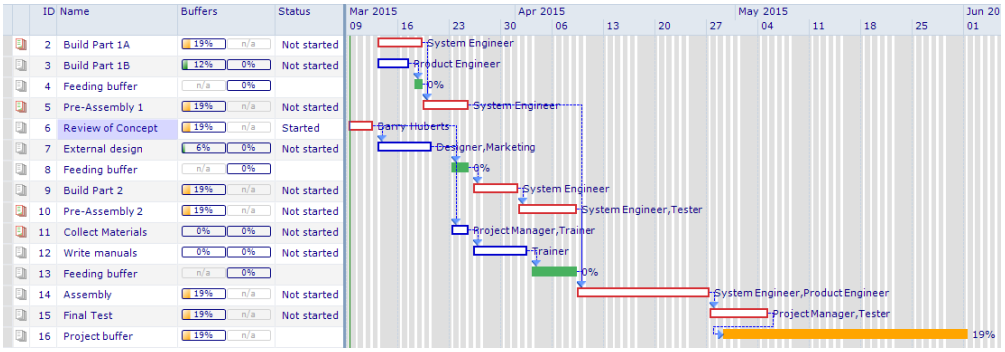
By applying ProjectsFlow(R), you can now easily identify which input delays and which change requests are actually causing a project to be late. You will be able to clearly see how the client's action impacts the project's critical chain.

LYNX supports Delay Impact Analysis

If a delay affects a task(s) on the Critical Chain (or the Current longest chain) it will directly impact the duration of the project.

If a delay "only" impacts a task(s) on a feeding chain this delay may not have any impact on the overall project duration, as long as the available space between the critical chain and the feeding chain concerned is larger than the size of the delay.

Delay impact analysis.



Task 3 "Build Part 1B" has less space (12 % buffer consumption) compared with task 11 (0 % buffer consumption). A delay on any task can easily be simulated, by applying the new expected duration. LYNX will immediately show the impact in the form of higher buffer consumptions.

Part 2

CCPM Software requirements

Part 2 consists of a list of functionalities which VISTEM considers as

(1) important
(2) nice to have
(3) Would be good if there was an option to switch it off

This list has been gathered through our extensive experience in the field of managing projects using CCPM software and improving business performance. It needs to be noted that CCPM is not simply about which software tool is used it is also about focusing management attention as described in the book 'Projects that Flow' by Uwe Techt.

1) Does LYNX have the following important options/functionalities?

A simple calendar for all. Only hours per day are entered, no individual calendars per person.	Yes
Backward scheduling (alap): processes which are not linked are not moved to the front, they will be moved backwards	Yes
The critical chain is calculated automatically. Parameters such as reduction percentage and buffer percentage can be adjusted individually.	Yes
The project plan clearly indicates project buffers and feeding buffers.	Yes
It is clearly visible who is responsible for a process/task/project	Yes
Delegation of task management is possible, for example during planning phase resource manager	Yes
Tasklists are printable for each division, task team or skill (including the three variants described above in WIP reduction)	Yes
Simple daily feedback of the remaining duration of processes, tasklists and project plan are updated in real time or overnight.	Yes
Feedback is provided per process (task) not per skill within each process.	Yes
Feedback is not provided for processes (tasks) which have not started yet.	Yes
It is possible to simply enter reasons for delays/hold-ups from a pre-defined list including a fully editable text field.	Yes
Operational priorities are calculated automatically based on buffer consumption/project progress (as described above "Identifying tactical priorities")	Yes
The fever chart of the portfolio can display the history as well is able to capture and display the history of the current progress and buffer consumption every day, draw the fever curve based on the history LCC/BC values on weekly base, calculate current progress of feeding chains and feeding buffer consumption similar to LCC/BC but for feeding chains, show the current “most penetrating task” and show the current “most penetrating chain” within a list underneath the diagram of the fever chart.	Yes
Flow trend as well as Continuous Flow trend	Yes
Task completion rate	Yes
Project completion rate	Yes
Average throughput time	Yes
Reliability (measured in flowrate throughput/Euro/days)	Yes
List of processes (tasks) with the least buffer consumption progress during past 7 days	Yes
The Inter-project buffer is shown in % (very important!)	Yes
Automatic pipelining is possible: for example (default) Virtual Drum to the next available position when a delivery date is entered and manual adjusting is possible through pipeline manager.	Yes

The Pipeline manager has the option to explicitly "Start the project"	Yes
Milestone buffer: A buffer before a milestone with a fixed date. This milestone can be part of the critical chain, which means the project is unable to progress before this date. This milestone could also be outside of the critical chain, which means it is crucial that the fixed date of the milestone is met. If the time target is met before it is due the project continues.	Yes
Fast scenario (trade-off) decision preparation, "what if" scenarios and looking at consequences: For example a simulation which demonstrates what happens if user changes the priority of a project by means of a drag-and-drop functionality of moving projects. Option to accept new pipeline or go back to previous one. Further, a what if scenario if capacity of Virtual Drum will increase / decrease by X percent. Software does: Accept Increase / decrease of Virtual Drum Capacity, rearranges the other projects, shows warnings if required due dates cannot be met due to priority-change (part of the buffer which is behind the required due date will turn RED), offers the option to save / accept pipeline or going back to previous one.	Yes

2) Does LYNX have the following "nice to have" options/functionalities?

Access Management for Users/Roles - each role has its own default view (for example the task manager will see his own tasklist upon launching the software. The roles which would benefit from this: Task-, Project and Resource managers, Admin, each of them have different reading and/or viewing rights.	Yes
Export of all project data in a simple data format including all keys and foreign keys in order to easily import them into other databases or spreadsheets.	Yes
Skills (Virtual Drum as well) can be specified with a simple capacity entry (1, 2, 3 ... %) including person accountable.	Yes
The range of the feverchart colours are editable (red, yellow, green).	Yes
The planning tool has simple standard features, for example relationships/links must not be lost during planning and execution and are always shown visually.	Yes
Allocation of skills is possible, including the skill "Virtual Drum" or an alternative way to highlight the staggering phase for pipelining.	Yes
Error messages are displayed when syntactic errors occur for example when creating a project plan (plan logic errors, missing links, missing Task manager, skills etc.).	Yes
Conditions of Satisfaction (COS) are defined (original condition and terminating condition).	Yes
Each process has a field for notes but notes are not displayed in the tasklist.	Yes
Printable list of issues for each project including status with a ranking according to buffer consumption. With this feature the question is answered: Which three processes have used up the most buffer during the last 7 days.	Yes
Printable list of projects and tasks which are in the Virtual Drum simultaneously and a printable list of active tasks which are currently on the critical chain.	Yes
Providing Feedback and how well this is executed can be analysed.	Yes
During planning the Virtual Drum is displayed in a differentiated way (Pipeline modus).	Yes
Teams and Skills can be selected in order to be displayed next/underneath the pipelining screen.	Yes
Skills are displayed according to workload/capacity in a range from top to bottom, the Virtual Drum is always on top.	Yes
Escalation, if remaining duration is not reported or if RDU trend is in wrong direction: Daily the task manager does the following: for each "in process" Task he has to give an estimation how many more days the task will need to be completed. If he gives "0", the task is completed, if he starts a new task, he has to give an estimation how many days the task will need to be completed, if a task needs more time than expected the task manager has to select a reason from a predefined list of reasons. There should be warning message to a pre-definable email address (the task managers line manager) if he does not report the remaining duration.	Yes (Email workflow to be customised)

3) Does LYNX provide the option to switch off the following functionalities?

Individual calendars	YES
Fixed duration tasks/projects which cannot be shortened will be considered partly in the buffer	YES
Time recording	YES

VISTEM GmbH & Co. KG
Von-Siemens-Straße 1
64646 Heppenheim
Germany

E-Mail: info@vistem.eu
Phone: +49 6252 795307-0
Fax: +49 6252 699079-9

www.vistem.eu

A-dato B.V.
Houtsingel 5
2719 EA, Zoetermeer
The Netherlands

E-mail: info@a-dato.com
Phone: +31 756409222

www.a-dato.com