Managing Projects with openSE

Part 5 focusing on Project Control and Follow-up

CERN | EN ENGINEERING DEPARTMENT

Pierre Bonnal

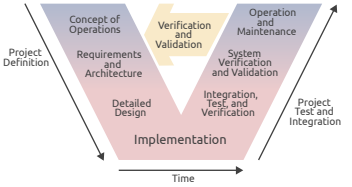
version **1.0**

Why?

1. to set a reference
2. to assess uncertainties
3. **to follow up progress**

Project Control and Follow-up

"Project triangle"



Verification
vs.
Validation

PERFORMANCE
QUALITY

Project Requirements

tangible
Deliverables

Physical Progress
(a.k.a. Earned Value)

COST

Project Budget

Actual Costs
vs. Budgeted Costs

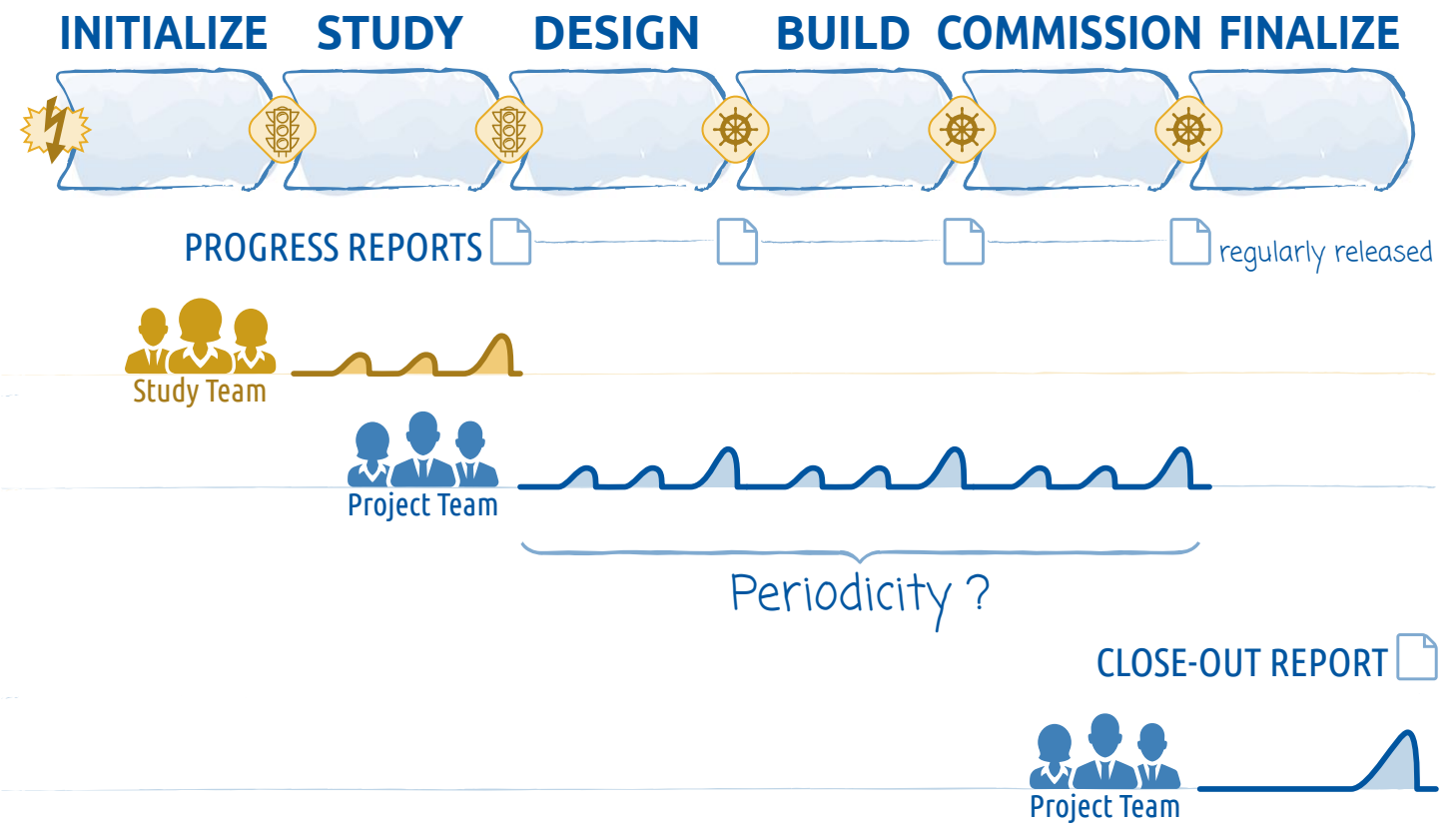
TIME

Project Schedule

Actual Dates
vs. Planned dates

Project Control and Follow-up

When and which effort?



Project Control and Follow-up with openSE

3 levels of implementation

The preferred project control and follow-up approach shall be defined in the Project Management Plan

Project Control and Follow-up

The ‘basic toolbox’

SIMPLE approach

Progress Status

Progress Reviews

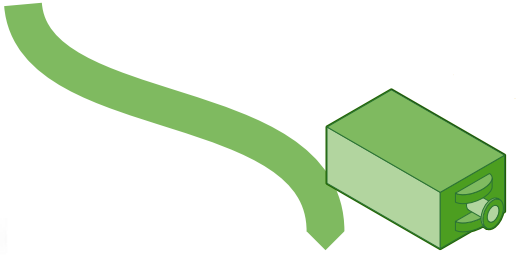
1. **Major achievements** (as bullet points)
2. **Problems encountered**
3. **Cost and schedule statuses**
   - 3.1 Cost status
     Table (actuals vs. budgeted)
   - 3.2 Schedule status
     Milestone Trend Chart
     (**gdpm Milestone Plan**)
   - 3.3 Physical progress status
     Dashboard
4. **Work laying ahead** (as bullet points)
5. **Risk Register update** (limited to changes)

Project Costing

3 types of **resources**

Manpower
(project participants)
[workload currency]

Financial
resources
[monetary cur.]



In-kind
contributions
[various cur.]

planned	manpower budget	financial budget	agreement figures
actuals	**time spent**	**expenses**	(= planned)
data	**timesheeting system** ⚠	**accounting books** ✓	∅

At CERN Project Costing

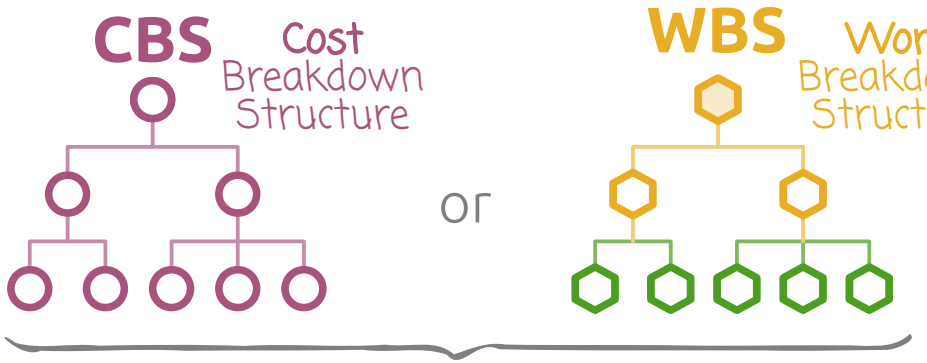
3 types of **resources**

	Manpower (project participants) [workload currency]	**Financial** resources [monetary cur.]	**In-kind** contributions [various cur.]
planned	manpower budget	financial budget	agreement figures
actuals	(**= planned**)	**expenses**	(= planned)
data	Ø	**accounting books** ✓	Ø

Project Control and Follow-up

3.1 Cost status → **Cost Control Table**

SIMPLE approach



Cost Control
speadsheet

BREAKDOWN	BUDGETED	COMMITTED	INVOICED	PAID

9.1

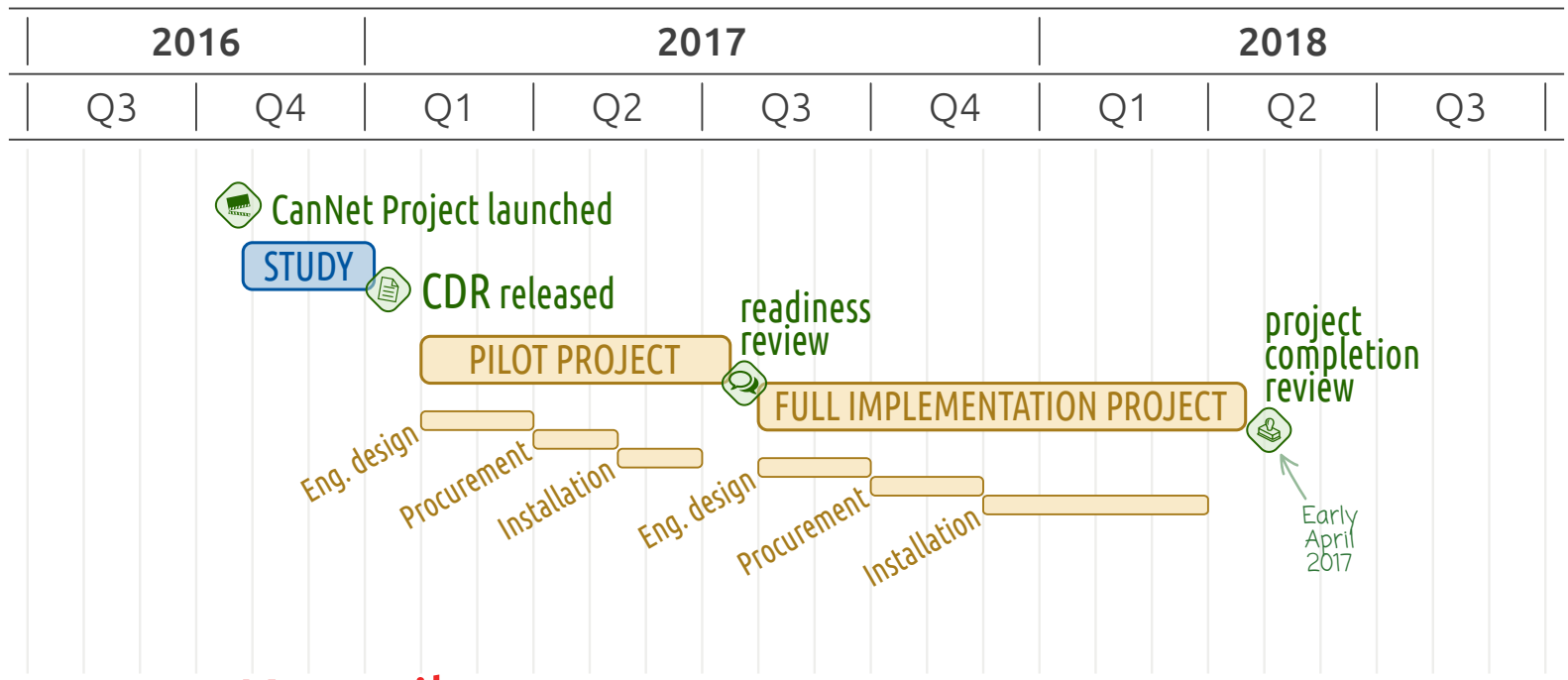
Milestone Trend Chart

openSE

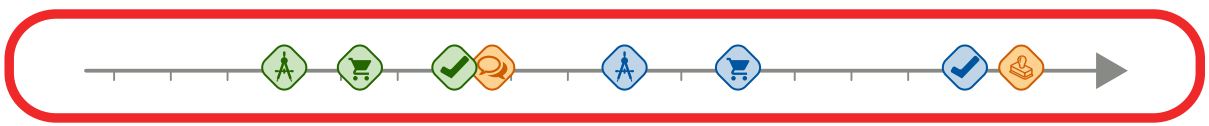
Project Control and Follow-up

3.2 Schedule status → Milestone Trend Chart

SIMPLE approach

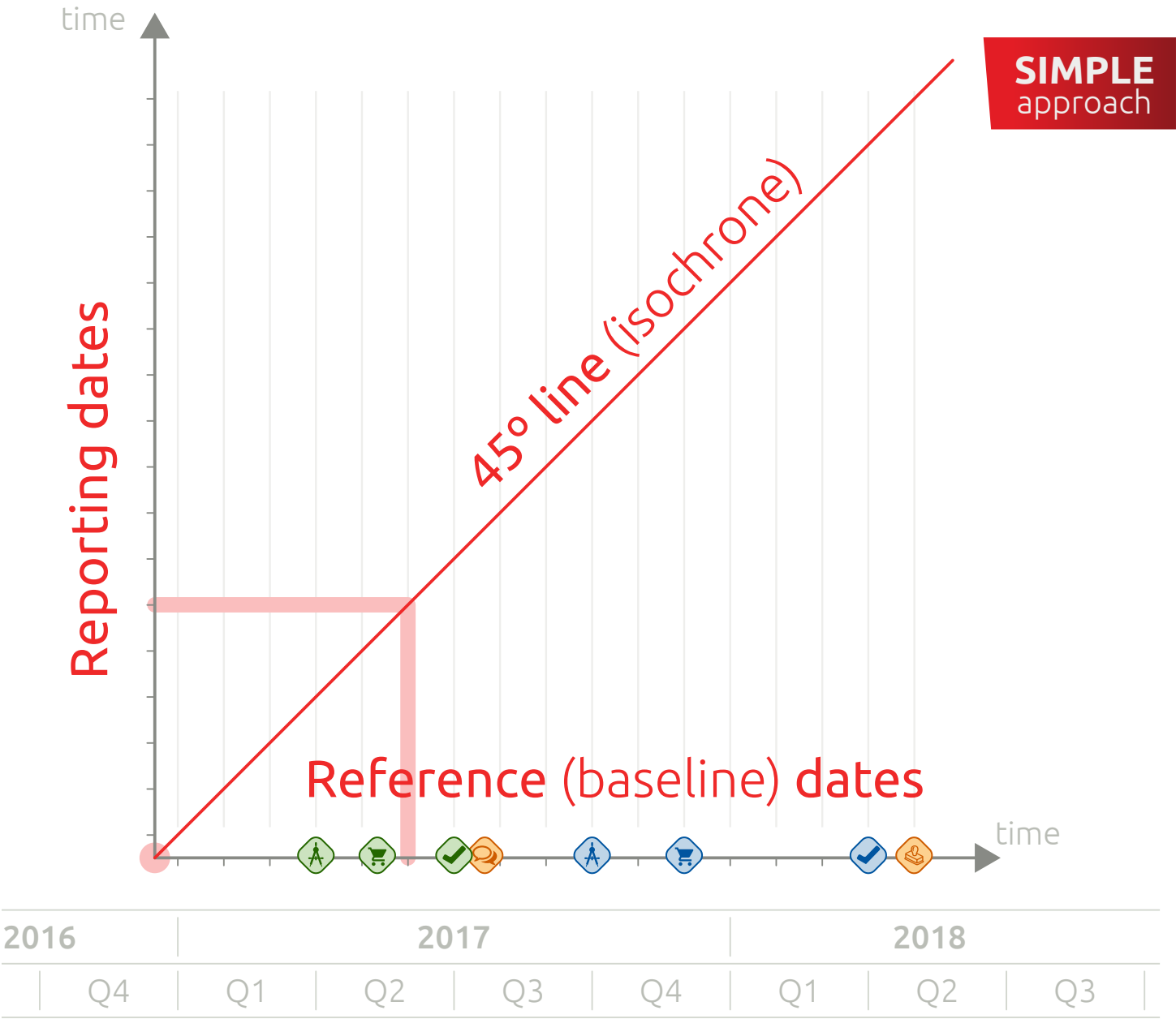


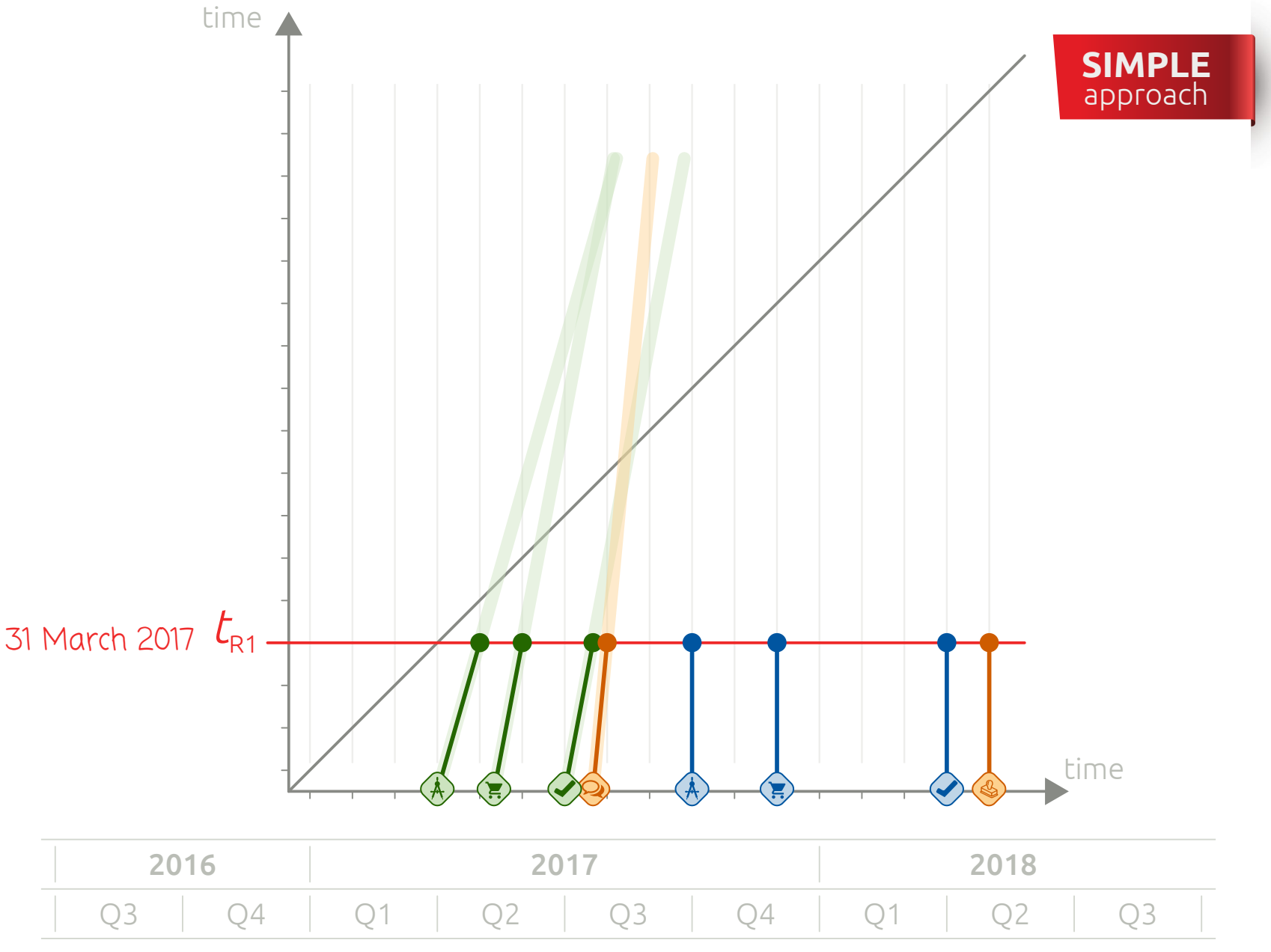
Key milestones

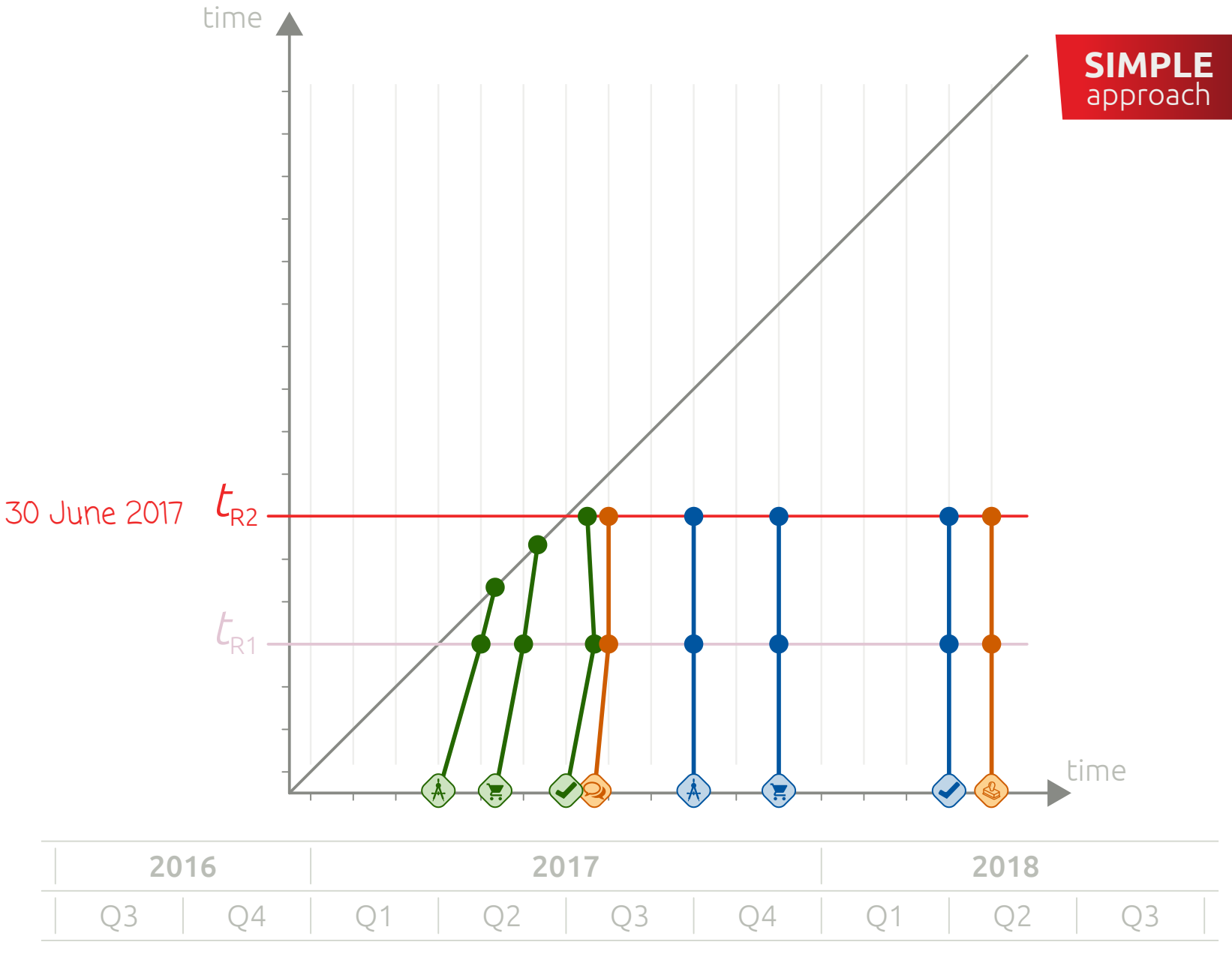


Project Control and Follow-up

3.2 Schedule status → **Milestone Trend Chart**




time
SIMPLE
approach
31 March 2017
t_{R1}
time
2016
2017
2018
Q3
Q4
Q1
Q2
Q3
Q4
Q1
Q2
Q3


time
SIMPLE
approach
30 June 2017
t_{R2}
t_{R1}
time
2016
2017
2018
Q3
Q4
Q1
Q2
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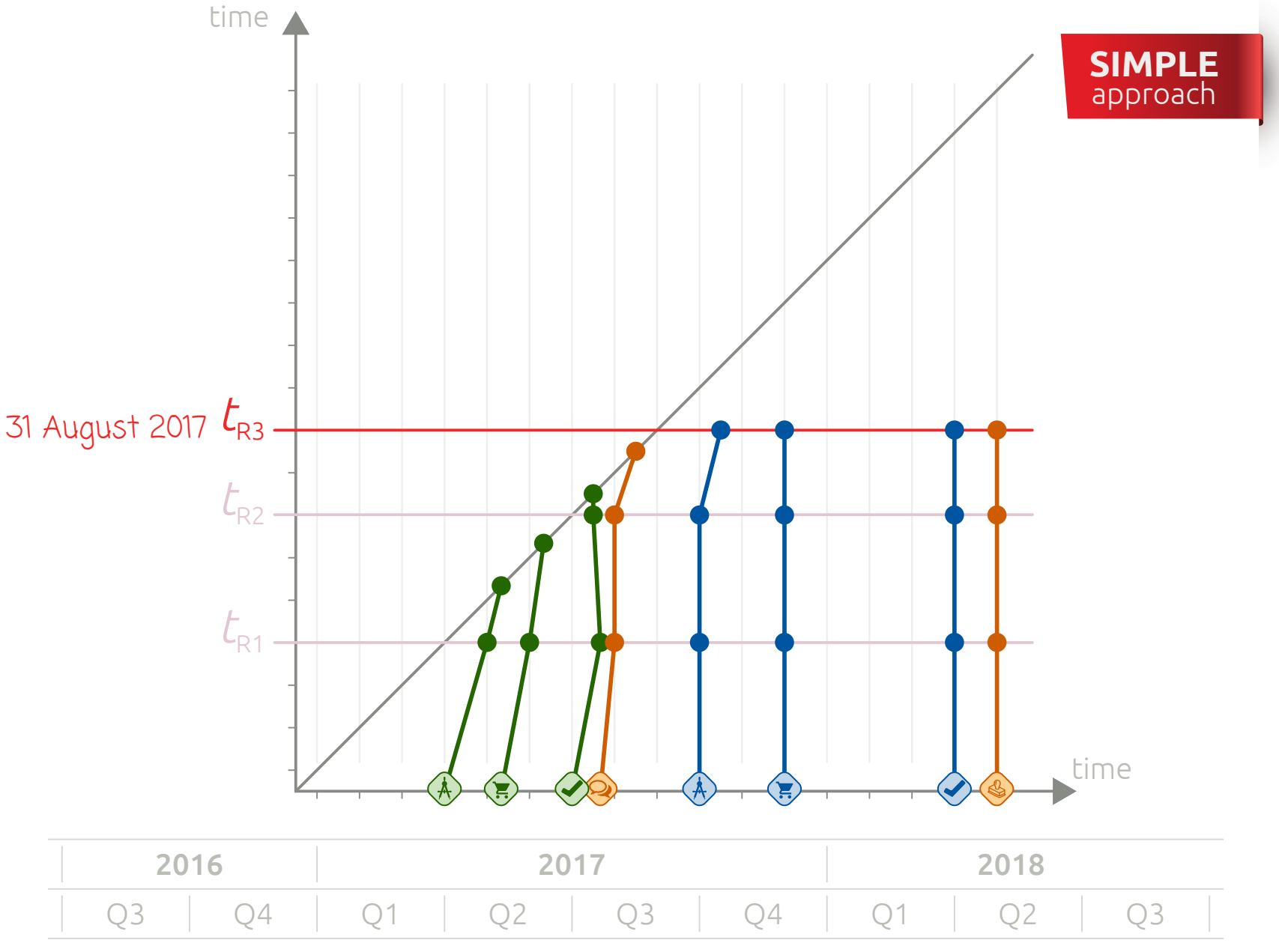
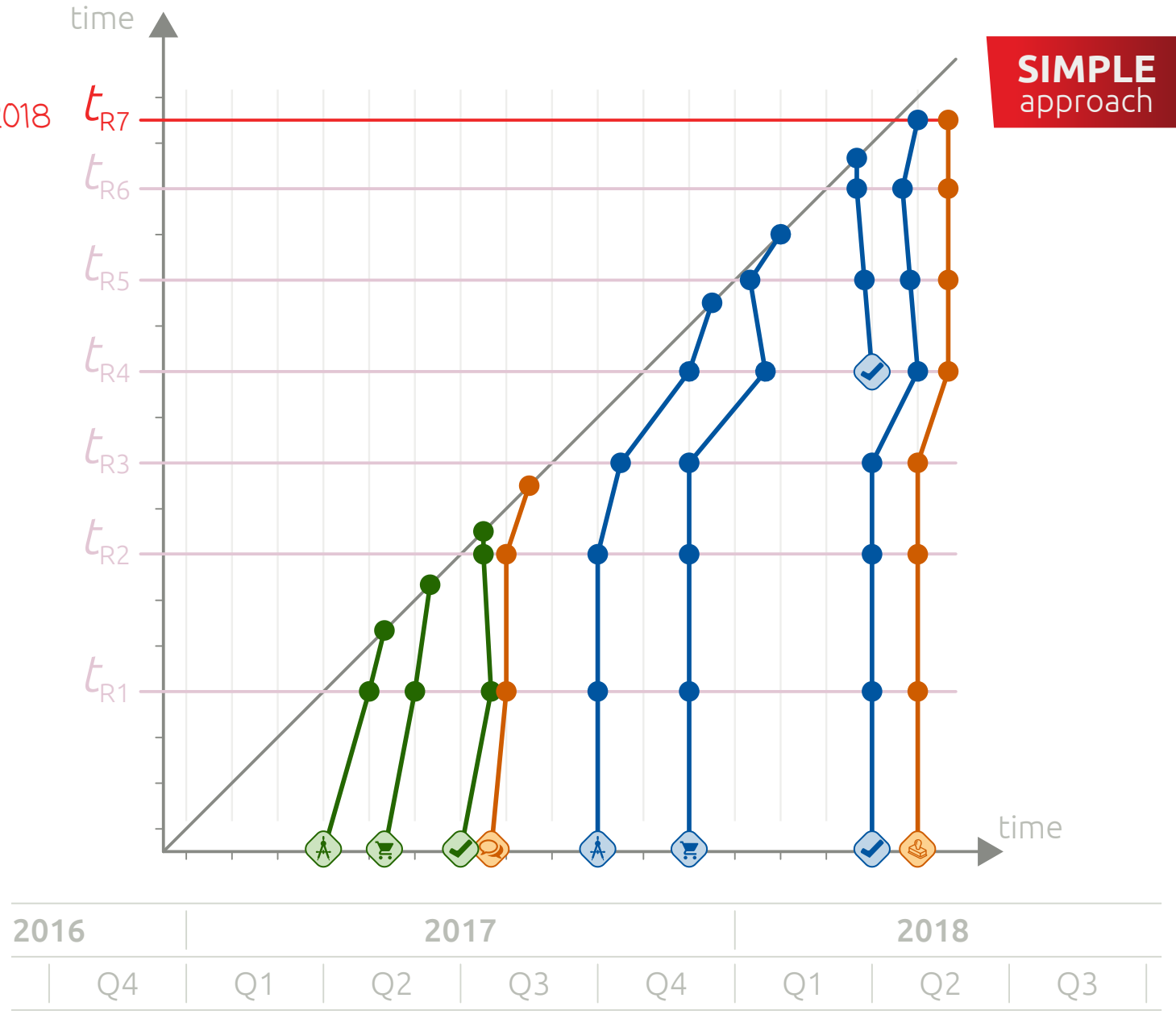
Q4
Q1
Q2
Q3


time
SIMPLE
approach
31 August 2017
t_{R3}
t_{R2}
t_{R1}
time
2016
2017
2018
Q3
Q4
Q1
Q2
Q3
Q4
Q1
Q2
Q3

Project Control and Follow-up

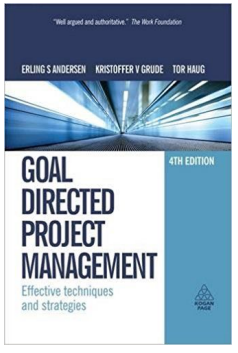
3.2 Schedule status → Milestone Trend Chart

SIMPLE approach



9.1.alt

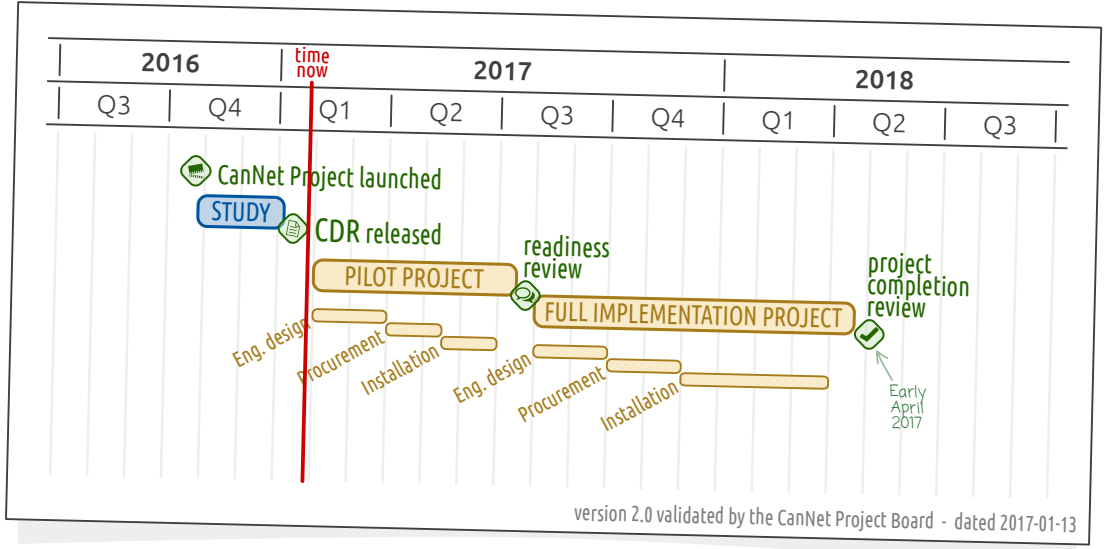
gdpm Milestone Plan



Project Control and Follow-up

3.2 Schedule status
Milestone Plan

© gdpm

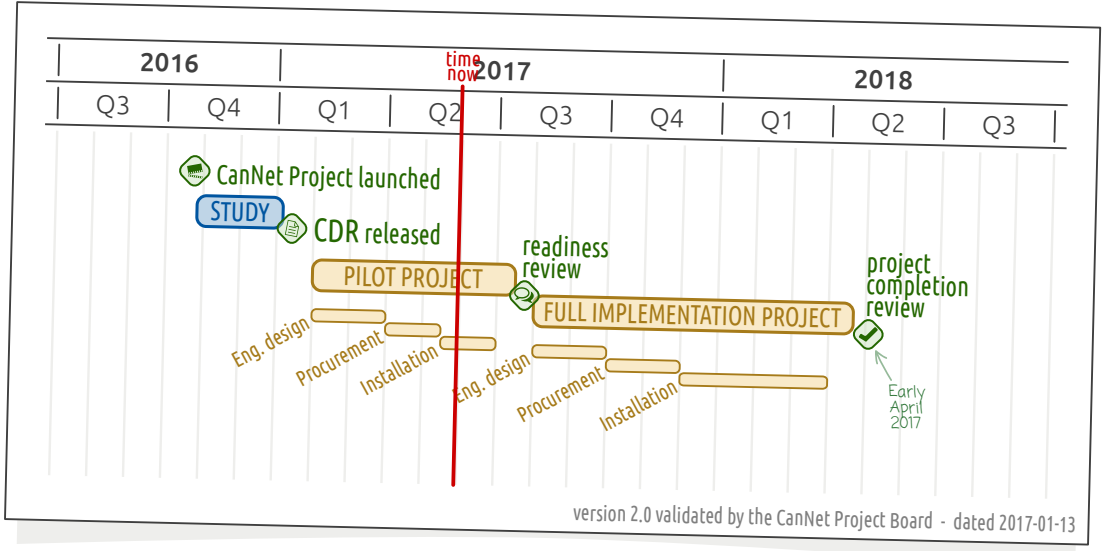


DATE	Project Board	Eng. Team	Proc. Team	Site Activities	MILESTONE DESCRIPTION
31.01	PPL				When the CanNet Pilot Project is formally launched by the Project Board
31.03		Eng			When the engineering design tasks of the Pilot Project are completed
15.05			Proc		When the procurement contract is signed
30.06				Inst	When the installation and commissioning works for the three tanks are completed
15.07	PPR				When the CanNet Project Readiness Review is held
31.10		Eng2			When the engineering design tasks of the Full Implementation Project are completed

Project Control and Follow-up

3.2 Schedule status
Milestone Plan

© gdpm



31.05.2017

DATE	Board	Eng. Team	Proc. Team	Site Activities	MILESTONE DESCRIPTION
31.01	PPL				When the CanNet Pilot Project is formally launched by the Project Board
31.03		Eng			When the engineering design tasks of the Pilot Project are completed
15.05			Proc		When the procurement contract is signed
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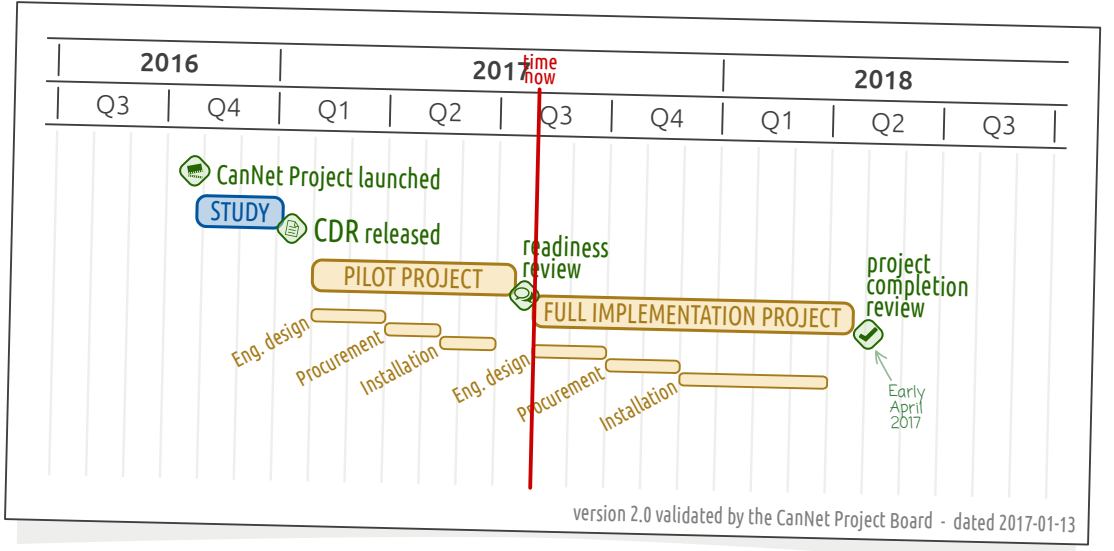
15.07	PPR				When the CanNet Project Readiness Review is held
31.10		Eng2			When the engineering design tasks of the Full Implementation Project are completed

Project Control and Follow-up

3.2 Schedule status
Milestone Plan

© gdpm



31.07.2017

DATE	Board	Eng. Team	Proc. Team	Site Activities	MILESTONE DESCRIPTION
31.01	PPL				When tl launche mally
31.03		Eng			When tl Pilot Pr of the
15.05			Proc		When tl gned
30.06				Inst	When tl works fo ning ted
15.07	PPR				When the CanNet Project Readiness Review is held
31.10		Eng2			When the engineering design tasks of the Full Implementation Project are completed

Planned
On-going
Completed
Late
Critical

9.2

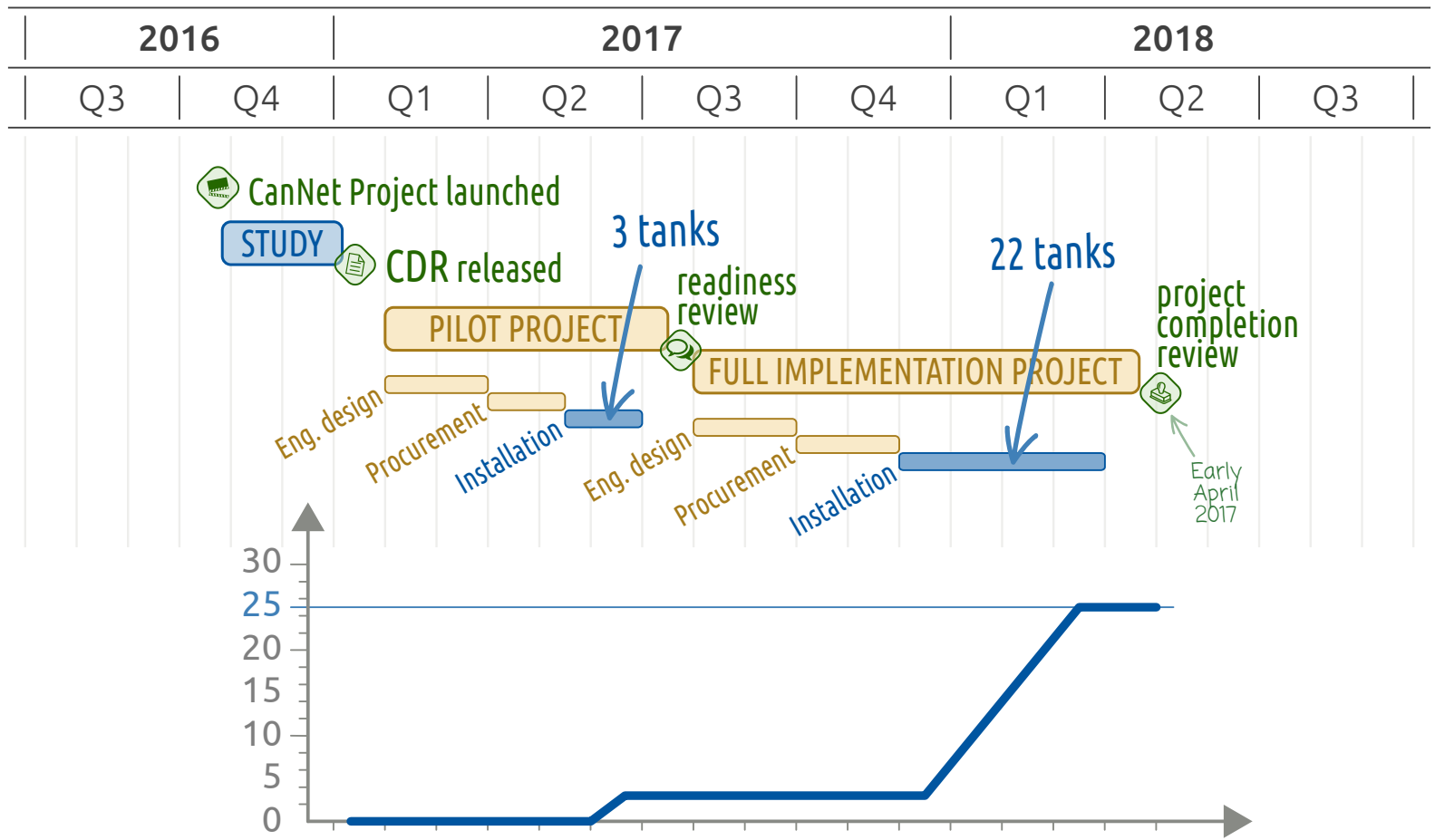
Progress Dashboard

openSE

Project Control and Follow-up

3.3 Physical progress status ⇢ **Dashboard**

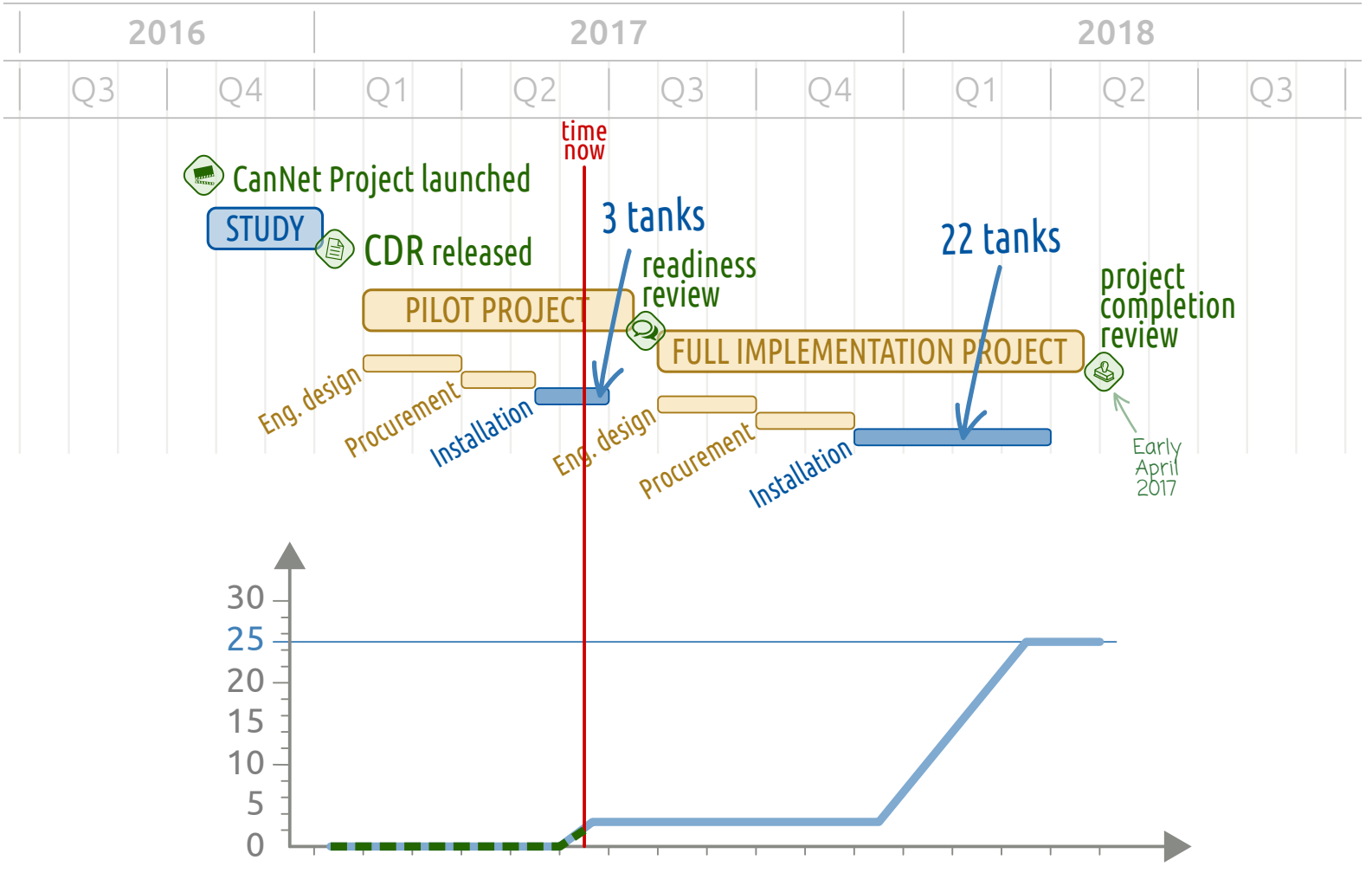
SIMPLE approach



Project Control and Follow-up

3.3 Physical progress status ⇢ **Dashboard**

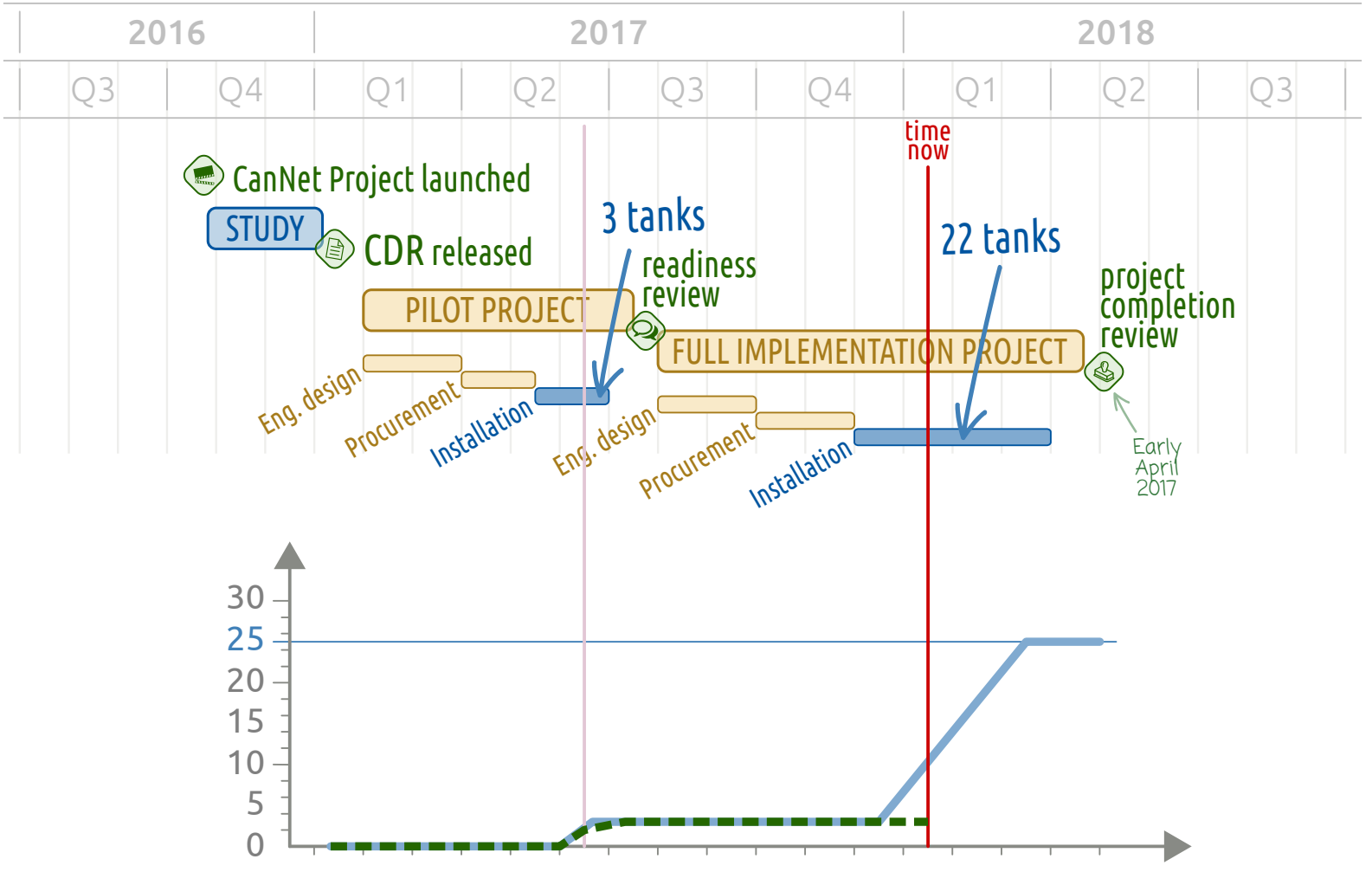
SIMPLE approach



Project Control and Follow-up

3.3 Physical progress status ⇢ **Dashboard**

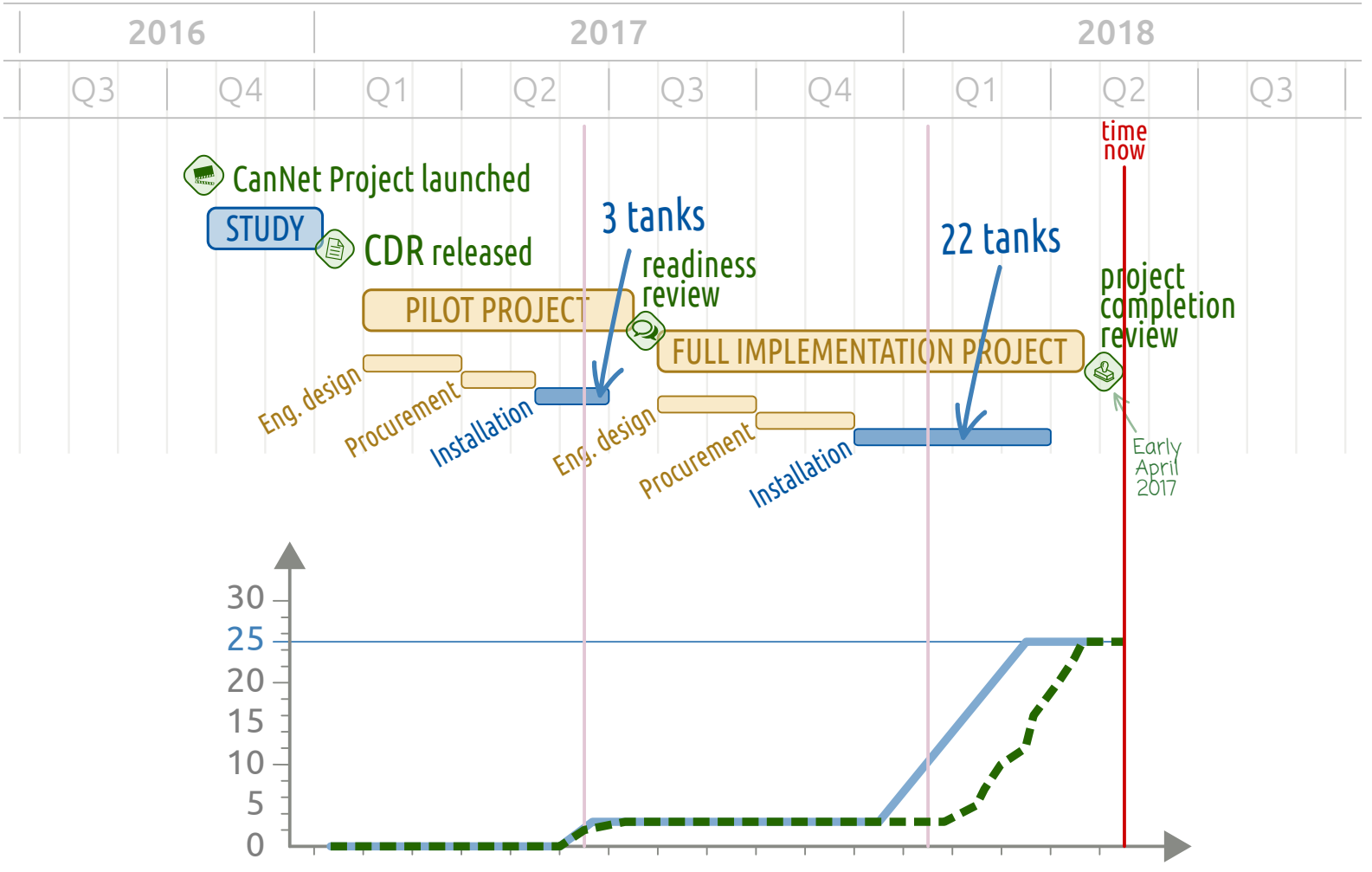
SIMPLE approach



Project Control and Follow-up

3.3 Physical progress status ⇢ **Dashboard**

SIMPLE approach



Project Control and Follow-up

The ‘basic toolbox’

SIMPLE approach

INTERMEDIATE approach

ADVANCED approach

Close-out Report

1. **Rationale**
2. **Major Achievements**
3. **Risks and Issues**
4. **Cost and Schedule**
   - 4.1 Cost status
     Table (actuals vs. budgeted)
   - 4.2 Schedule status
     Milestone Trend Chart
   - 4.3 Physical progress status
     Dashboard
5. **Lessons Learned**

Project Control and Follow-up

The 'intermediate toolbox'

INTERMEDIATE approach

Progress Presentations

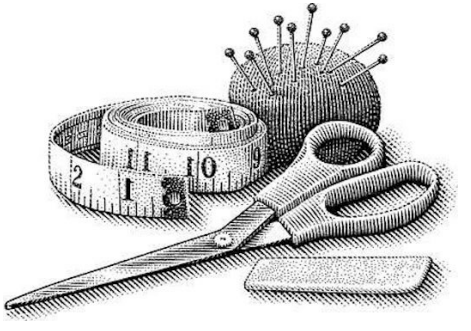
Progress Reports

Gantt Chart (coord. sched.)

EVM Data

Progress Reviews

Project Board



9.3

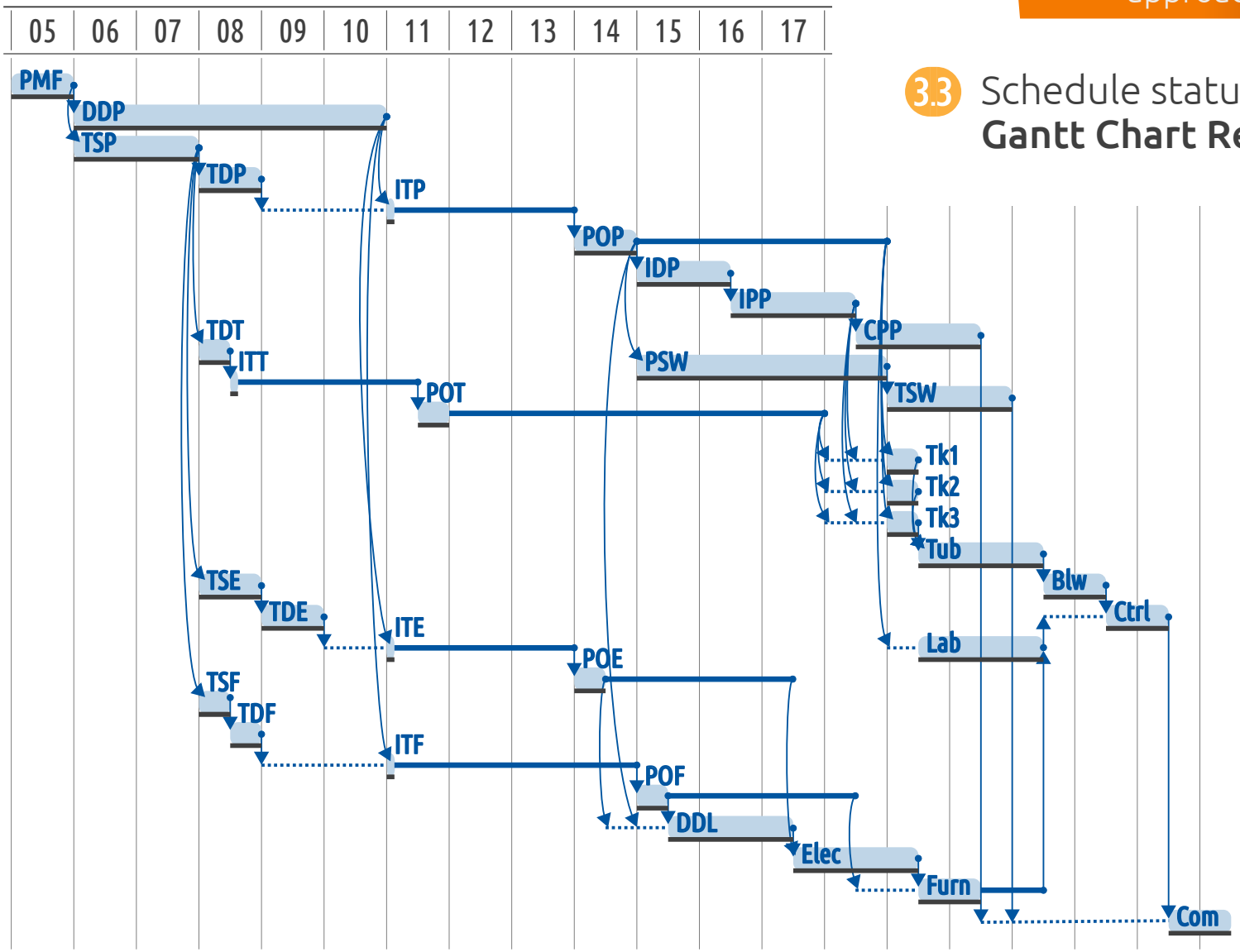
Gantt Chart Report

openSE

Project Control and Follow-up

INTERMEDIATE approach

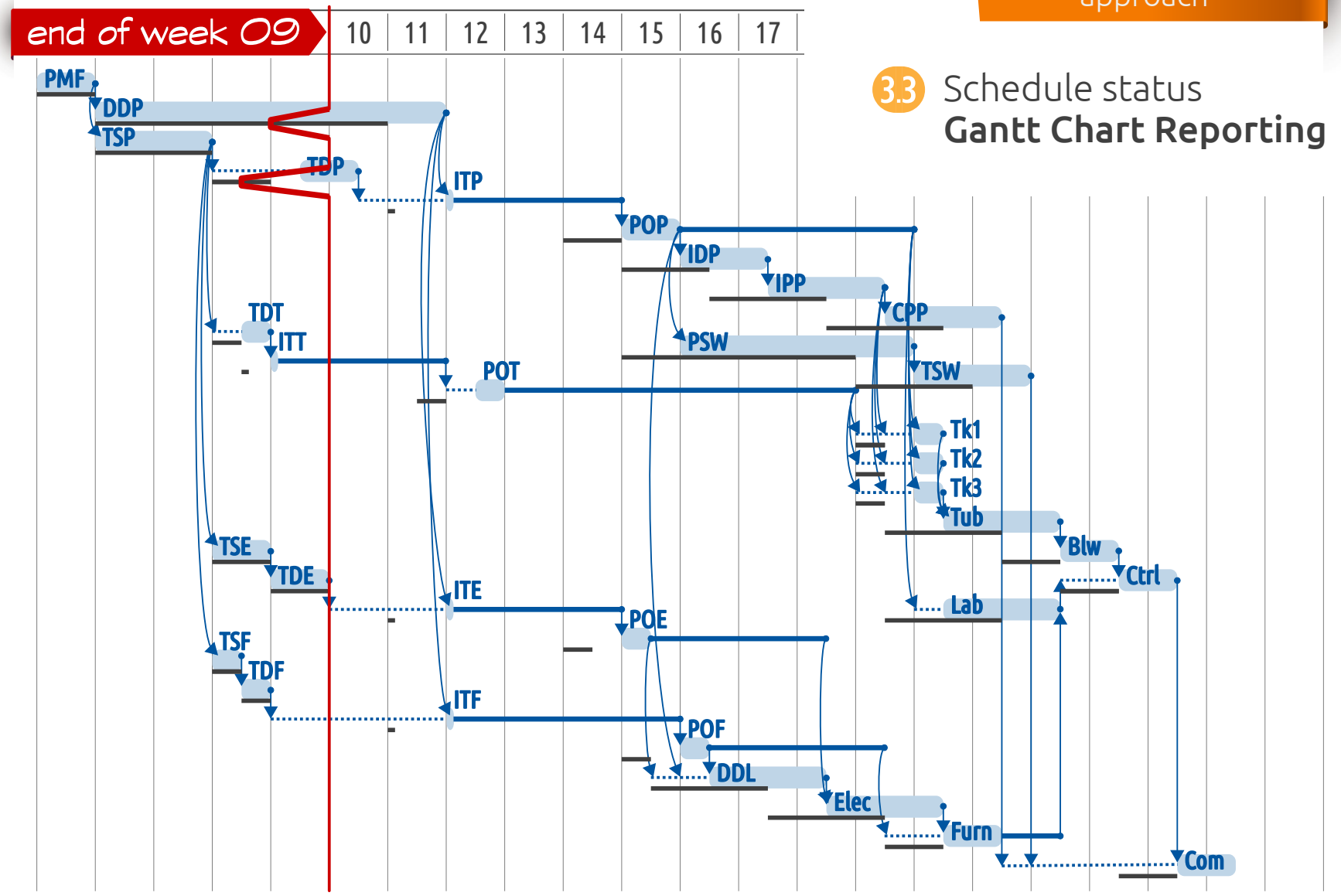
3.3 Schedule status
Gantt Chart Reporting



Project Control and Follow-up

INTERMEDIATE approach

3.3 Schedule status
Gantt Chart Reporting

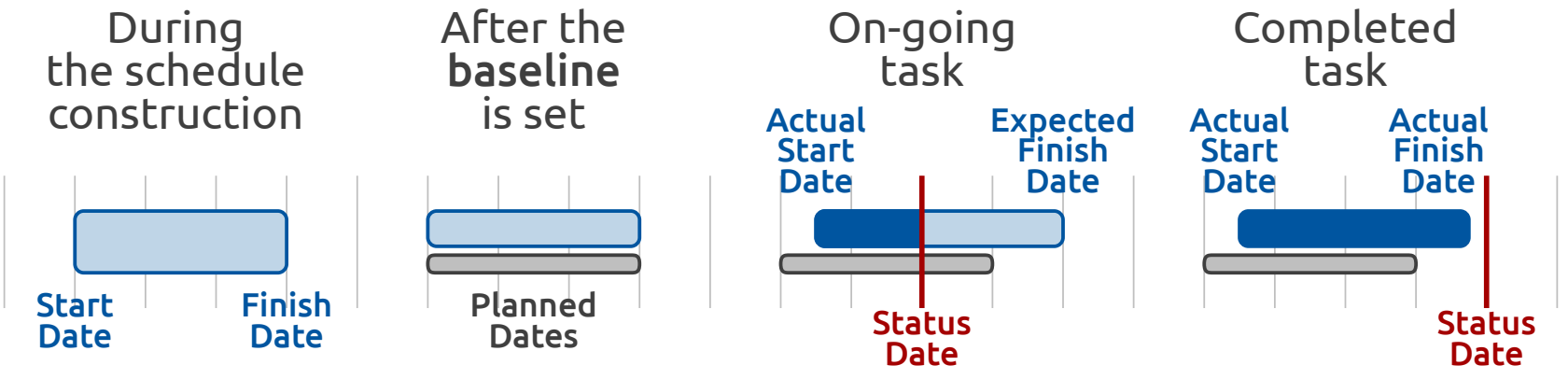


Project Control and Follow-up

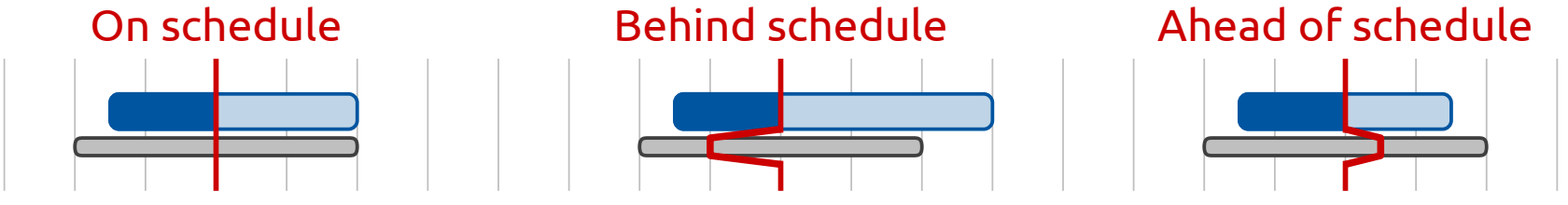
3.3 Schedule status → **Gantt Chart Reporting**

INTERMEDIATE approach

Reporting principles implemented in most project scheduling software:



Meaning of the **status line** (**isochrone line***):

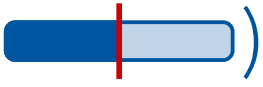
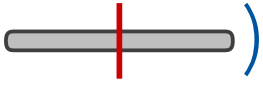


* A line drawn on a Gantt chart connecting points (tasks) at which something occurs or arrives at the same time

Project Control and Follow-up

3.3 Schedule status ⇢ **Gantt Chart Reporting**

INTERMEDIATE approach

At a given **status date**, the focus is given on tasks
that either **are on-going** () or
that **should be on-going** ()

As a driving principle, duration of planned tasks (i.e. )
is not re-evaluated with each schedule status report

9.4

Earned Value Report

openSE

Earned Value Management

Earned Value Analysis

creation

1969

American Military Standard

C/SCSC

Cost/Schedule Control System Criteria

32 criteria/guidelines to consider

1996

ANSI

American National Standard Institute

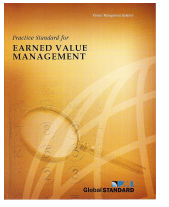
EIA

Electronic Industries Alliance

ANSI/EIA-**748**-C

PMI

Practice Standard for Earned Value Management



2005

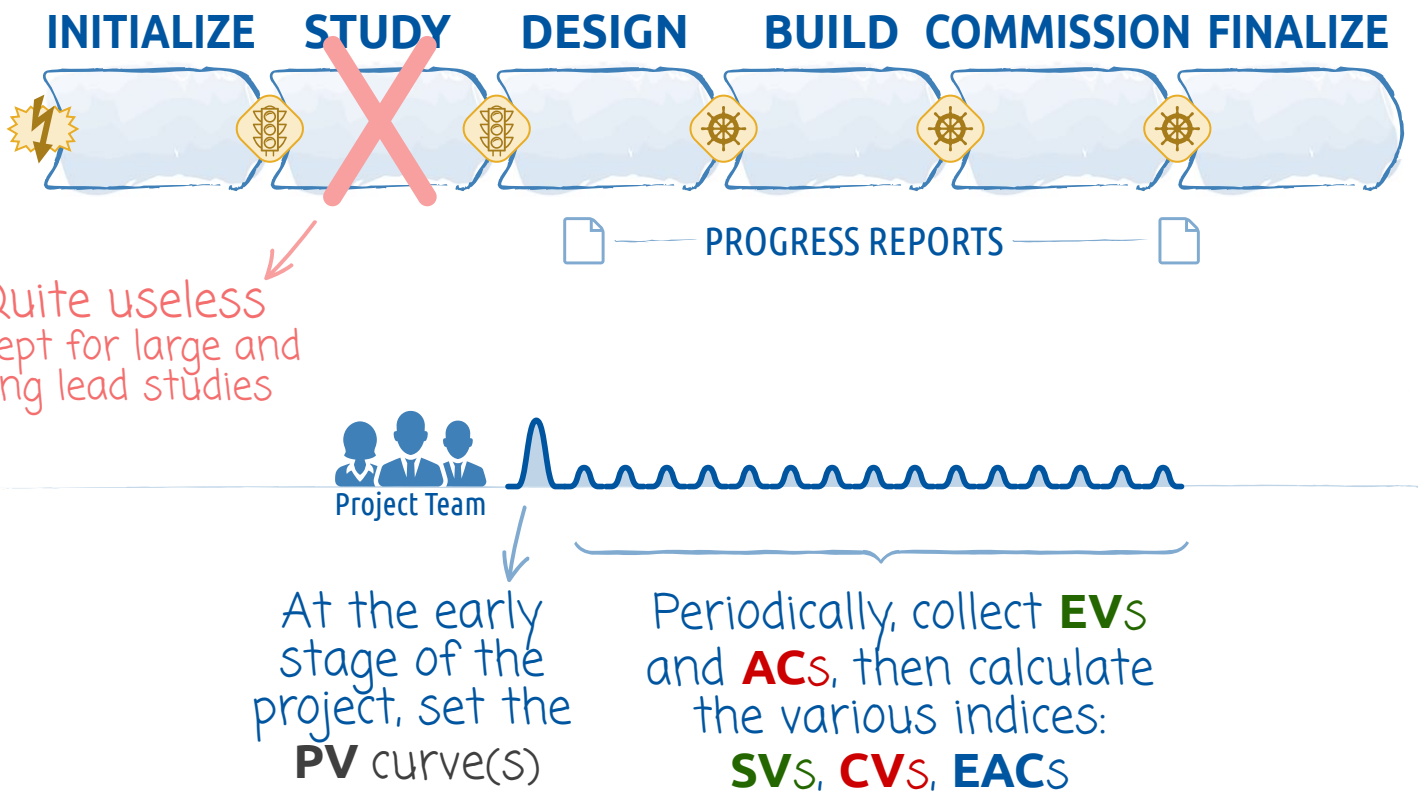
NDIA

National Defense Industrial Association

Earned Value Management

When and which effort?

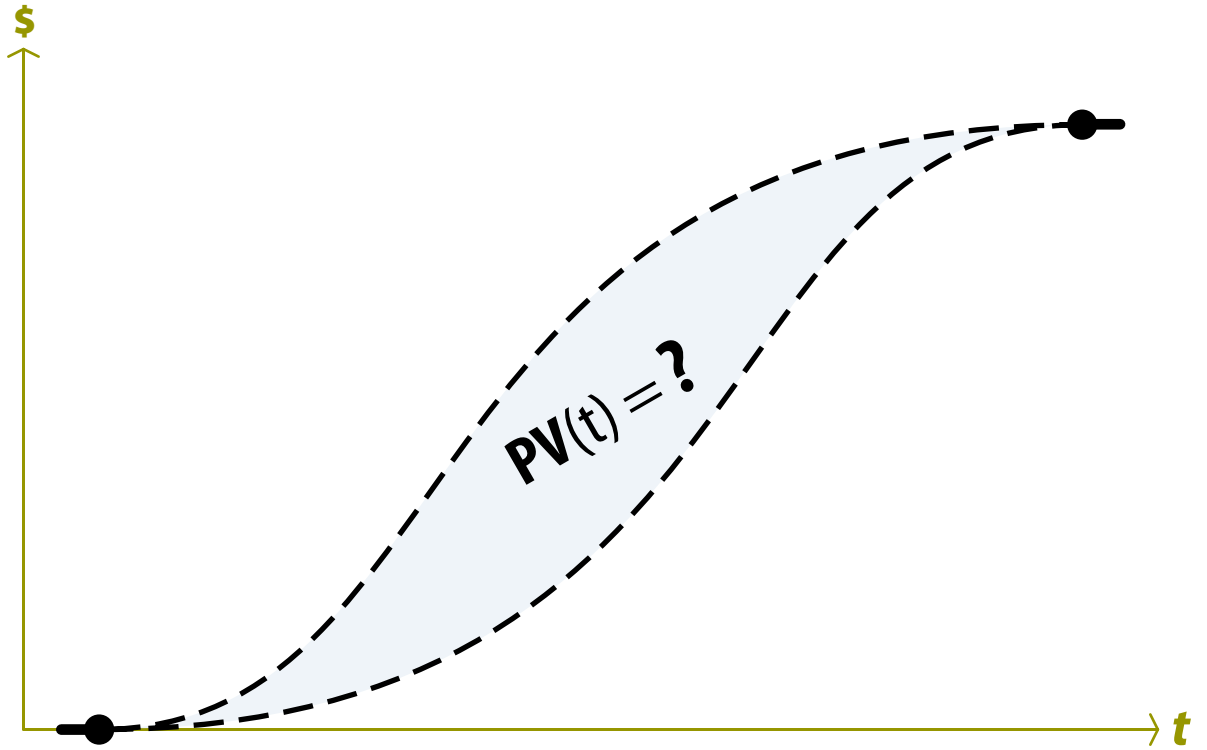
INTERMEDIATE approach



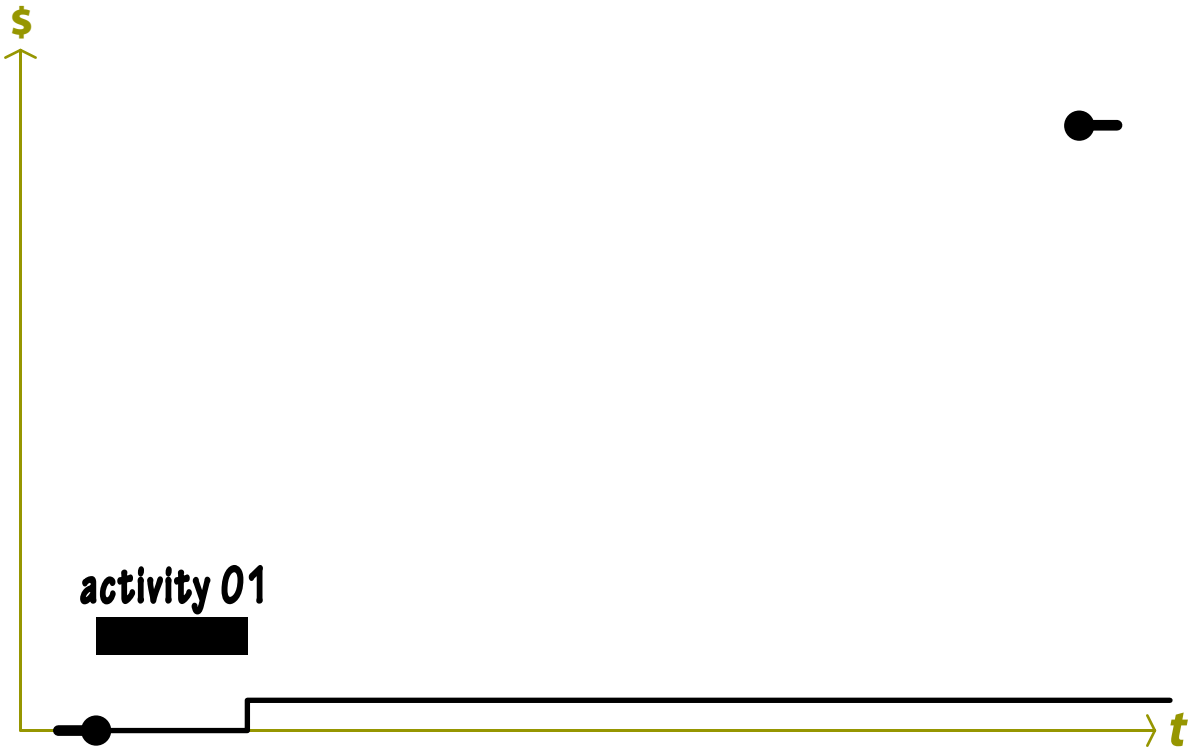
9.4.1

EVM Foundations

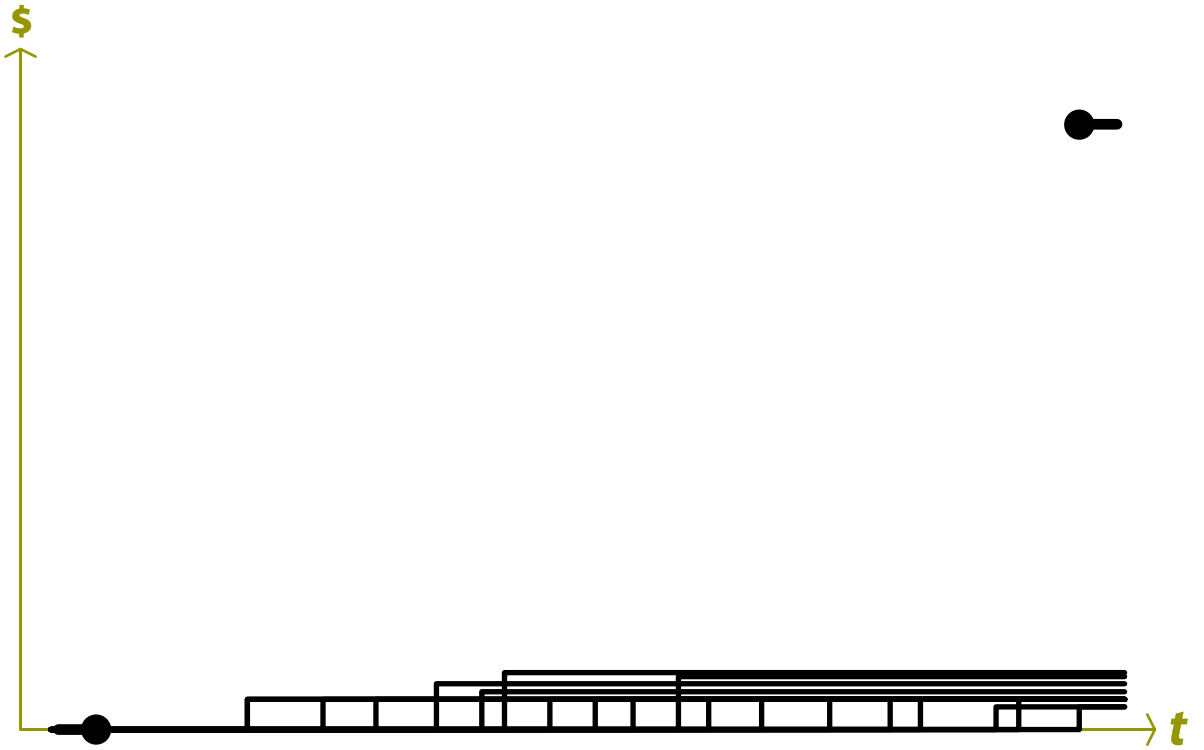
EVM Basics



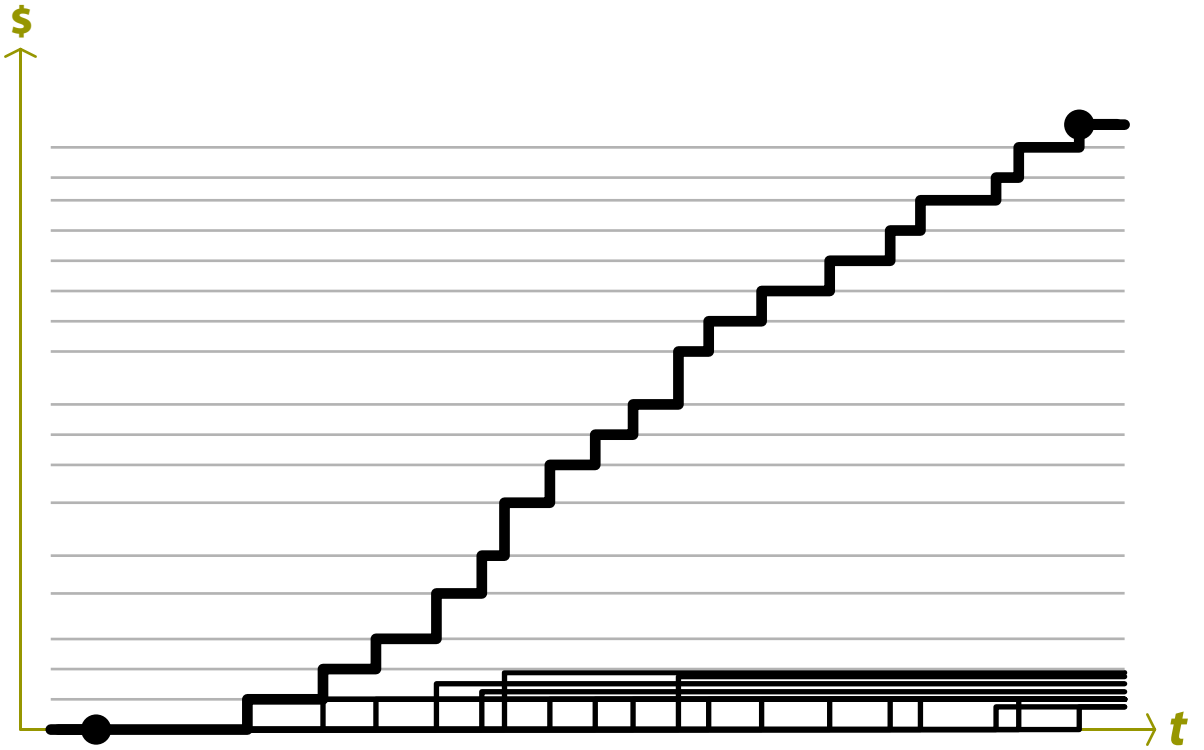
EVM Basics



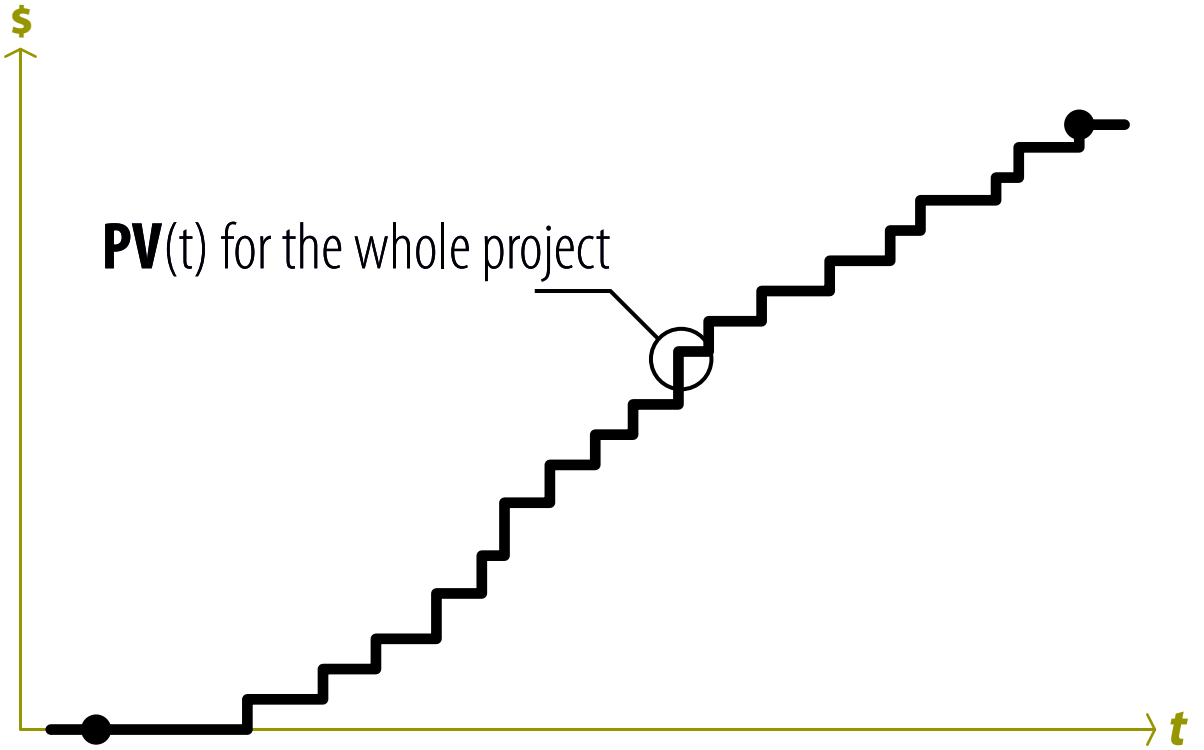
EVM Basics



EVM Basics

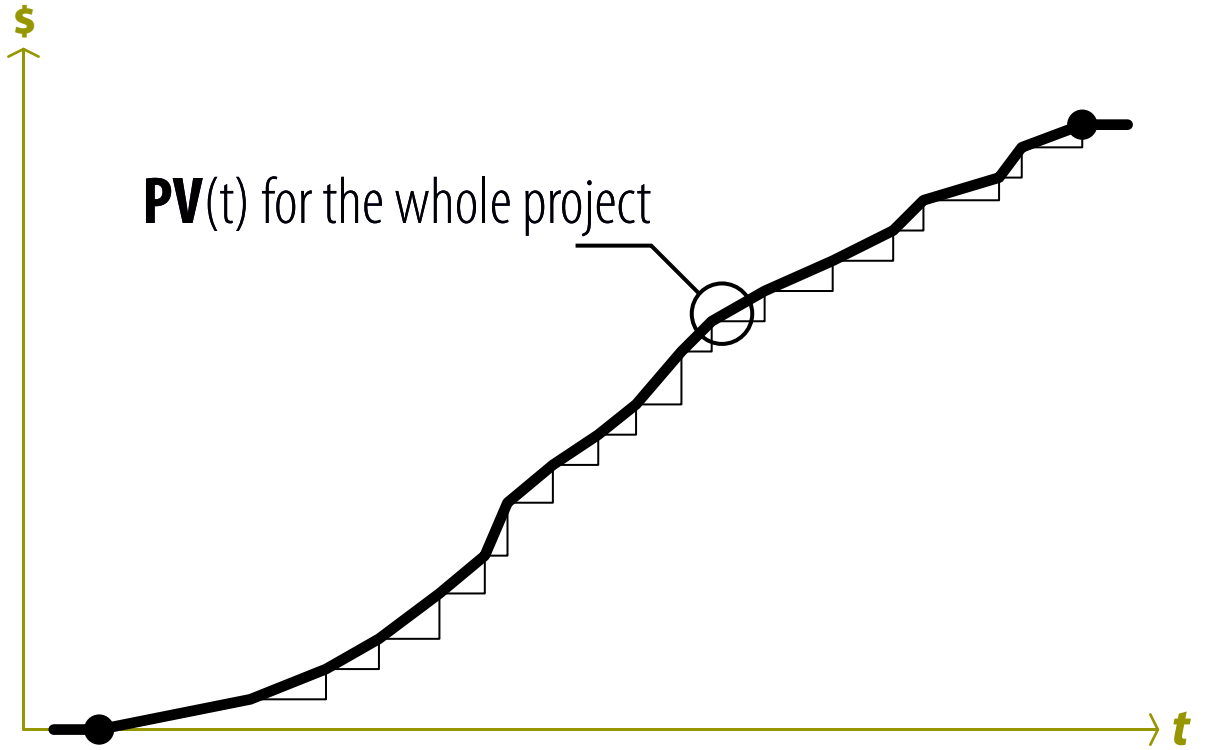


EVM Basics

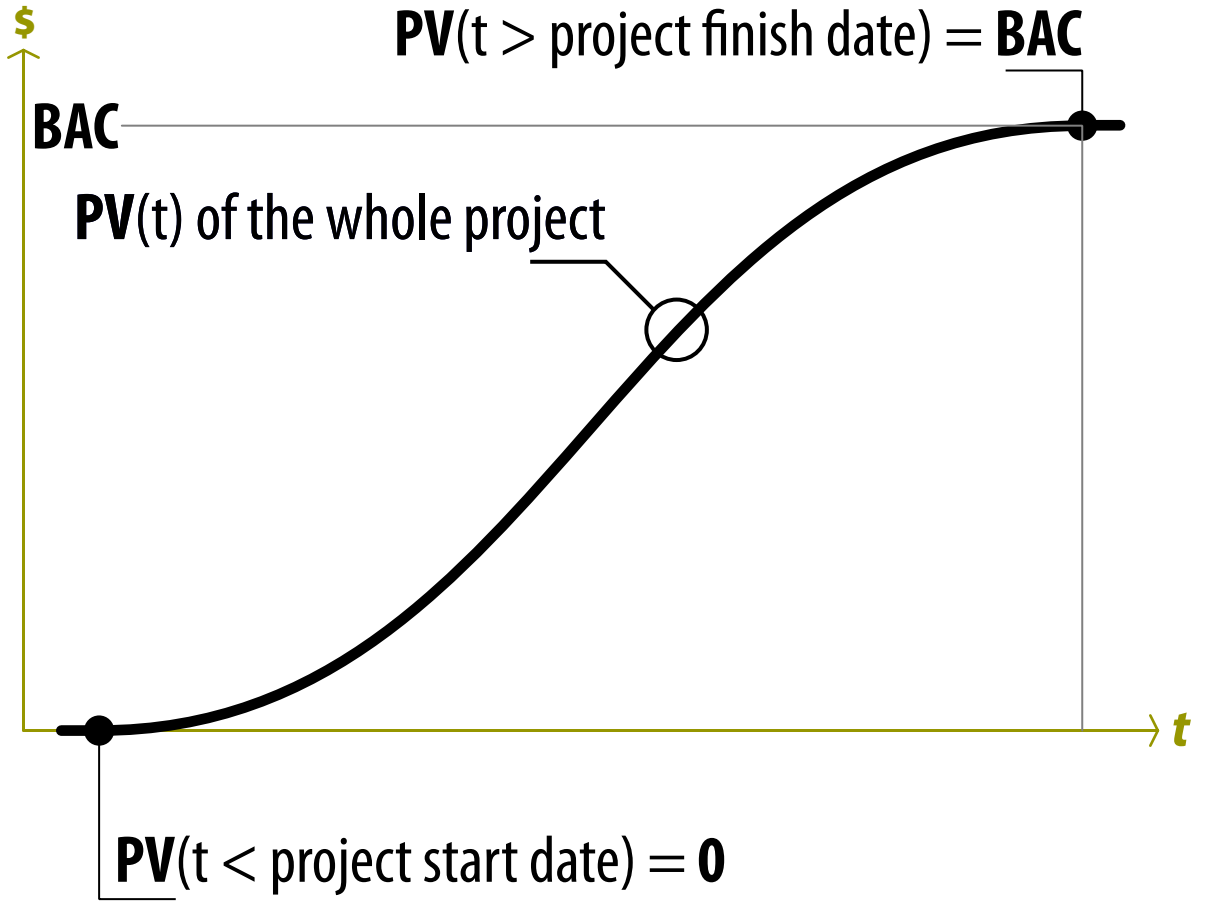


EVM Basics

EVM Basics



EVM Basics ⇢ PV, Planned Value



The LAMPE Project – Reporting & Summaries

http://campus.hesge.ch/bonnalp/LAMPE/00/Lrs.html

Google

Samhain ▾ Imbolc ▾ Beltaine ▾ Lugnasad ▾ Telaranha ▾ Evaluanda.ch

LAMPE

Friday 25 January 2002 16:00

Documents | Work Units | Change Control | Reporting

Progress curves | Actual Costs

Summary

- **Material Budget** (excl. in-kind contr.)
- **Material Budget** (incl. in-kind contr.)

Personnel

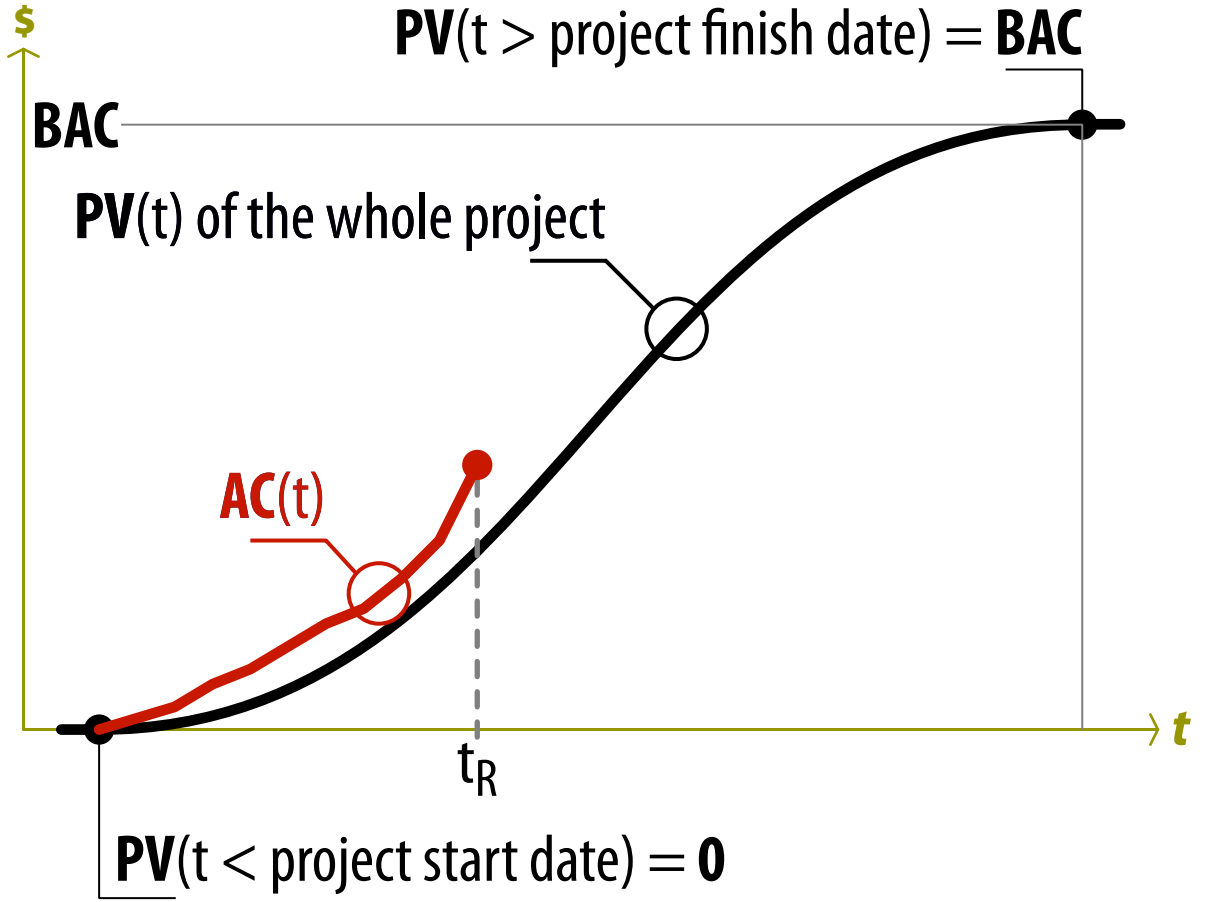
- Total **Personel Budget**
- Art@lab.org
- Ben@lab.org
- Bill@lab.org
- Billie@lab.org
- Bud@lab.org
- Carla@lab.org
- Cassandra@lab.org
- Chet@lab.org
- Count@lab.org
- Django@lab.org
- Ella@lab.org
- Errol@lab.org
- Fats@lab.org
- Gil@lab.org
- Helen@lab.org
- Jacky@lab.org
- Joshua@lab.org
- Lester@lab.org

EVM Curves for **Material Budget** (incl. in-kind contr.) in CHF

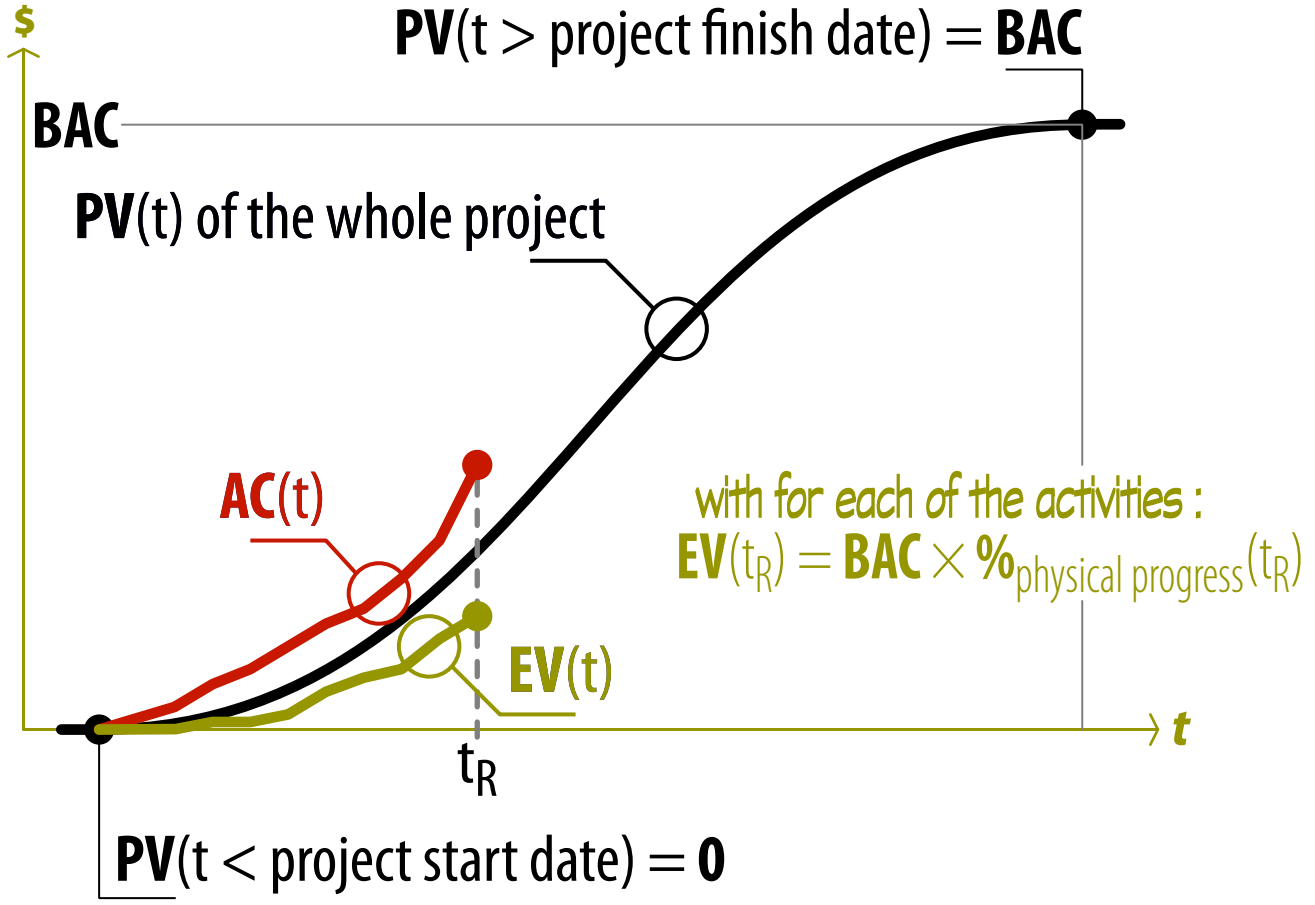
EVM Summary

BAC	PV	PV_{00}	EV	SV	AC	CV
2'800'000	0	0	0	0	0	0

EVM Basics ⇢ AC, Actual Costs



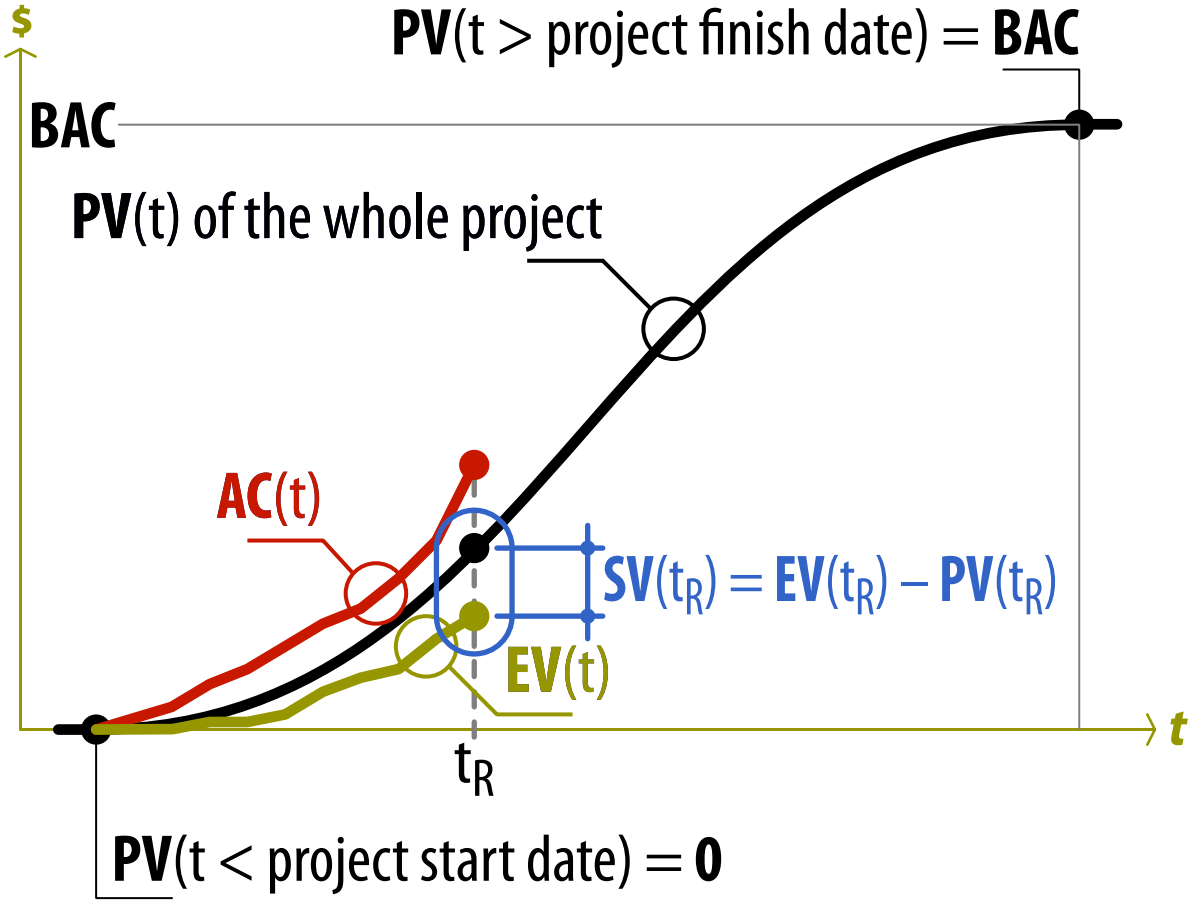
EVM Basics ⇢ EV, Earned Value



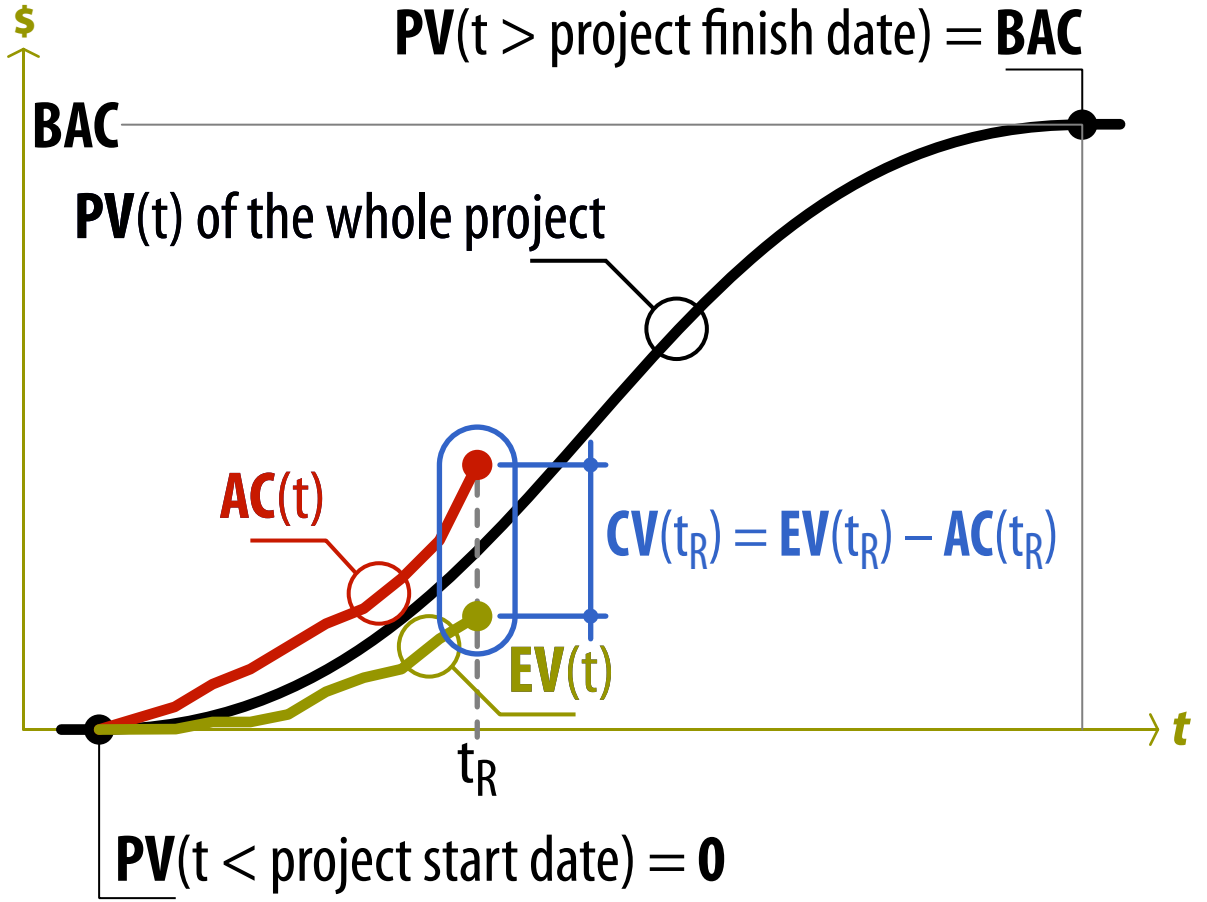
EVM Basics

AFITEP	C/SCSC	ANSI #748
CBTP Coût budgété du travail prévu	**BCWS** Budgeted Cost of the Work Scheduled	**PV** Planned Value
CRTE Coût réel du travail effectué	**ACWP** Actual Cost of the Work Performed	**AC** Actual Cost
CBTE Coût budgété du travail effectué	**BCWP** Budgeted Cost of the Work Performed	**EV** Earned Value
CTB Coût total budgété	**BAC** Budget at Completion	**BAC** Budget at Completion

EVM Basics ⇢ SV, Schedule Variance



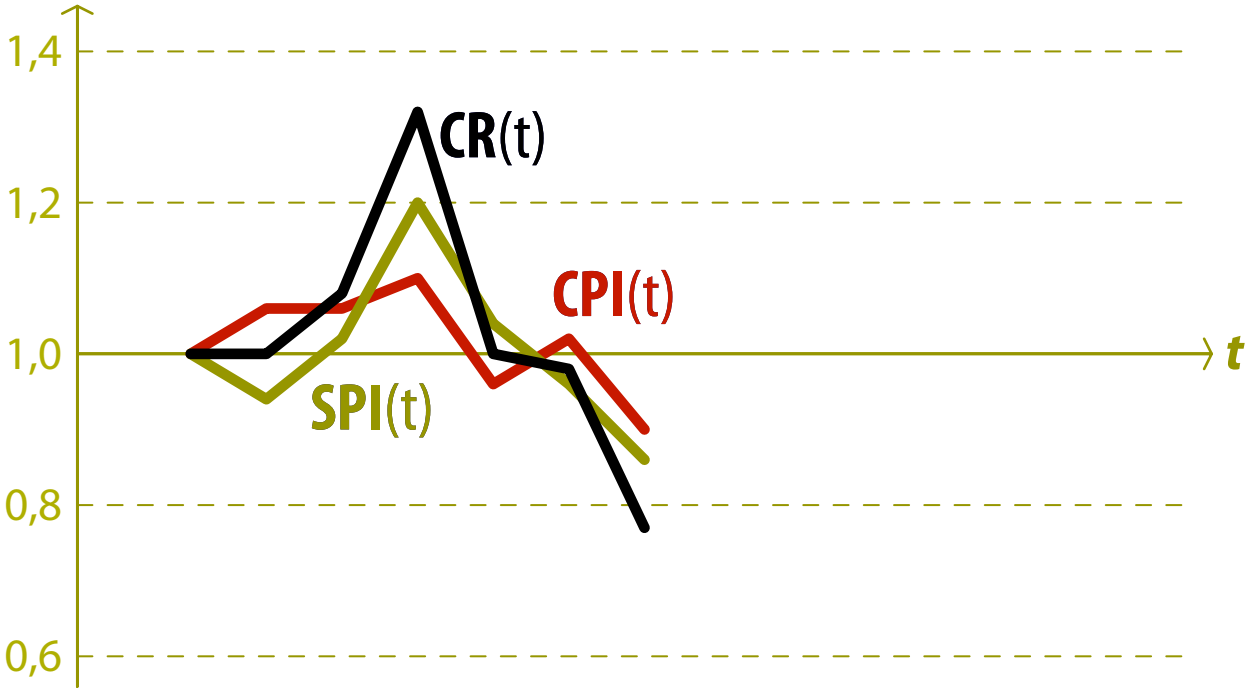
EVM Basics ⇢ CV, Cost Variance



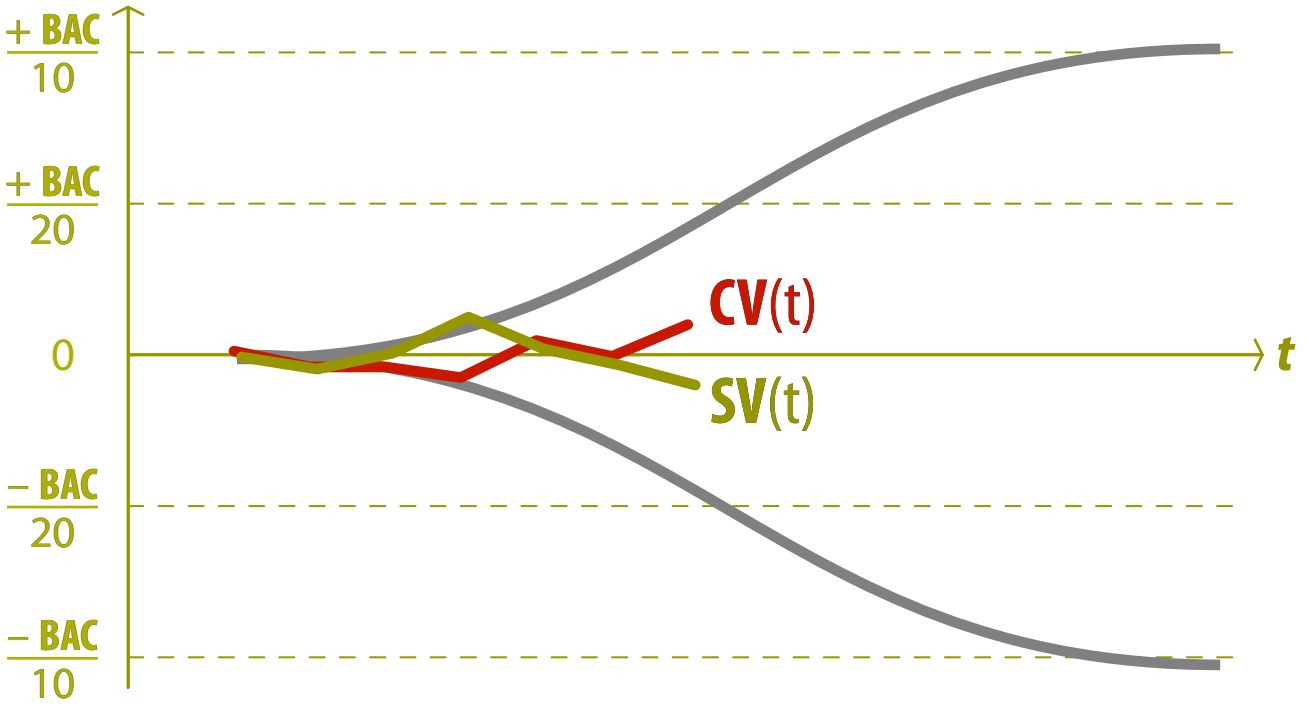
EVM Basics

Schedule Variance $\mathbf{SV}(t_R) = \mathbf{EV}(t_R) - \mathbf{PV}(t_R)$	**Cost Variance** $\mathbf{CV}(t_R) = \mathbf{EV}(t_R) - \mathbf{AC}(t_R)$
Schedule Performance Index $\mathbf{SPI}(t_R) = \frac{\mathbf{EV}(t_R)}{\mathbf{PV}(t_R)}$ $\mathbf{SPI}(t_R) > 1$ ☺ $\mathbf{SPI}(t_R) < 1$ ☹	**Cost Performance Index** $\mathbf{CPI}(t_R) = \frac{\mathbf{EV}(t_R)}{\mathbf{AC}(t_R)}$ $\mathbf{CPI}(t_R) > 1$ ☺ $\mathbf{CPI}(t_R) < 1$ ☹
Critical Ratio $\mathbf{CR}(t_R) = \mathbf{SPI}(t_R) \times \mathbf{CPI}(t_R)$	**Physical Progress** $\varphi(t_R) = \frac{\mathbf{EV}(t_R)}{\mathbf{BAC}}$

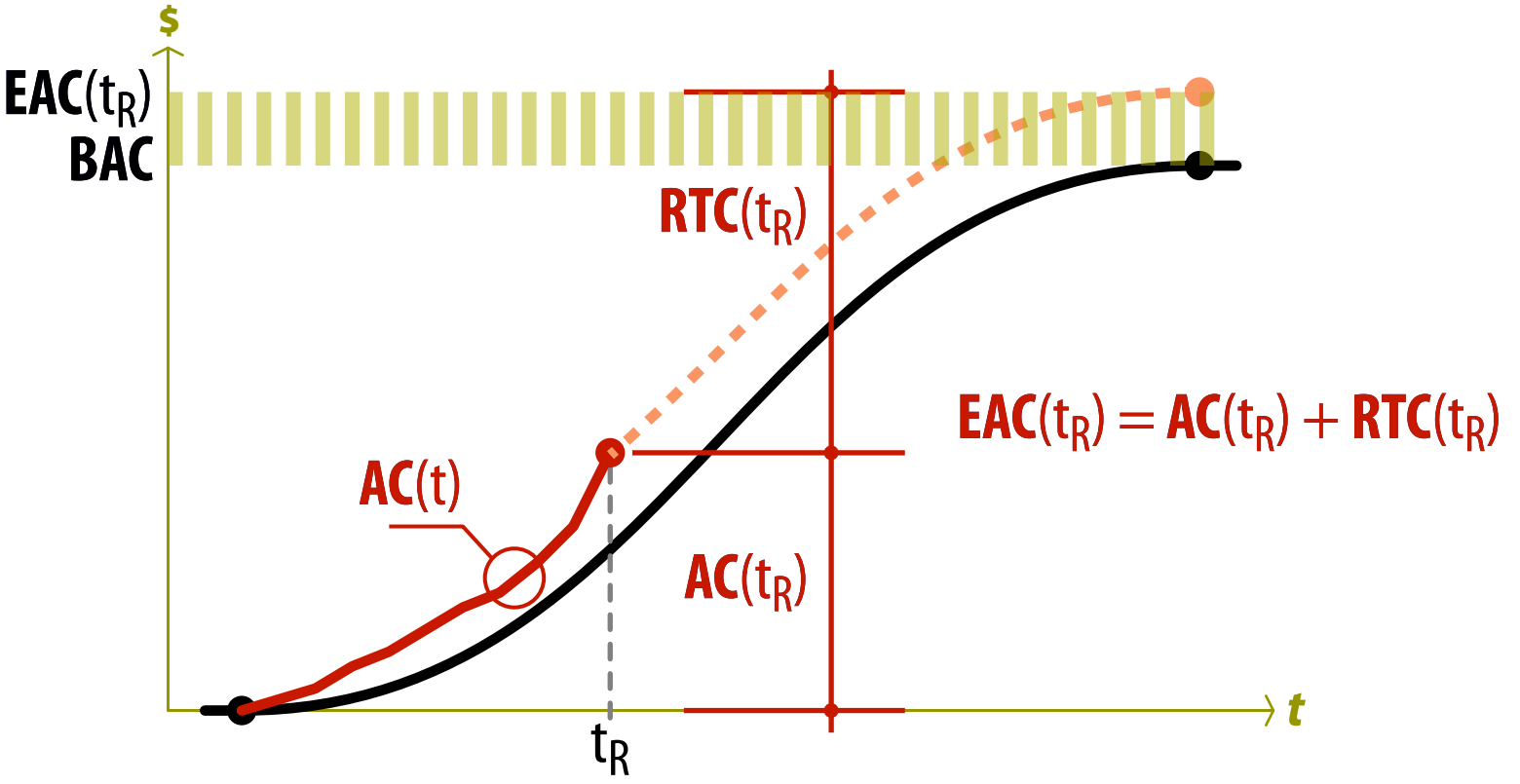
EVM Basics



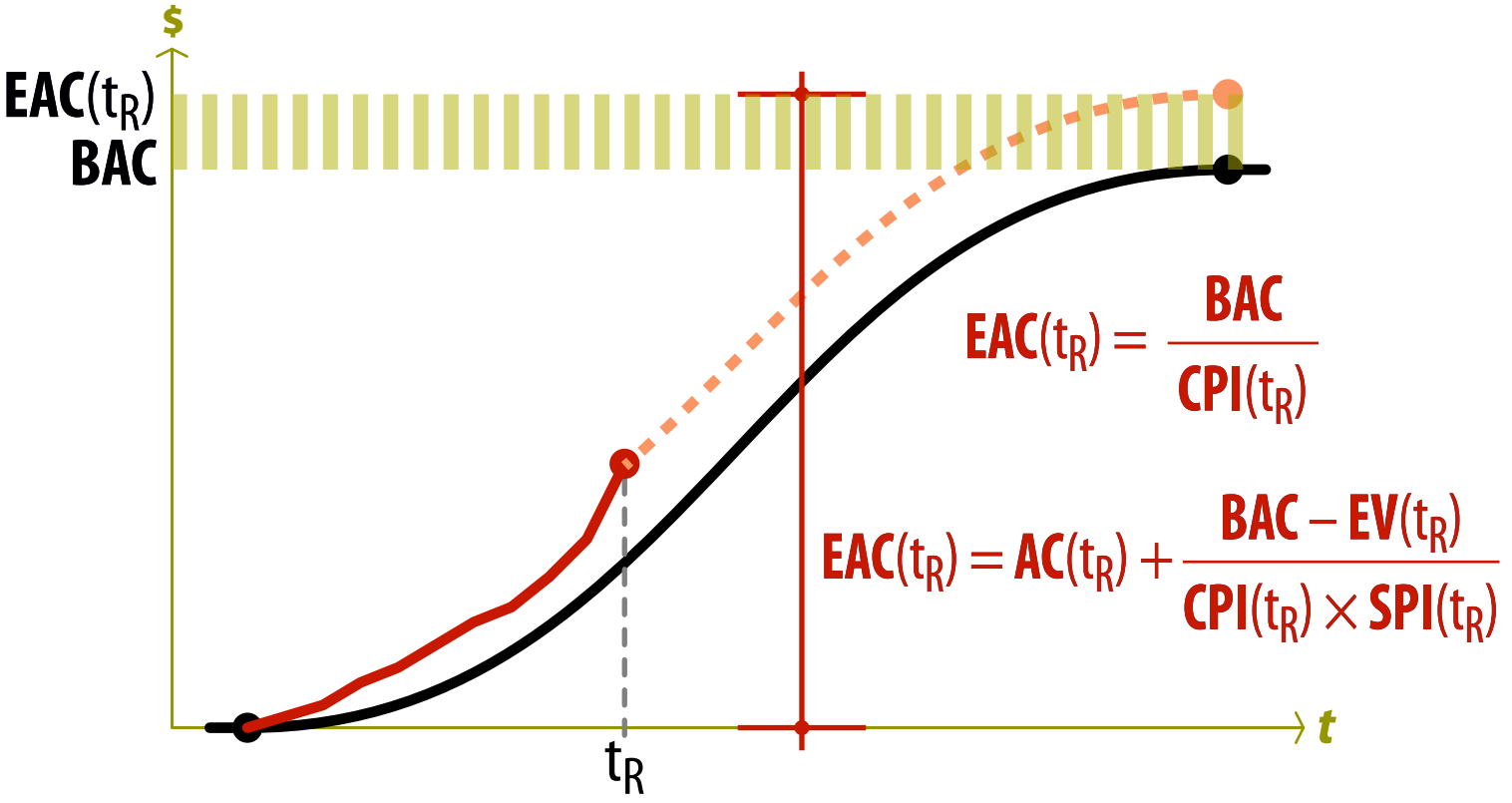
EVM Basics



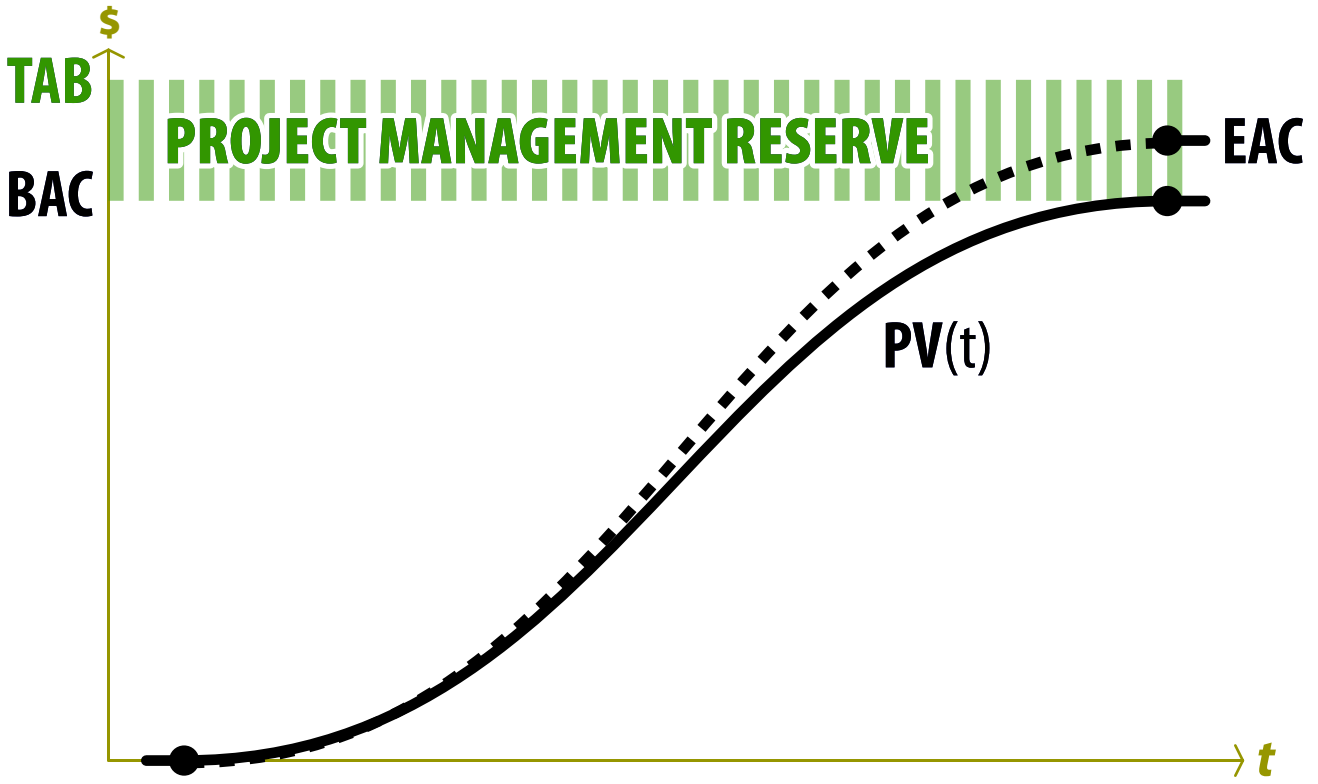
EVM Basics ⇢ EAC, Estimate at Completion



EVM Basics ⇢ EAC, Estimate at Completion

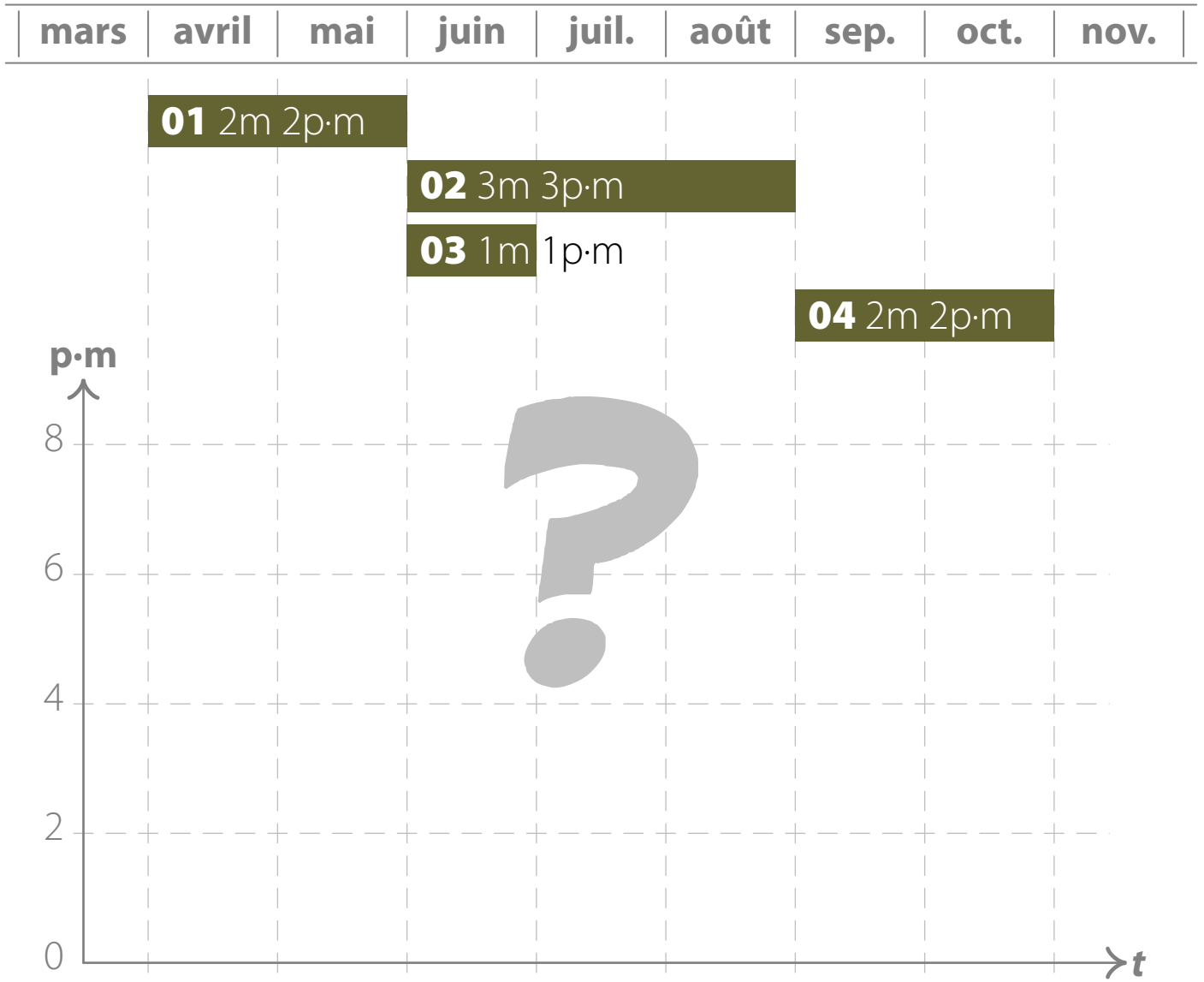


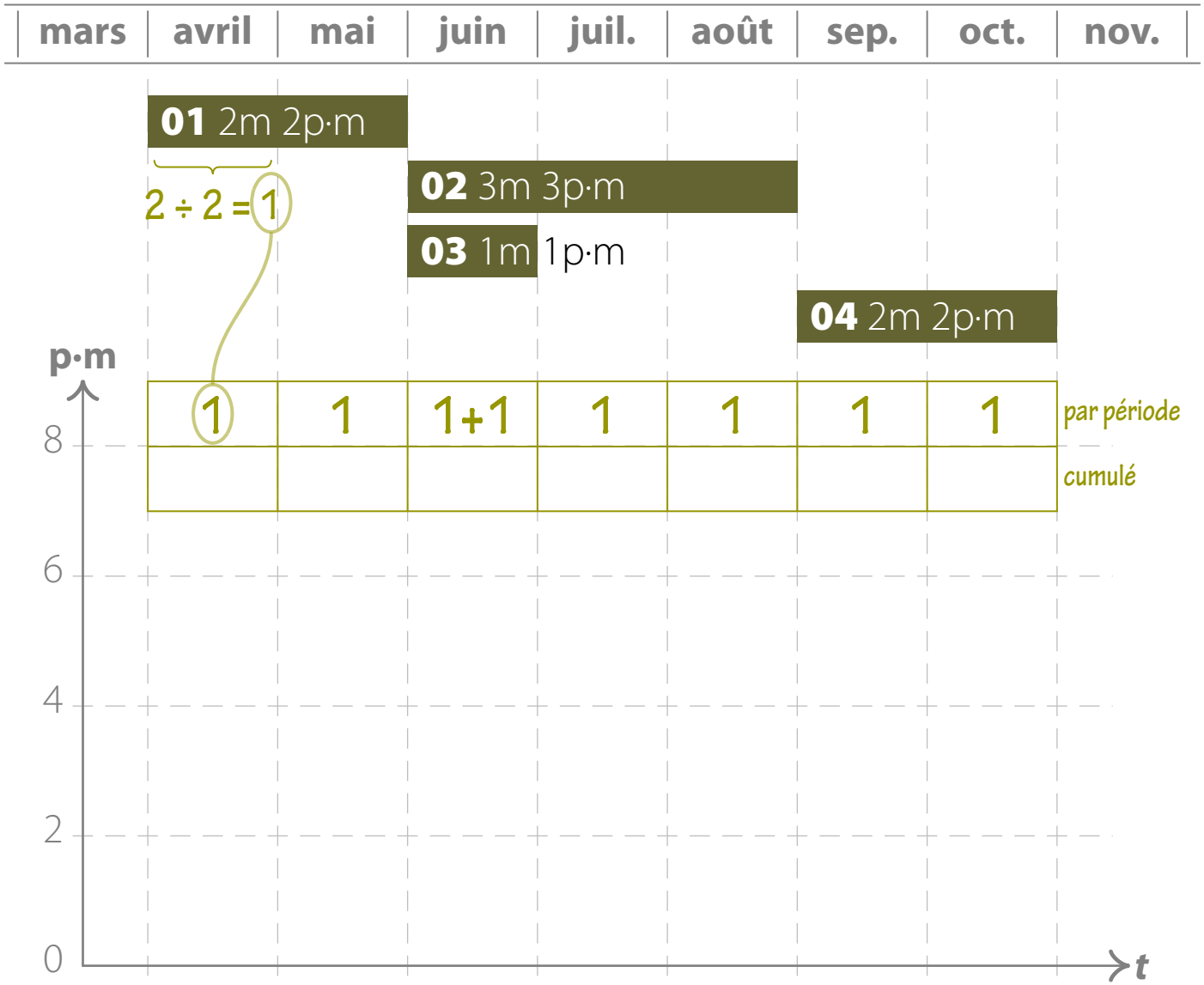
EVM Basics ⇢ TAB, Total Allocated Budget



9.4.2

PV Curve Construction


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
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juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
2 ÷ 2 = 1
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
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2
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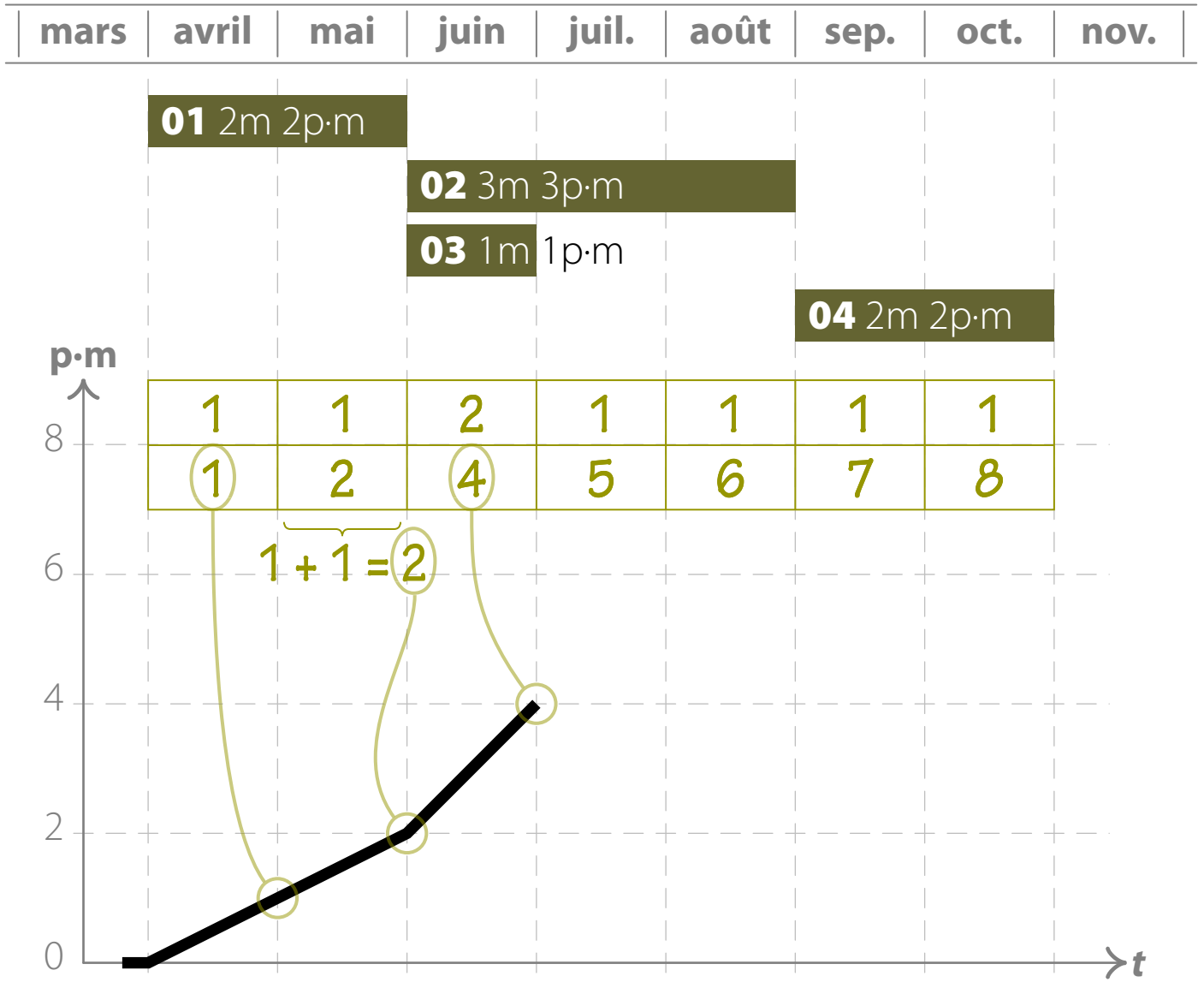
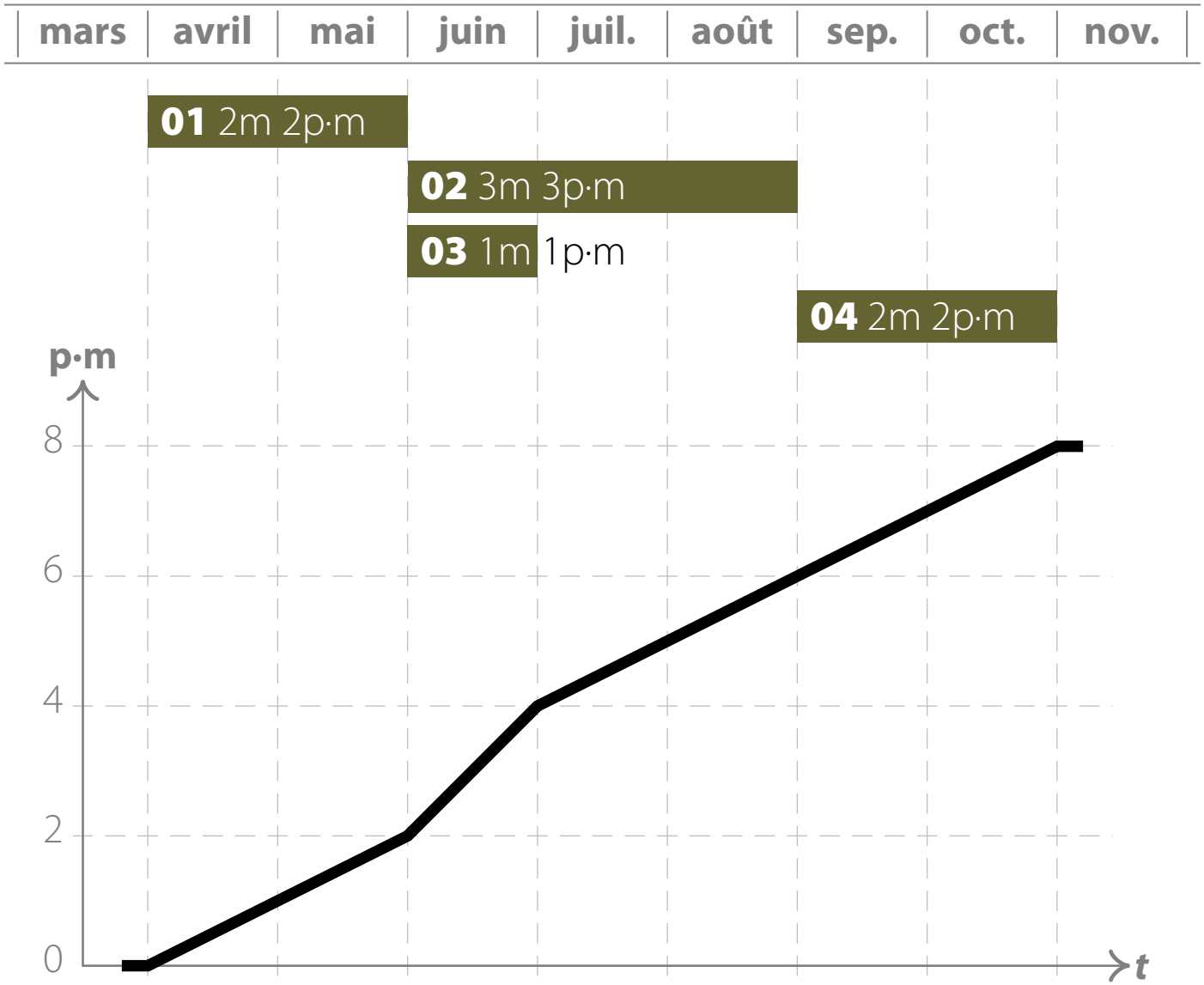
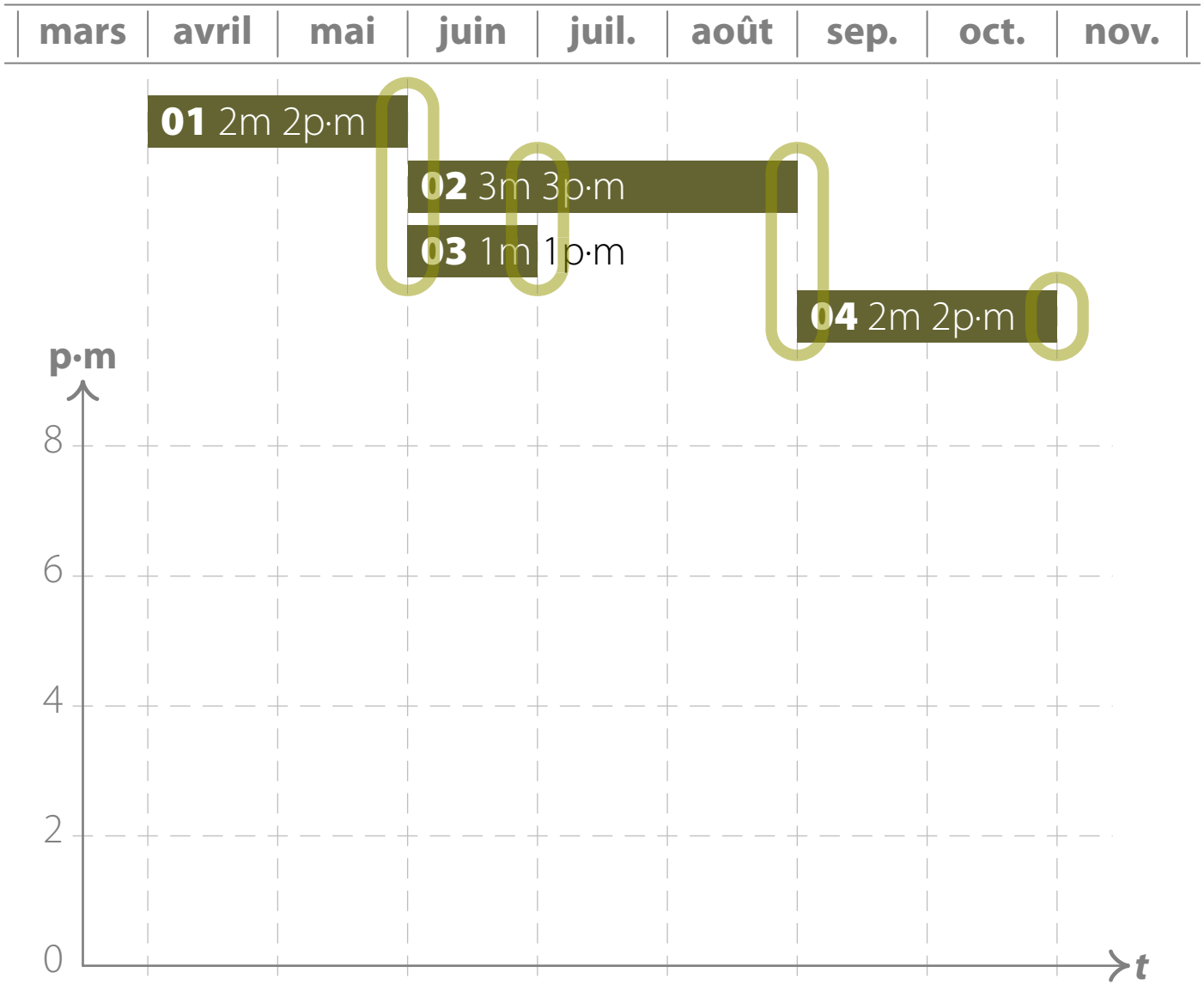
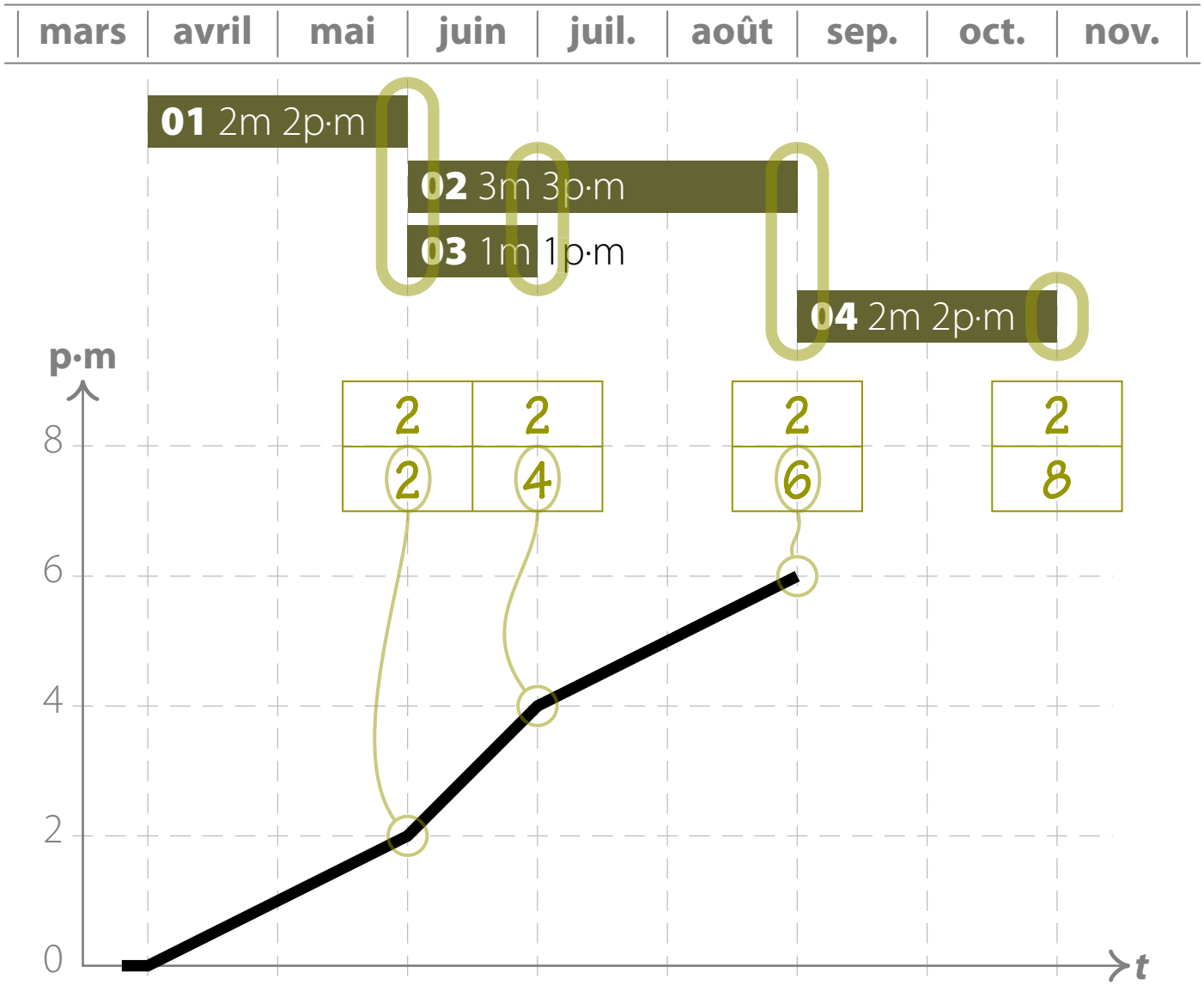
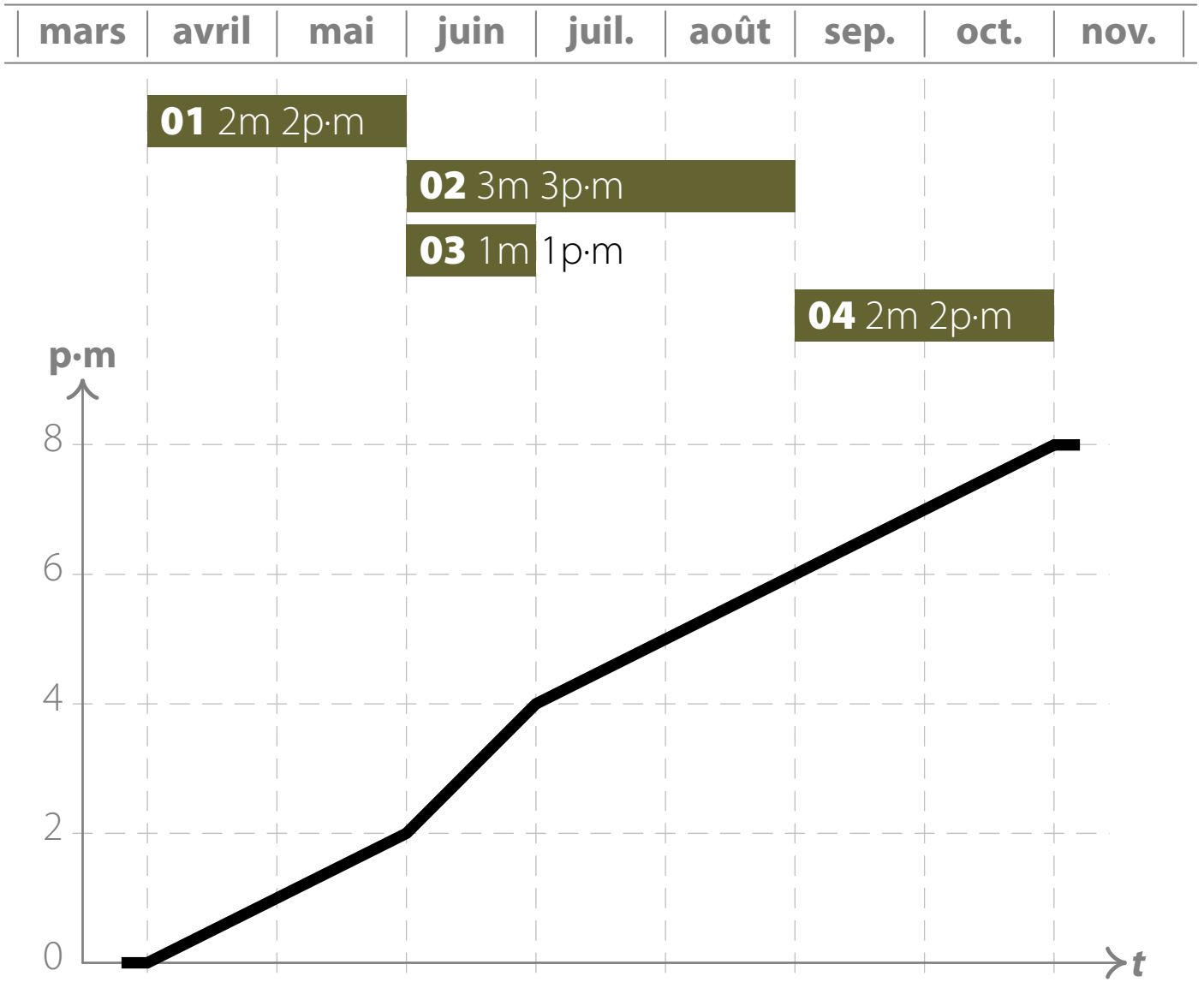
t
1
1
1+1
1
1
1
1
par période
cumulé

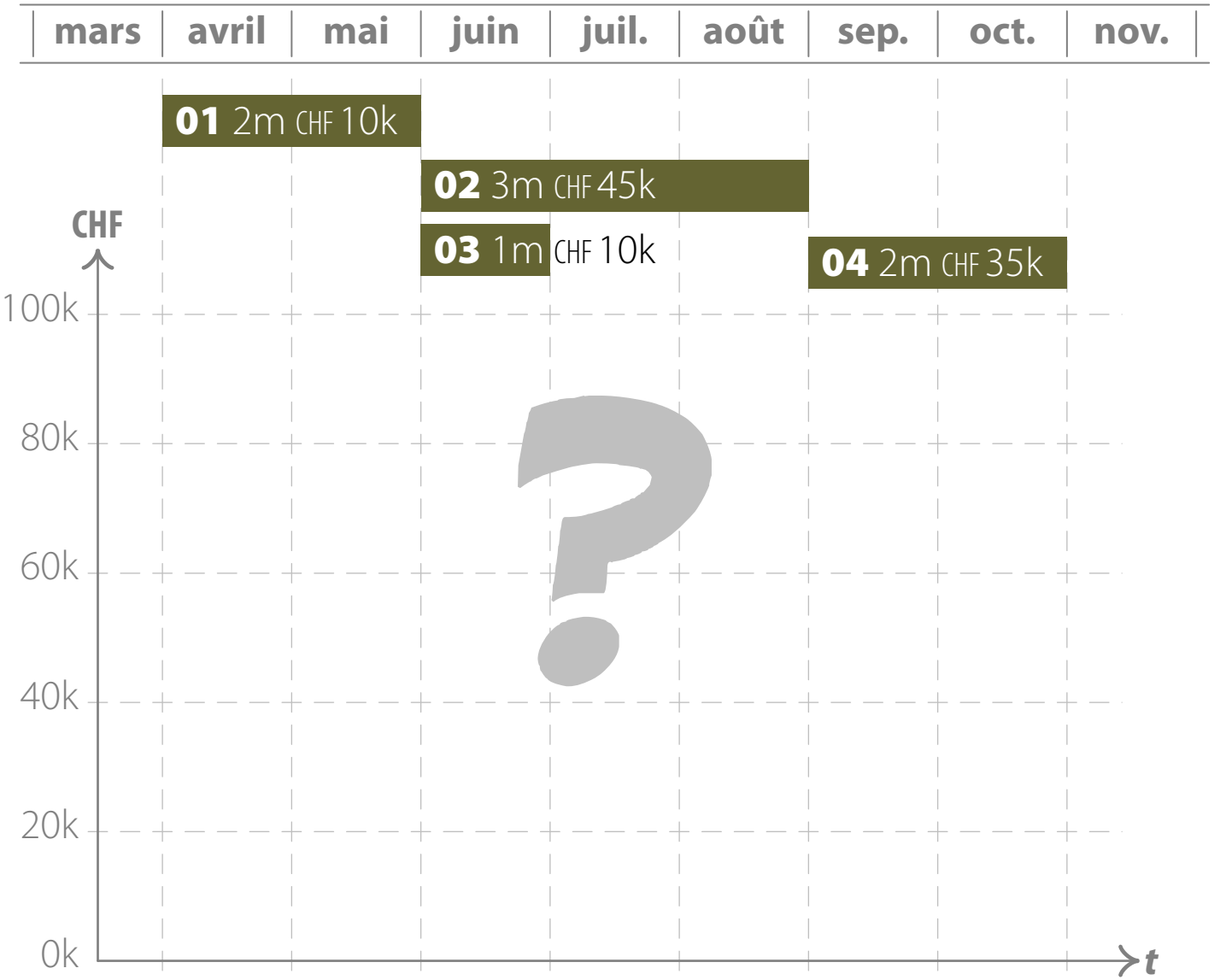

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t
1 1 2 1 1 1 1
1 2 4 5 6 7 8
1 + 1 = 2

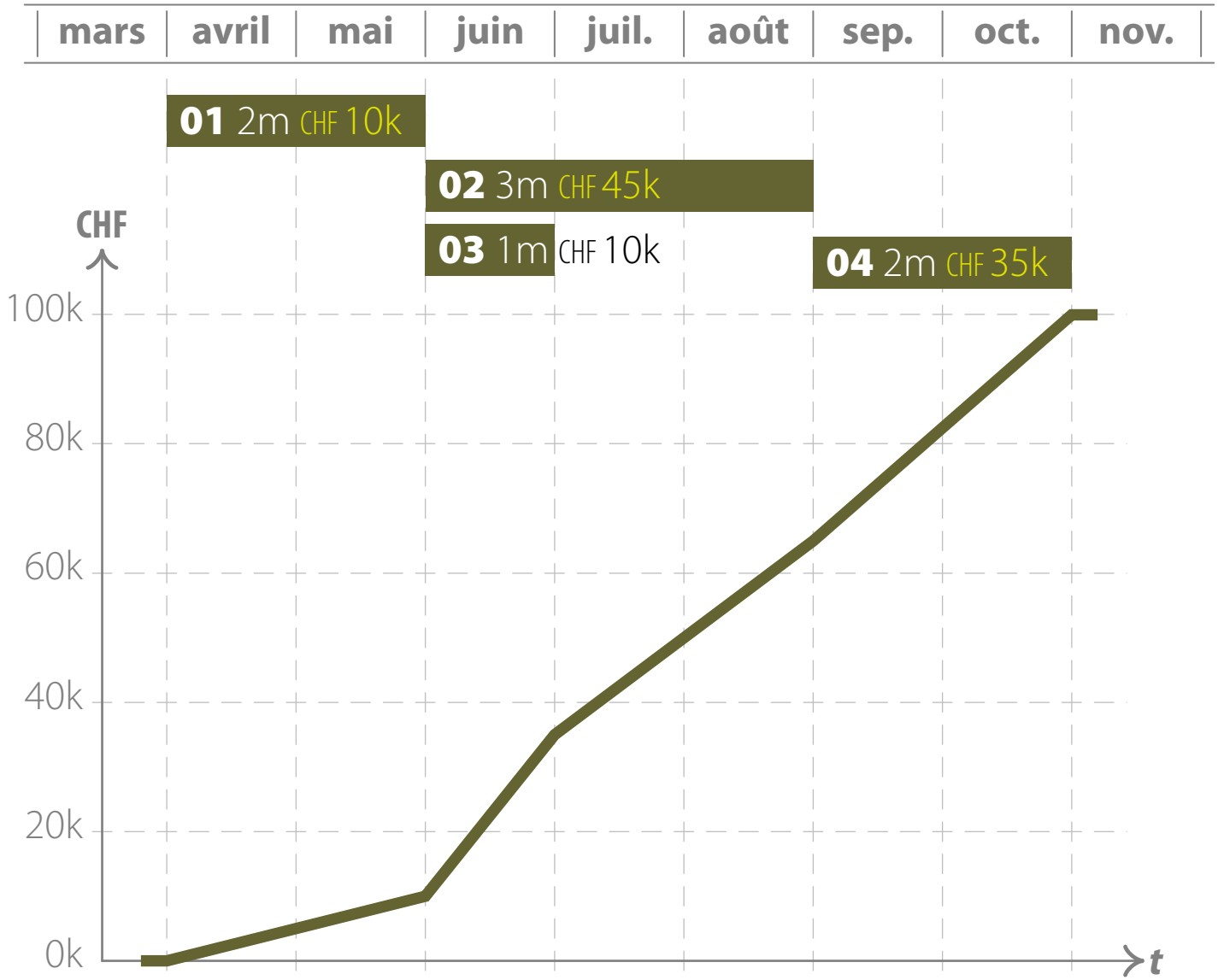

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t

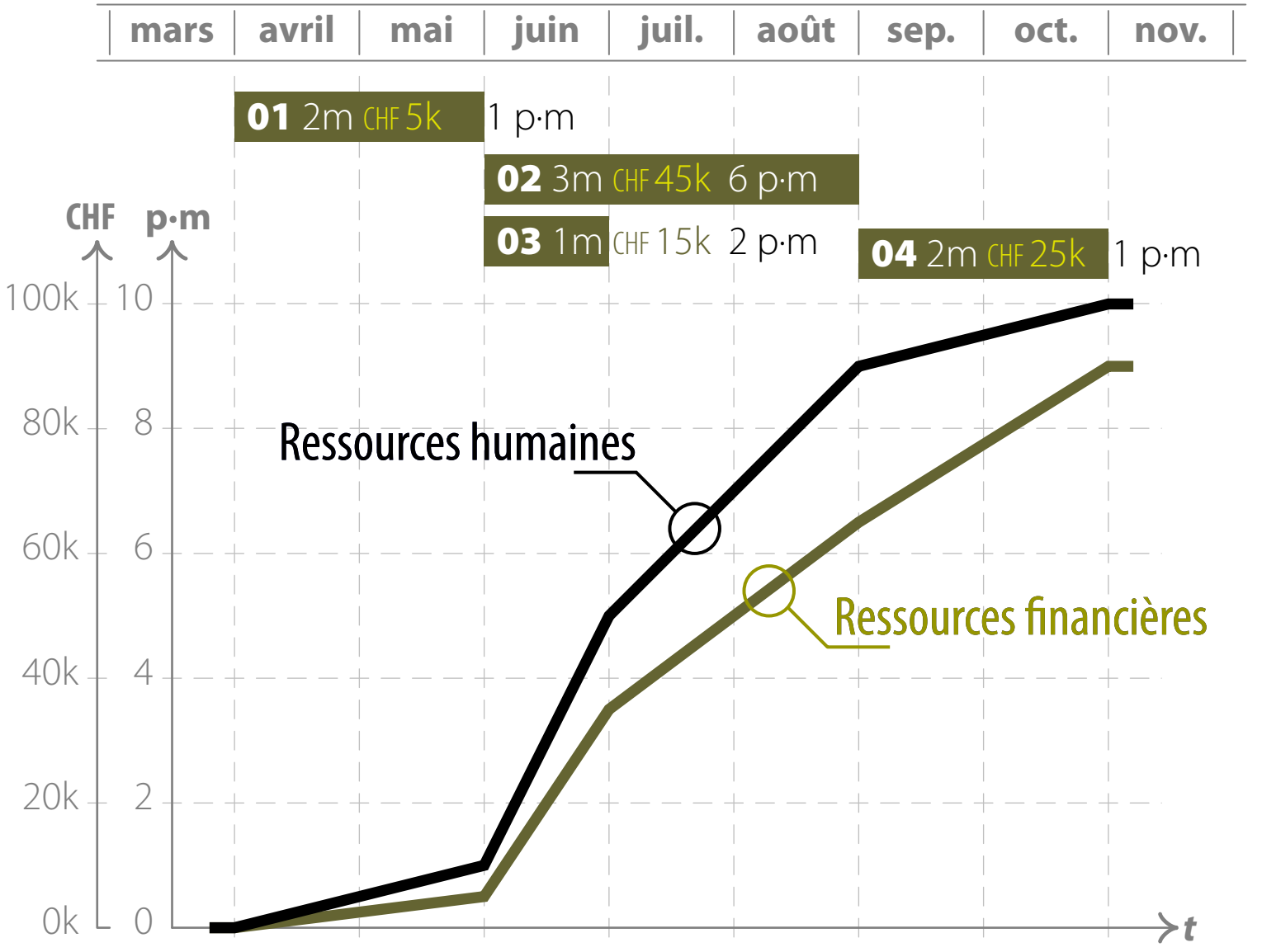

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t

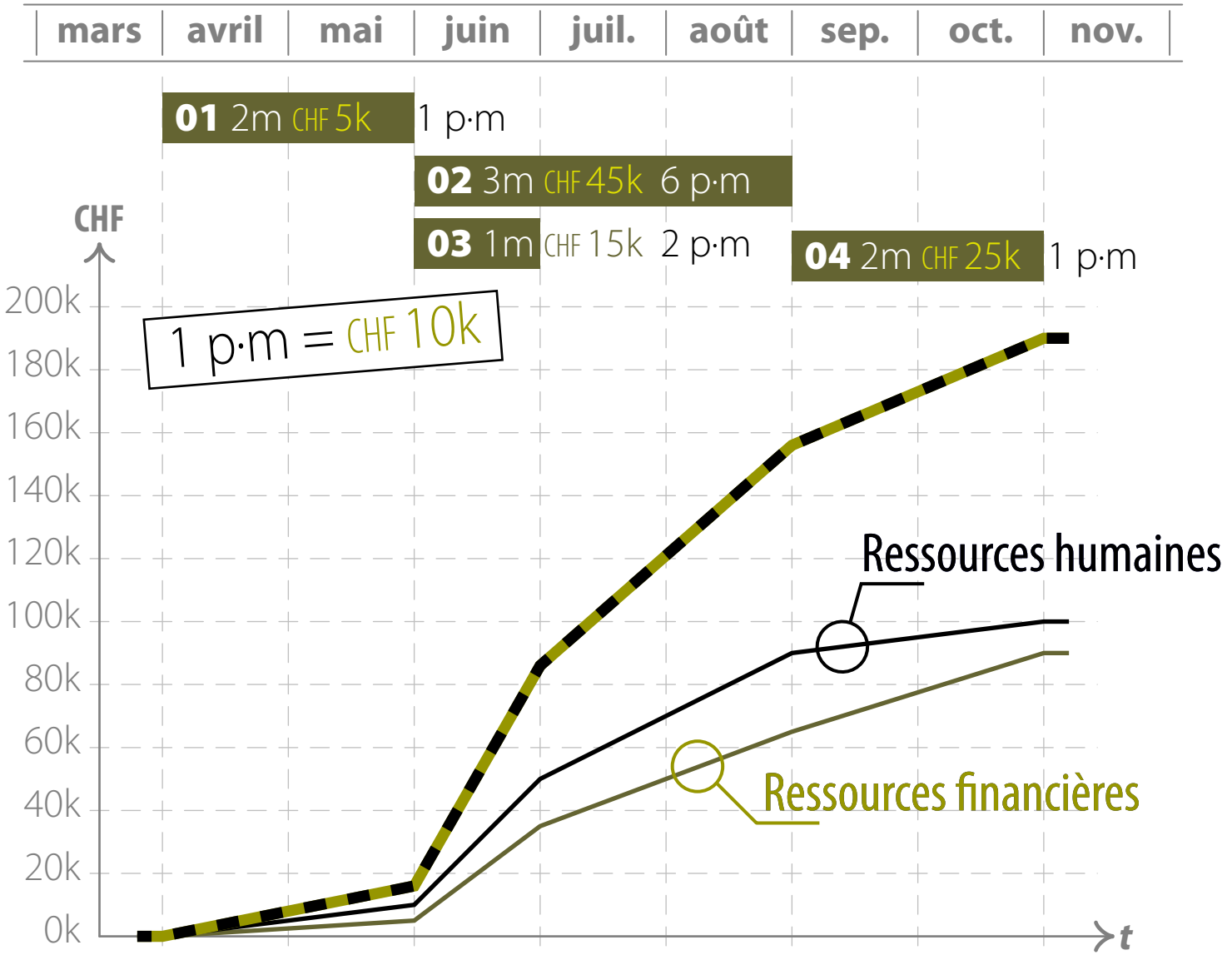

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t
2
2
2
4
2
6
2
8


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m CHF 10k
02 3m CHF 45k
03 1m CHF 10k
04 2m CHF 35k
CHF
100k
80k
60k
40k
20k
0k
t
?


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m CHF 10k
02 3m CHF 45k
03 1m CHF 10k
04 2m CHF 35k
CHF
100k
80k
60k
40k
20k
0k
t

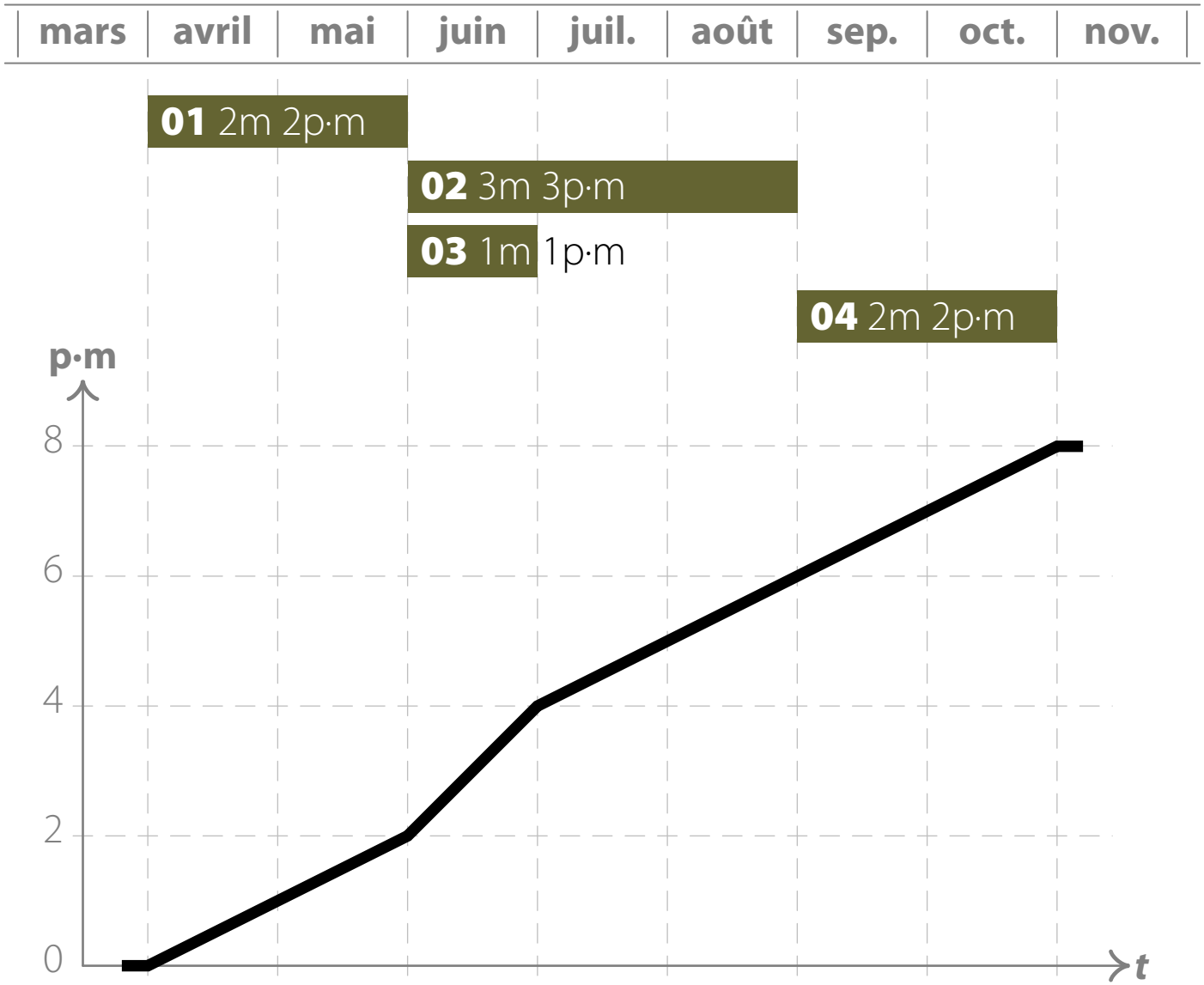

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m CHF 5k 1 p·m
02 3m CHF 45k 6 p·m
03 1m CHF 15k 2 p·m
04 2m CHF 25k 1 p·m
CHF
p·m
100k
80k
60k
40k
20k
0k
10
8
6
4
2
0
Ressources humaines
Ressources financières
t

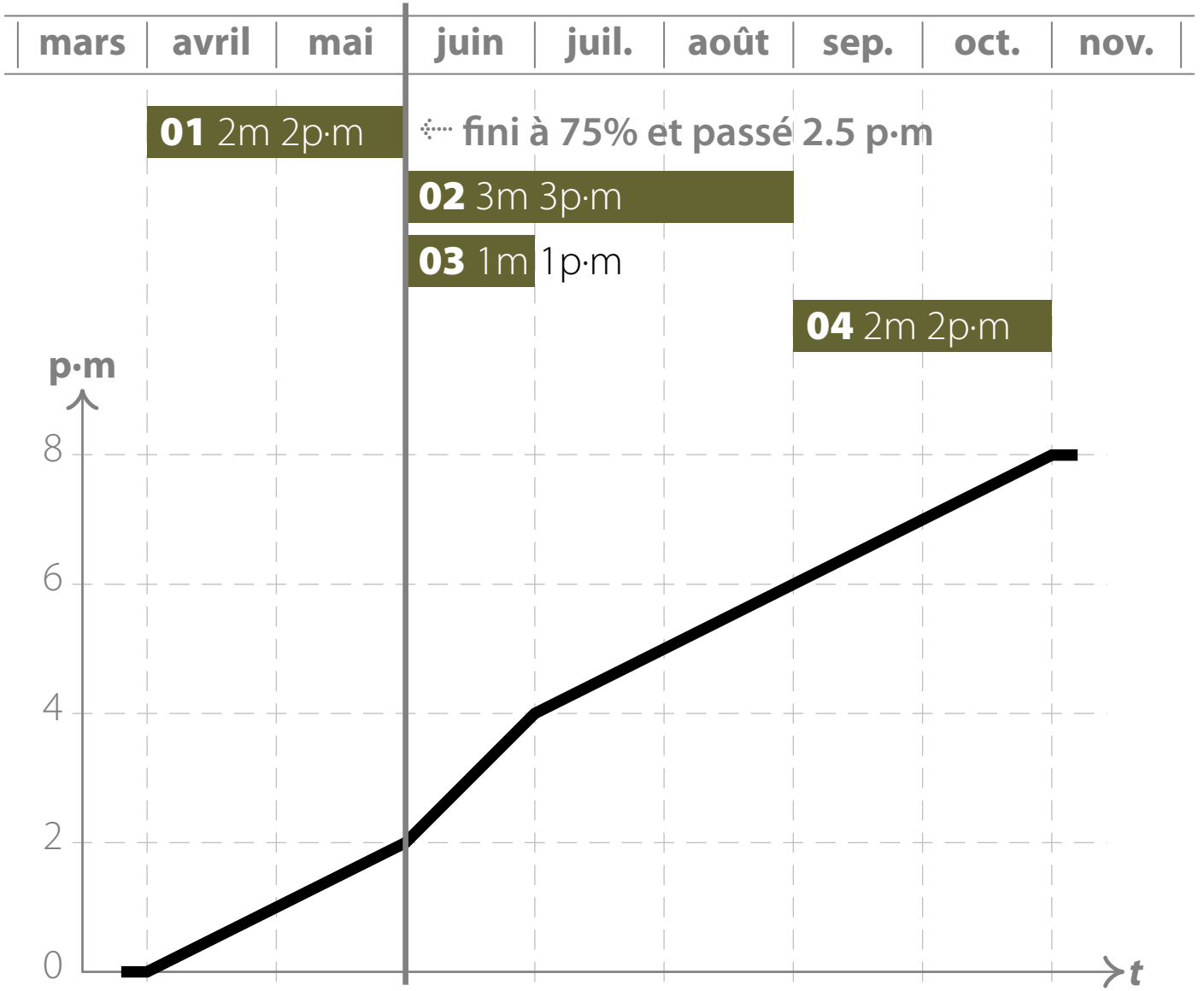

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m CHF 5k 1 p·m
02 3m CHF 45k 6 p·m
03 1m CHF 15k 2 p·m
04 2m CHF 25k 1 p·m
CHF
200k
180k
160k
140k
120k
100k
80k
60k
40k
20k
0k
1 p·m = CHF 10k
Ressources humaines
Ressources financières
t

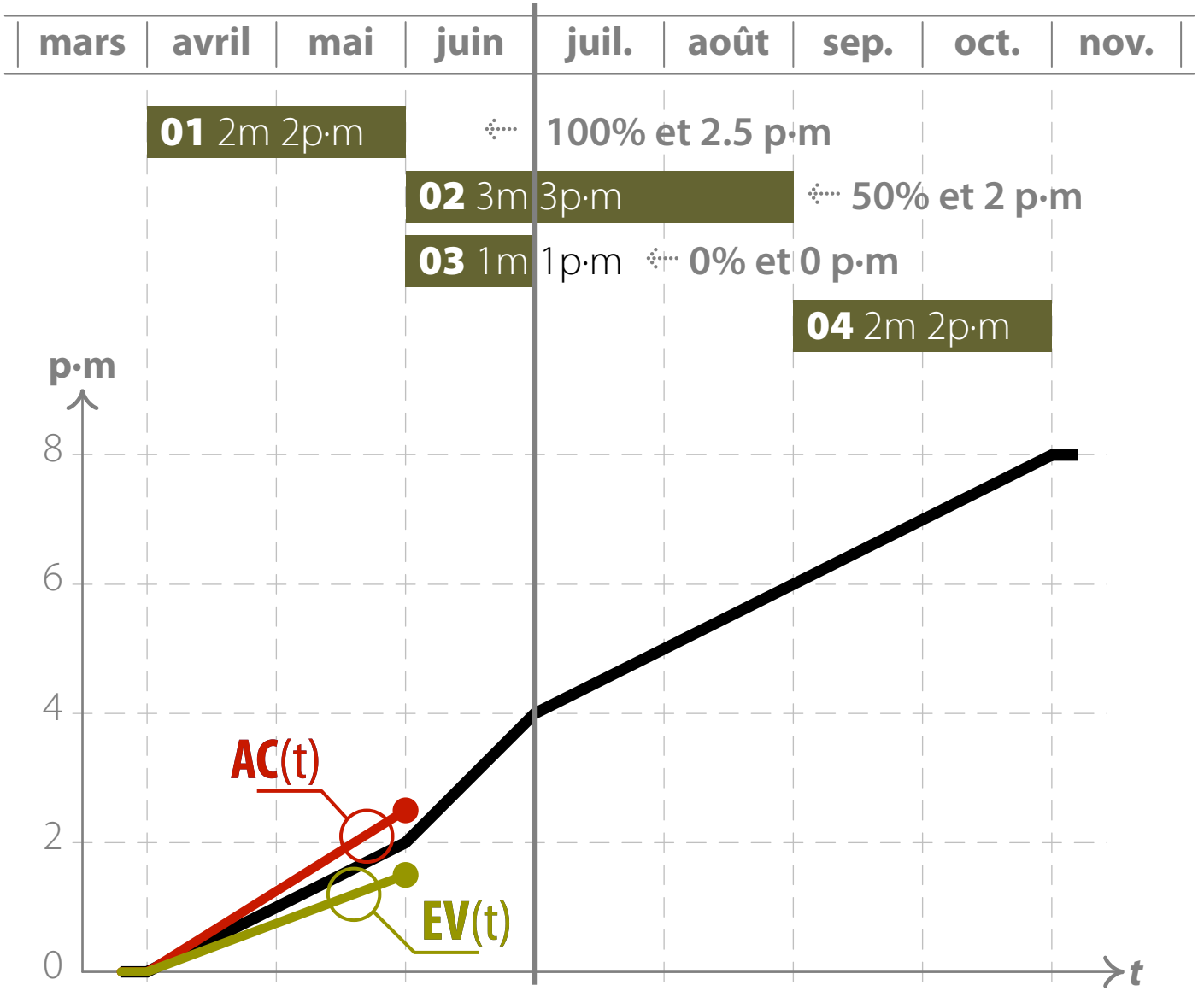
9.4.3

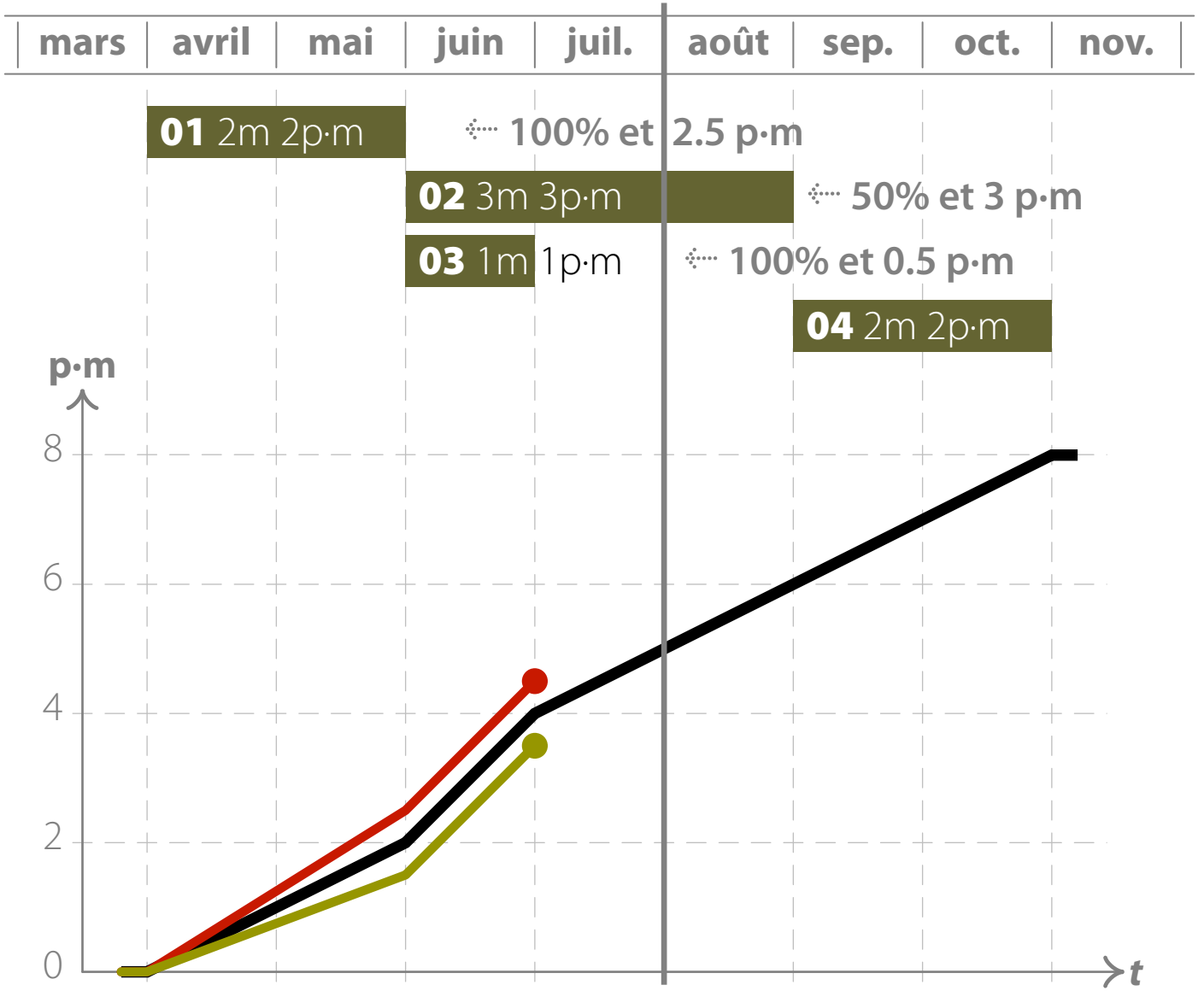
Progress Status Analyses

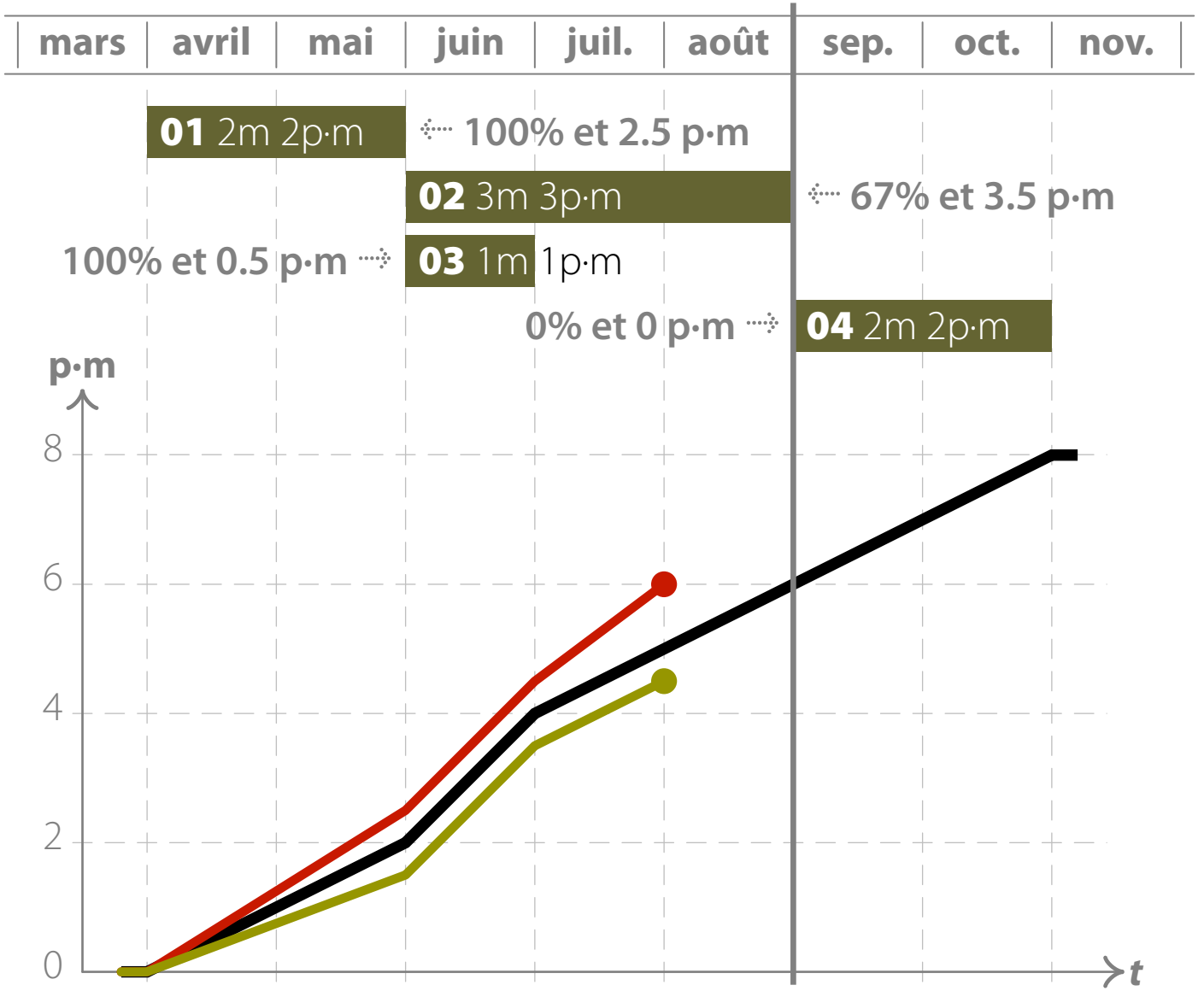
openSE

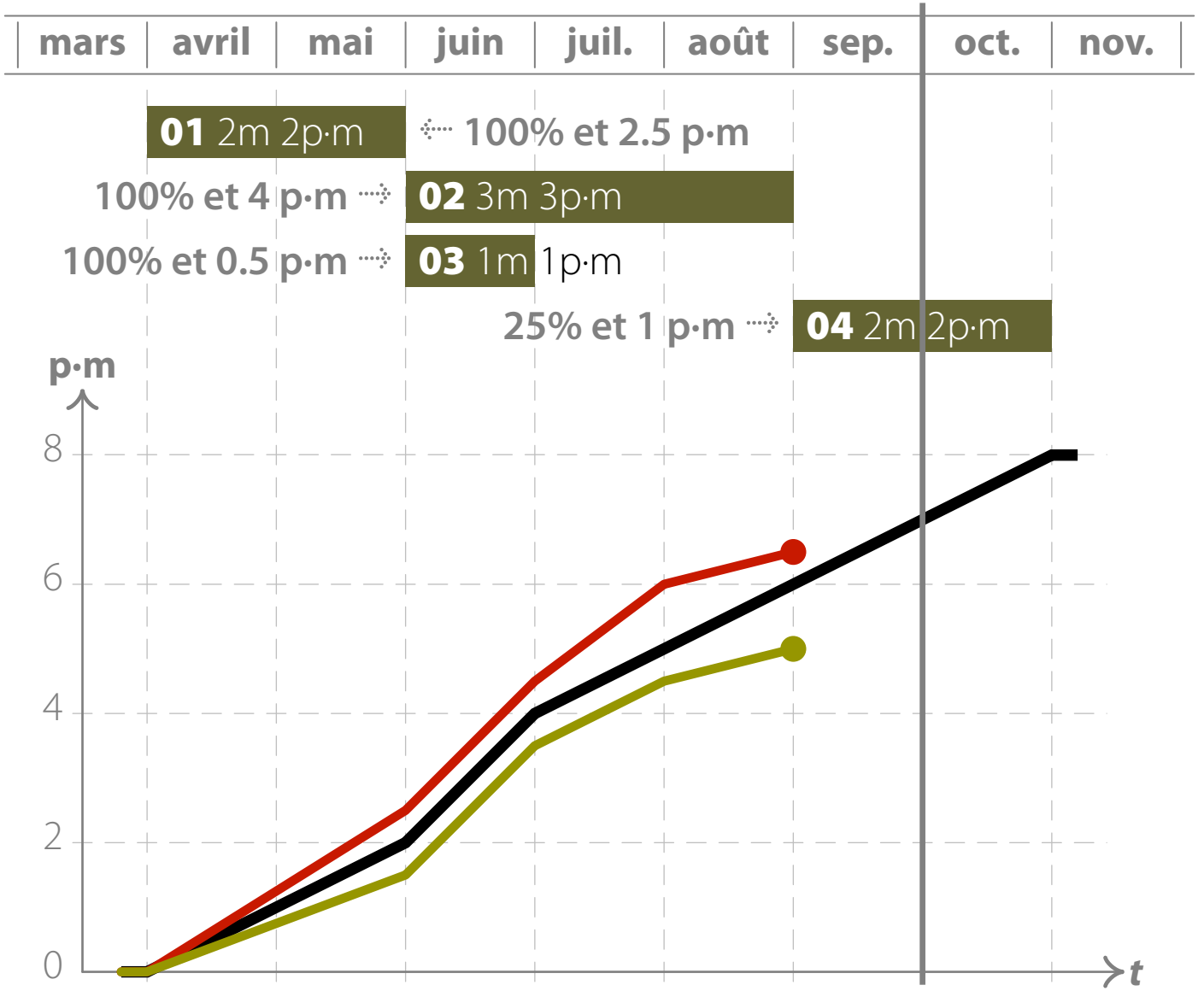

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t

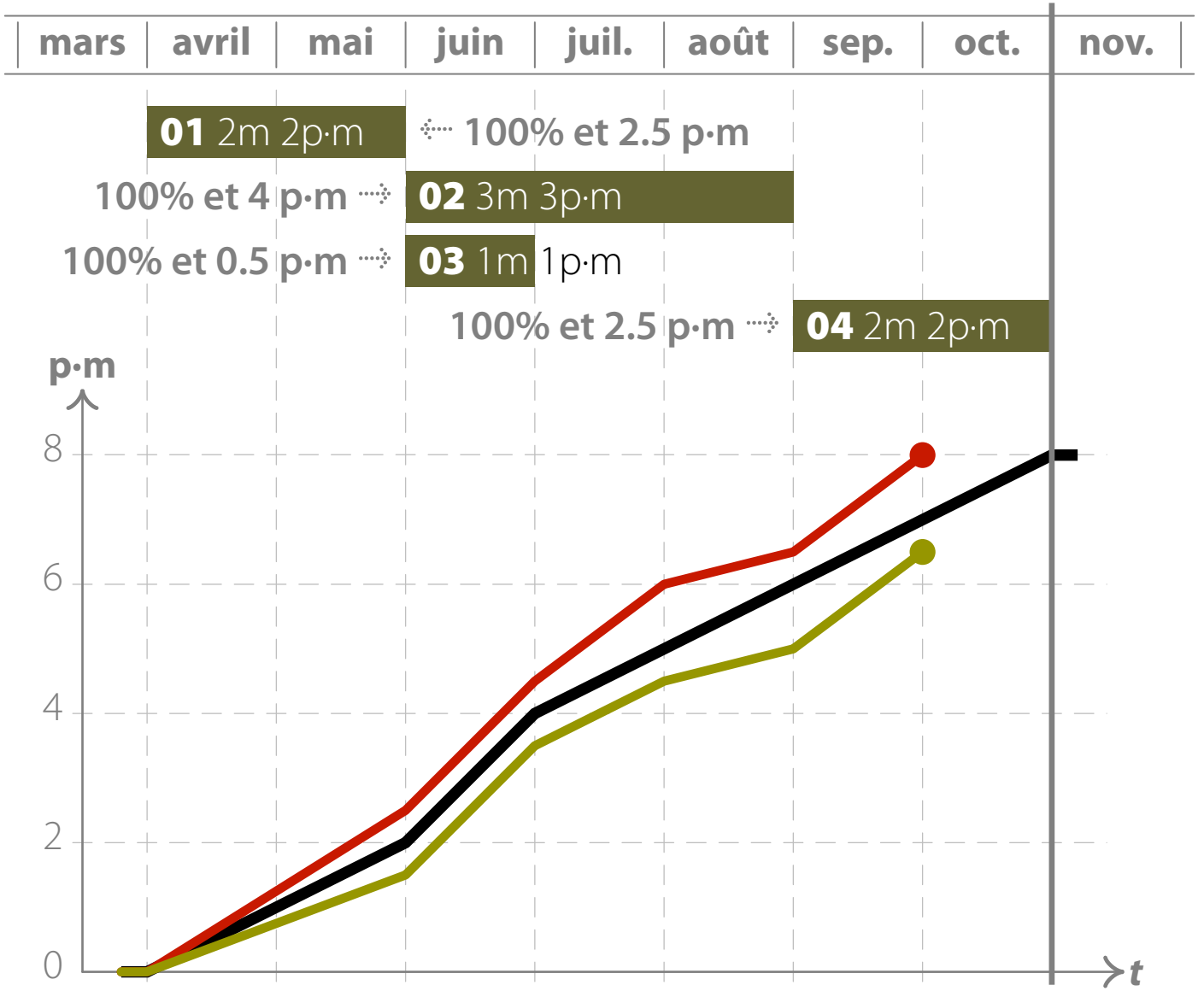

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
fini à 75% et passé 2.5 p·m
02 3m 3p·m
03 1m 1p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
02 3m 3p·m
50% et 2 p·m
03 1m 1p·m
0% et 0 p·m
04 2m 2p·m
p·m
8
6
4
2
0
AC(t)
EV(t)
t


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
02 3m 3p·m
50% et 3 p·m
03 1m 1p·m
100% et 0.5 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
02 3m 3p·m
67% et 3.5 p·m
100% et 0.5 p·m
03 1m 1p·m
0% et 0 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
100% et 4 p·m
02 3m 3p·m
100% et 0.5 p·m
03 1m 1p·m
25% et 1 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t


mars
avril
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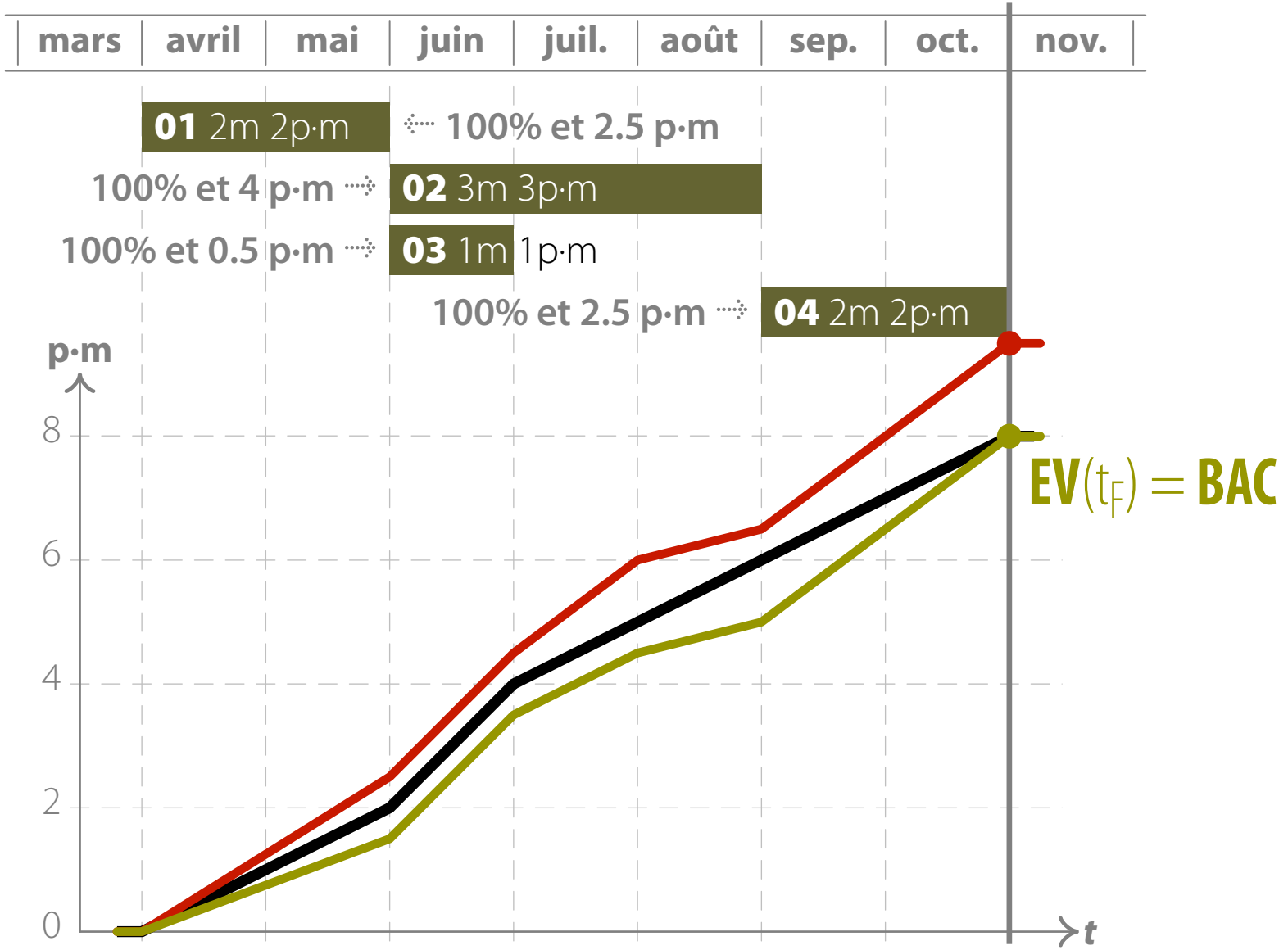
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
100% et 4 p·m
02 3m 3p·m
100% et 0.5 p·m
03 1m 1p·m
100% et 2.5 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t

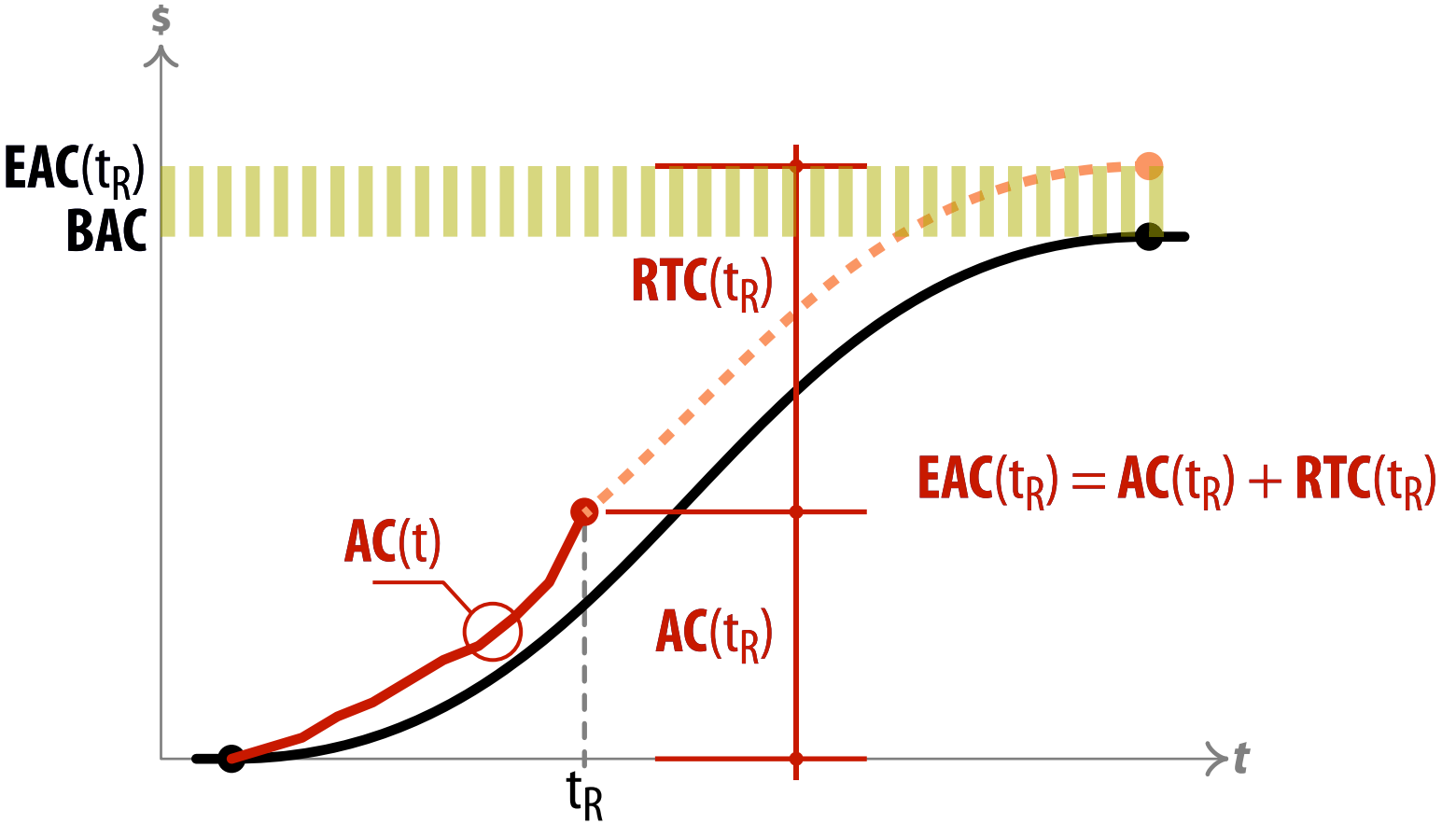

mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
100% et 4 p·m
02 3m 3p·m
100% et 0.5 p·m
03 1m 1p·m
100% et 2.5 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t
EV(t_F) = BAC

9.4.4

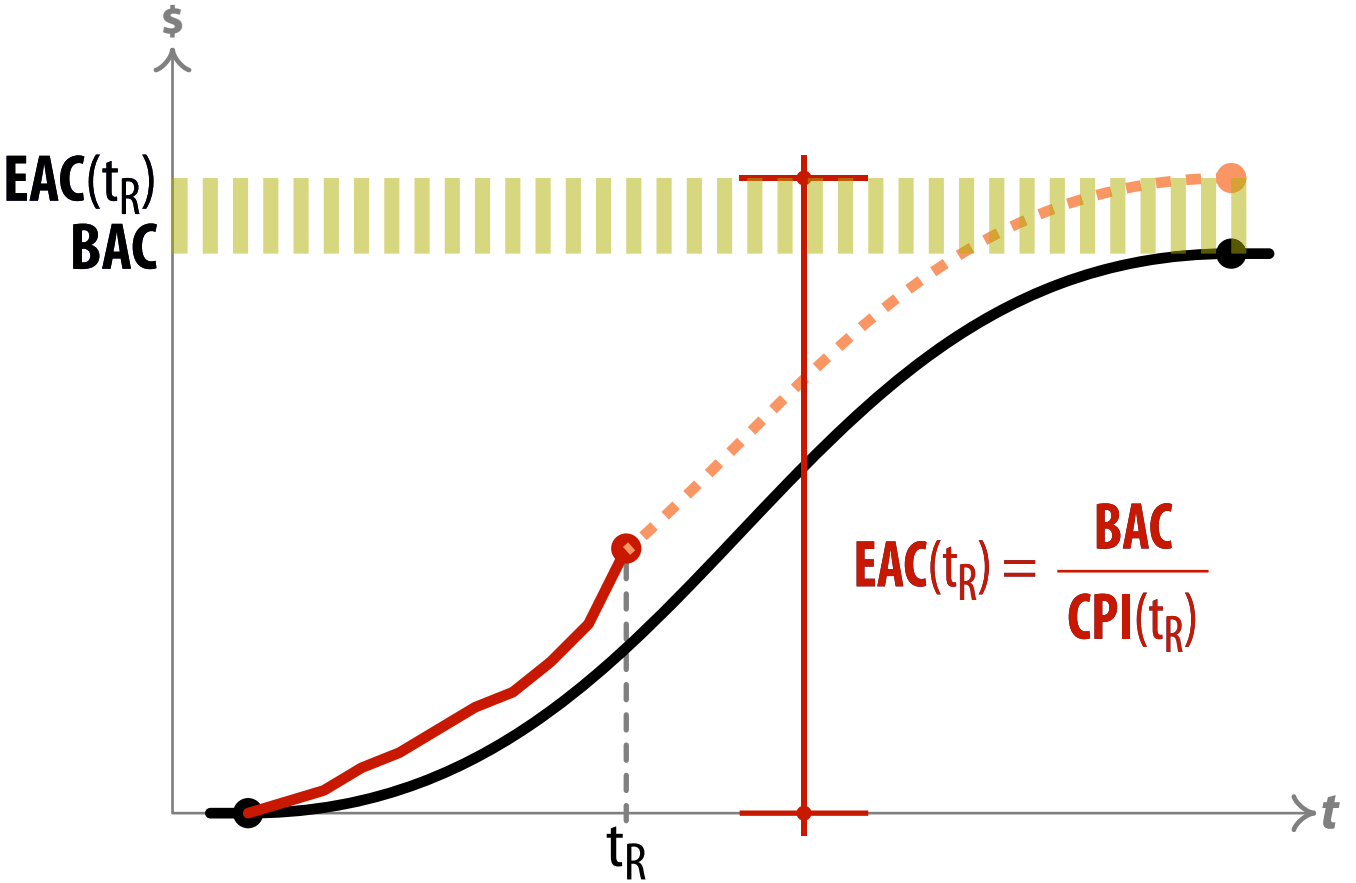
Estimates at Completion

openSE

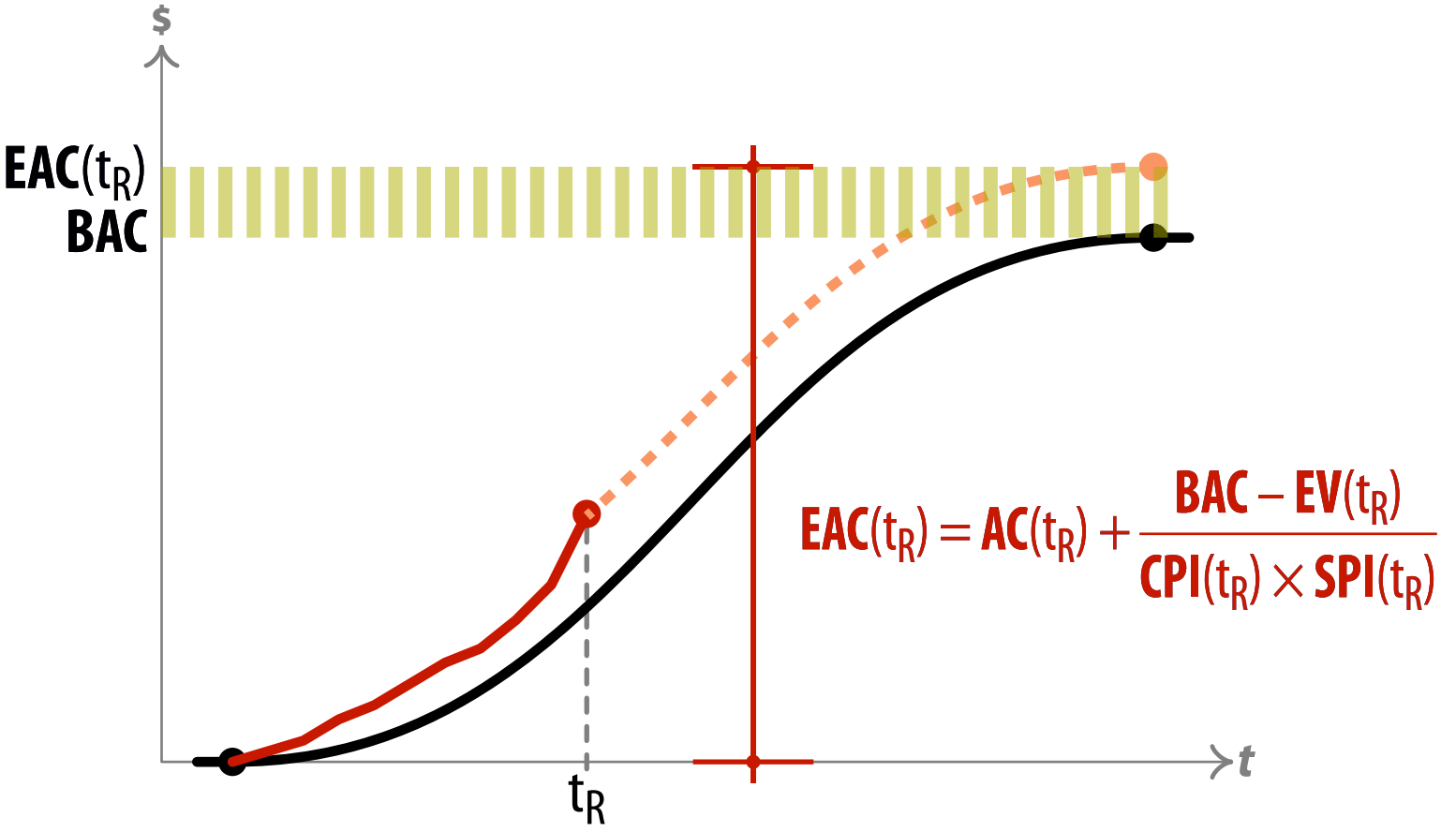
EVM ⇢ EAC, Estimation à l'achèvement, *Estimate At Completion.*



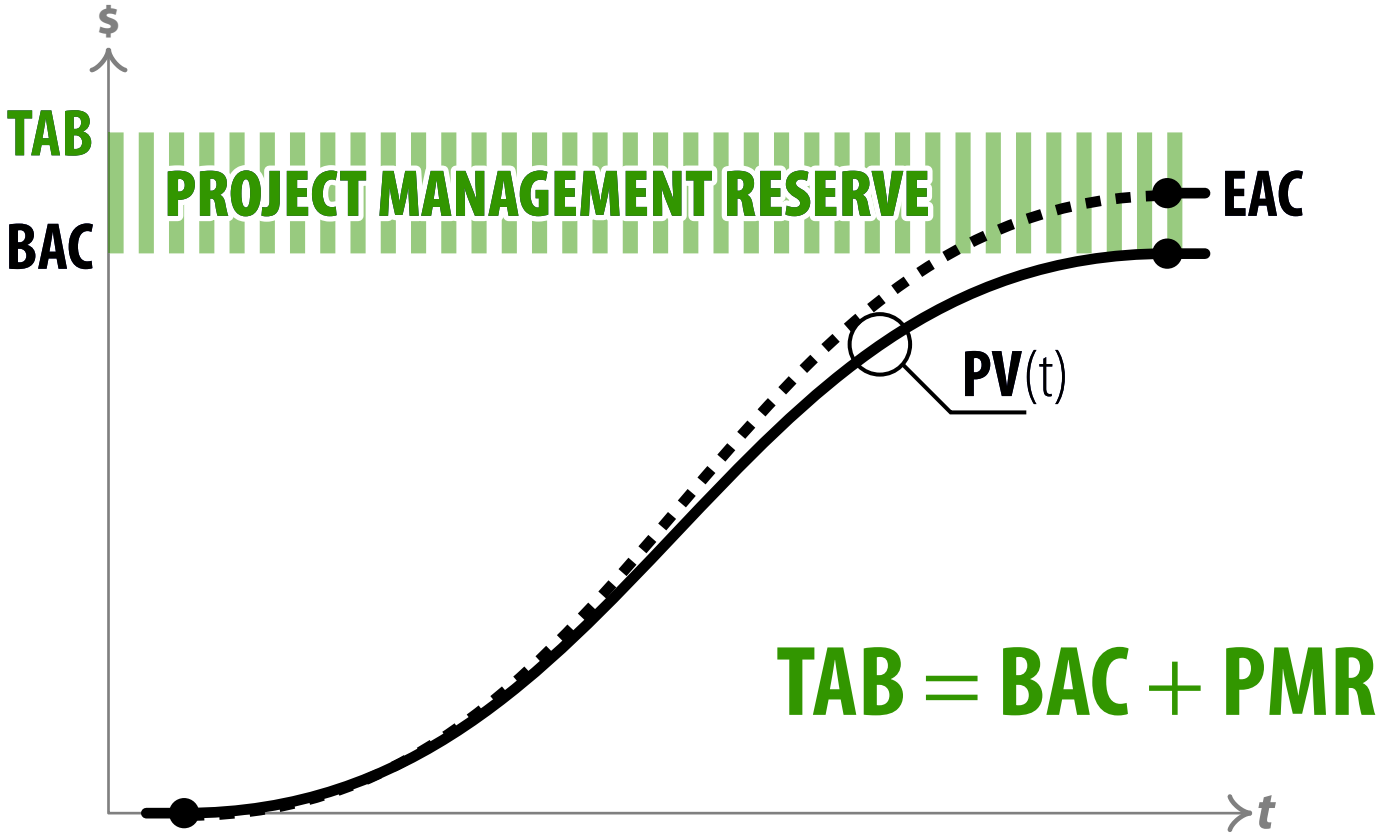
EVM → EAC, Estimation à l'achèvement, *Estimate At Completion.*

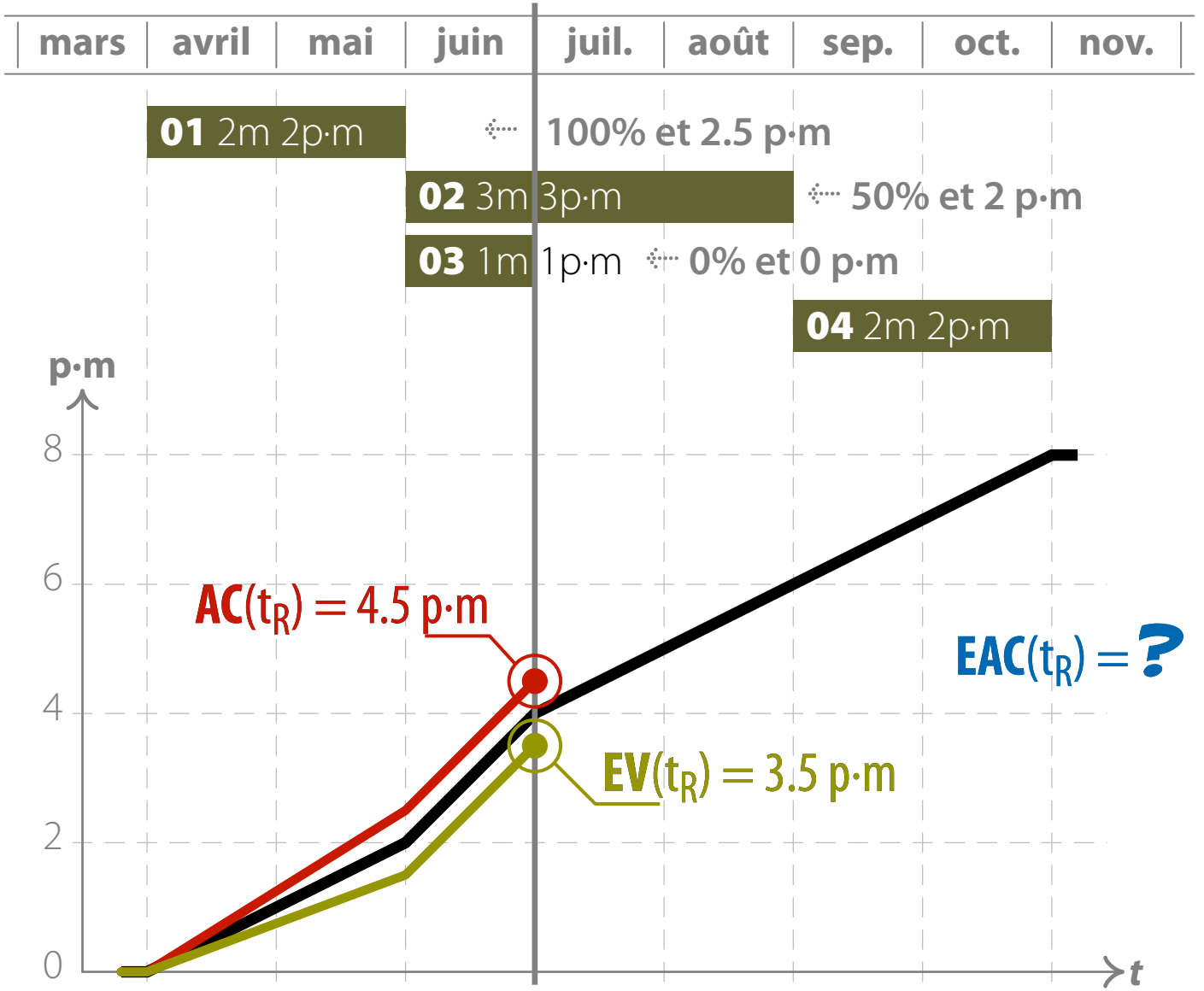


EVM ⇢ EAC, Estimation à l'achèvement, *Estimate At Completion.*



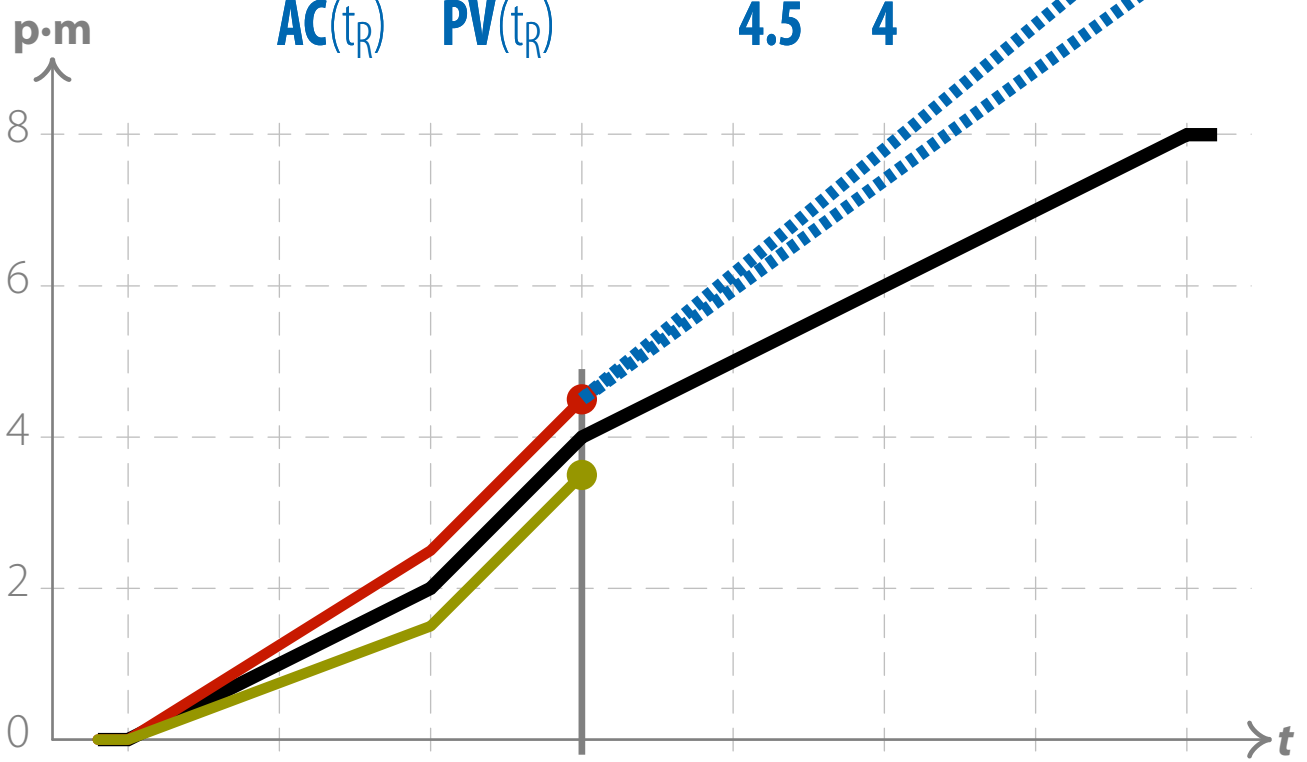
EVM → TAB, Budget total alloué,
Total Allocated Budget.

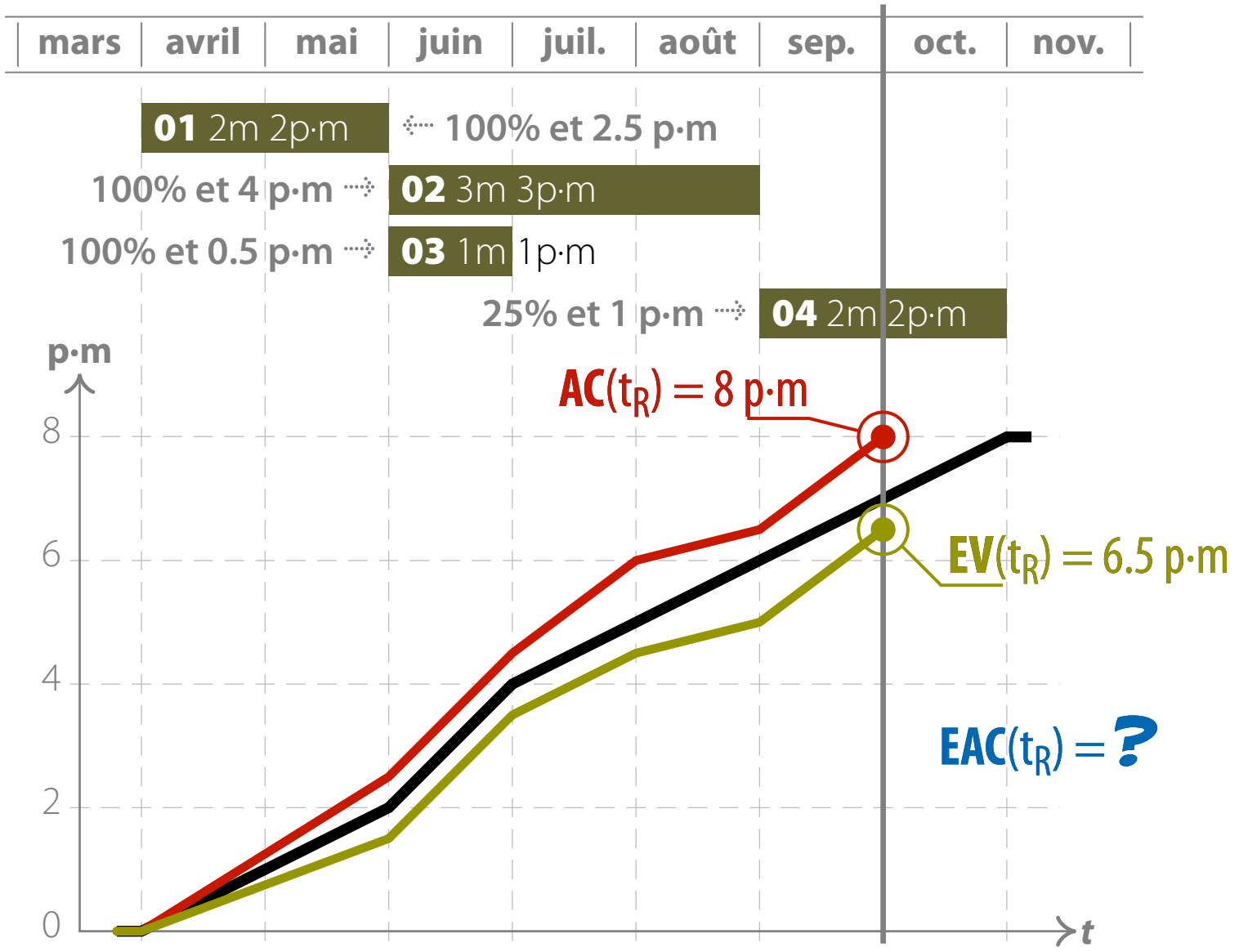



mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
02 3m 3p·m
50% et 2 p·m
03 1m 1p·m
0% et 0 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t
AC(t_R) = 4.5 p·m
EAC(t_R) = ?
EV(t_R) = 3.5 p·m

$$EAC(t_R) = \frac{BAC}{CPI(t_R)} = BAC \times \frac{AC(t_R)}{EV(t_R)} = 8 \times \frac{4.5}{3.5} = 10.3$$

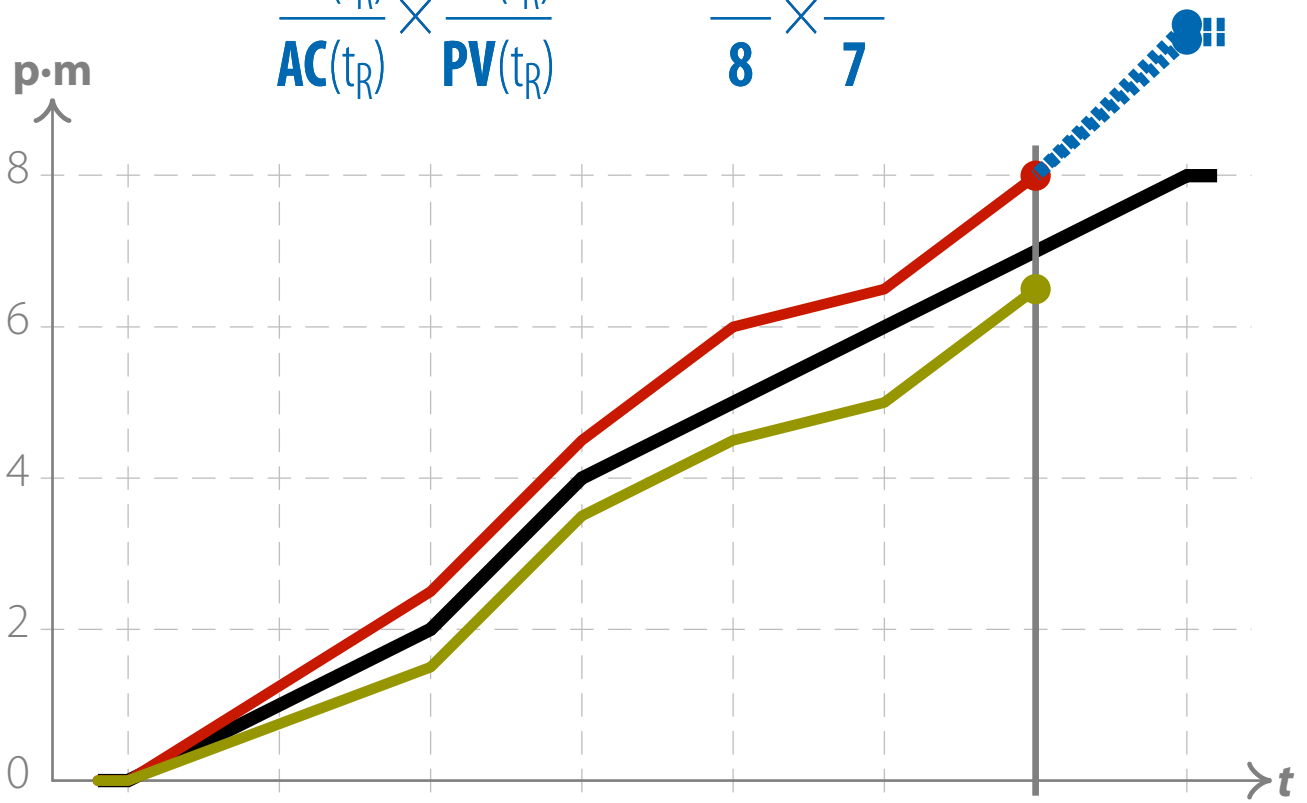
$$EAC(t_R) = AC(t_R) + \frac{BAC - EV(t_R)}{\frac{EV(t_R)}{AC(t_R)} \times \frac{EV(t_R)}{PV(t_R)}} = 4.5 + \frac{8 - 3.5}{\frac{3.5}{4.5} \times \frac{3.5}{4}} = 11.1$$




mars
avril
mai
juin
juil.
août
sep.
oct.
nov.
01 2m 2p·m
100% et 2.5 p·m
100% et 4 p·m
02 3m 3p·m
100% et 0.5 p·m
03 1m 1p·m
25% et 1 p·m
04 2m 2p·m
p·m
8
6
4
2
0
t
AC(tR) = 8 p·m
EV(tR) = 6.5 p·m
EAC(tR) = ?

$$EAC(t_R) = \frac{BAC}{CPI(t_R)} = BAC \times \frac{AC(t_R)}{EV(t_R)} = 8 \times \frac{8}{6.5} = 9.8$$

$$EAC(t_R) = AC(t_R) + \frac{BAC - EV(t_R)}{\frac{EV(t_R)}{AC(t_R)} \times \frac{EV(t_R)}{PV(t_R)}} = 8 + \frac{8 - 6.5}{\frac{6.5}{8} \times \frac{6.5}{7}} = 10.0$$



ALARA EVM

EVM applied to dose planning and follow-up

exotic approach

PV → **PW**	: Planned Work		
EV → **EW**	: Earned Work	[µSv]	
AC → **AD**	: Actual Dose		
SV → **WV**	: Work Variance	**WV = EW - PW**	
SPI → **WPI**	: Work Performance Index	**WPI =**	$\frac{EW}{PW}$
CV → **DV**	: Dose Variance	**DV = EW - AD**	
CPI → **DPI**	: Dose Performance Index	**DPI =**	$\frac{EW}{AD}$

Courtesy of **Thijs Wijnands**

9.4.5

32 Criteria (Guidelines) of ANSI/EIA-**748**-C

openSE

32 Guidelines of ANSI/EIA-748-C

Group 1 ⇢ Five **organization** criteria

INTERMEDIATE approach

Guideline #

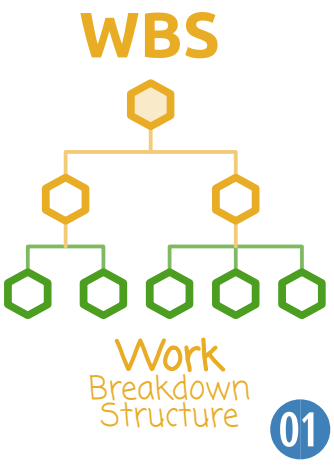
01 Define the work scope ⇢ **WBS**

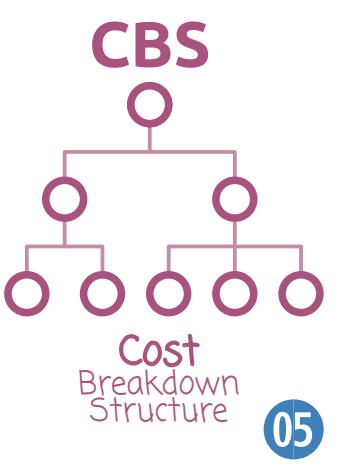
02 Define the project organization ⇢ **OBS** (and **RACI matrix**)

03 Integrate the project control processes to those of the organization

04 Organize overhead management ⇢ **indirect costs**

05 Integrate (i.e. matrix) the WBS and OBS ⇢ **control accounts** (**CBS**)





32 Guidelines of ANSI/EIA-748-C

Group 2 ⇢ **Planning, scheduling and budgeting** criteria

INTERMEDIATE
approach

06 Schedule tasks with network logic ⇢ **Coord. Schedule** 

07 Set progress **measurement indicators** (i.e. deliverables, results)

08 Set time-phased **detail budgets** for authorised work (i.e. at task level)

09 Set budgets by **cost elements** (i.e. manpower, material, etc.)

10 Create **work packages** (**WP**s) and **planning packages** (**PP**s)*

11 Sum detail budgets to **control accounts** (**CBS**)

12 Set **level-of-effort*** (**LoE**) **budgets** (direct costs)

13 Set **overhead budgets** (i.e. indirect costs)

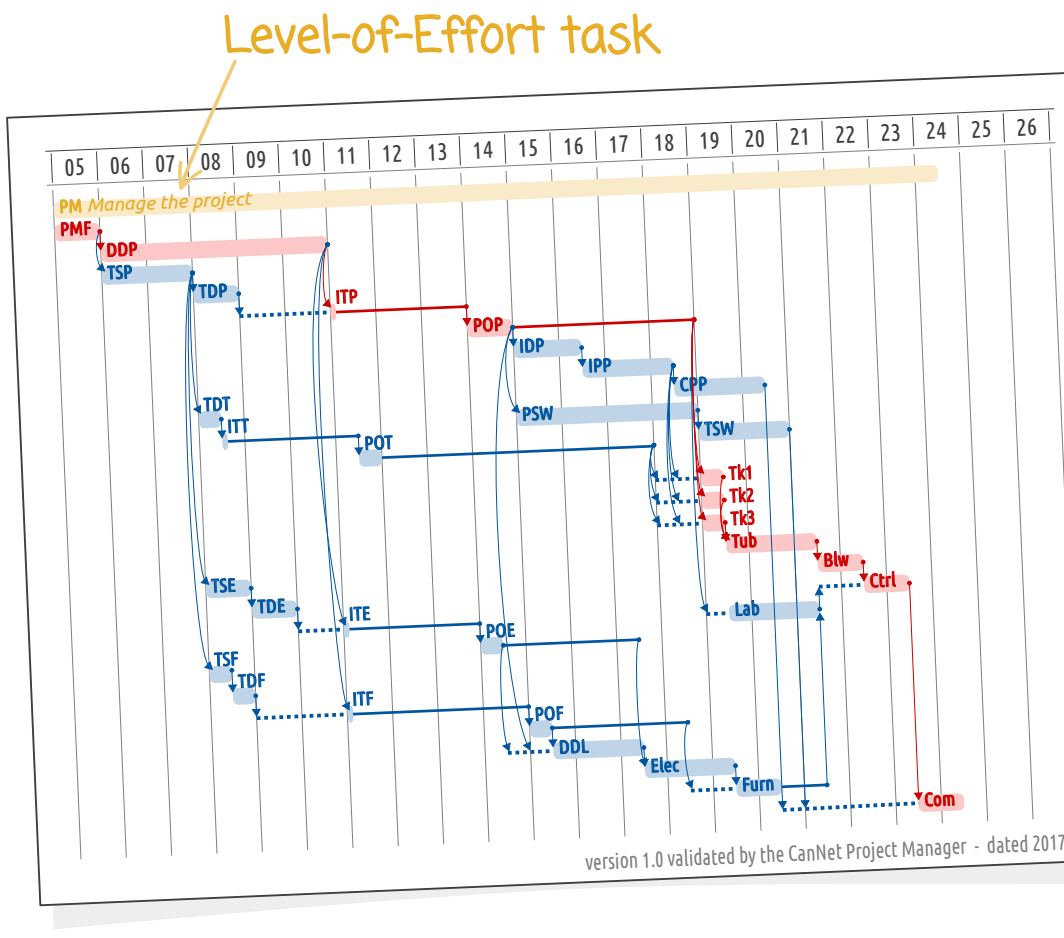
14 Set the **project management reserve** (**PMR**)*
Set **undistributed budgets** (**UB**s)*

15 Reconcile to **total allocated budget** (**TAB**)*

Level-of-Efforts (LoE) Budgets

INTERMEDIATE
approach

- Efforts that commence at project start and end at project finish
- No measurable performance basis
  EV(*t*) = **PV**(*t*)
  SV(*t*) = 0 always!
- LoE value < 10% BAC
- LoE tasks distort overall performance measurement
- Quarantine LoE outside the Performance Management Baseline



Budget Element Hierarchy

INTERMEDIATE approach

Total Allocated Budget

TAB

Performance Management Baseline

PMB

15

PMR

Project Management Reserve

Budget At Completion

BAC

DBs Distributed Budgets

SLPPs Summary Level Planning Packages

14

UBs Undistributed Budgets

WPs Work Packages

10 12

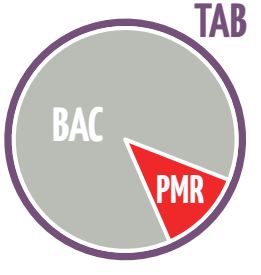
PPs Planning Packages

CAs Control Accounts

11

Time-Phased Cost Elements

06 07 08 09



NDIA (2014) EVMS ANSI/IEA-478-C Intent Guide [Fig. 3, p. 15]

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Group 3 ⇢ **Accounting consideration** criteria

INTERMEDIATE approach

16 Record **direct costs** from the accounting system ⇢ **AC**s

17 Summarize direct costs by **WBS** element

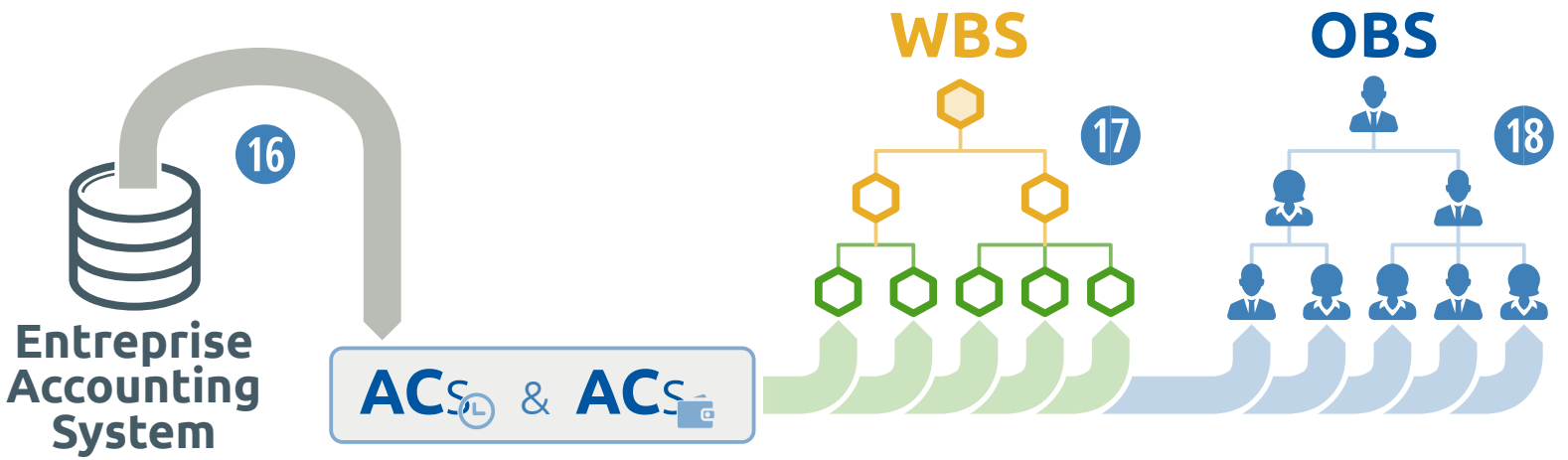
18 Summarize direct costs by **OBS** element

19 Record/allocate **indirect costs**

20 Identify **unit costs** or **lot costs**

21 Track and report **material costs** and **quantities** ⇢ **EV**s

21 **EV**s / **PV**s



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Group 4 ⇢ **Analysis and management reports** criteria

INTERMEDIATE approach

22 Calculate (at least monthly) EVM **indicators** ⇢ **SV**, **CV**, **SPI**, **CPI**, **EAC**, etc.

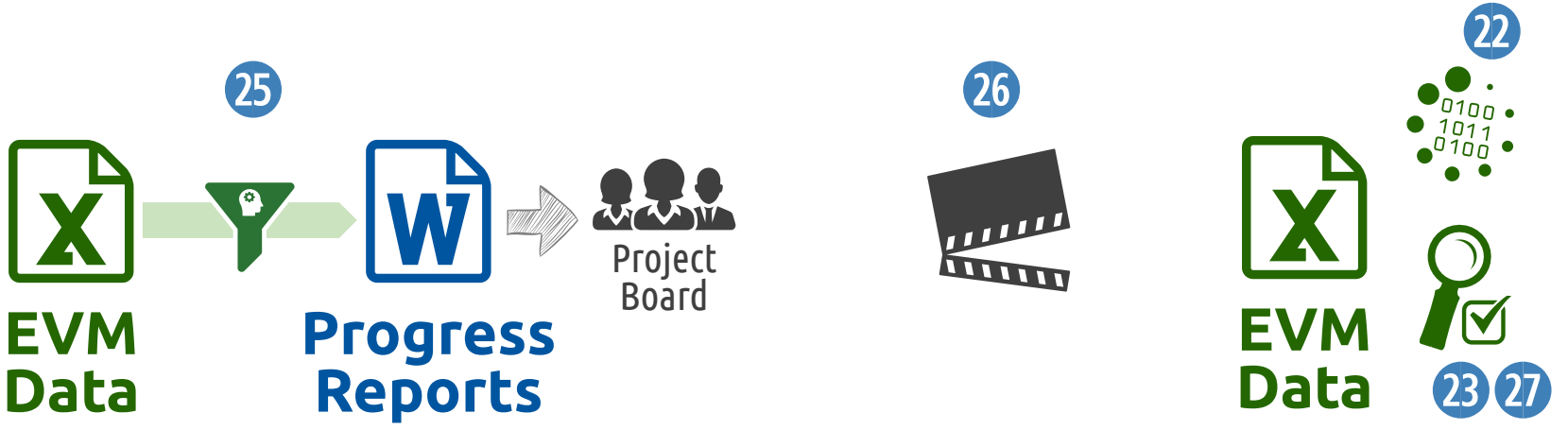
23 Explain **significant variances**

24 Identify and explain **indirect cost variances**

25 Summarize EVM information for the **project board**

26 Implement **managerial actions** as result of guideline 26

27 Revise **estimates at completion** ⇢ **EAC**s



32 Guidelines of ANSI/EIA-748-C

Group 5 → **Revision and data maintenance** criteria

INTERMEDIATE approach

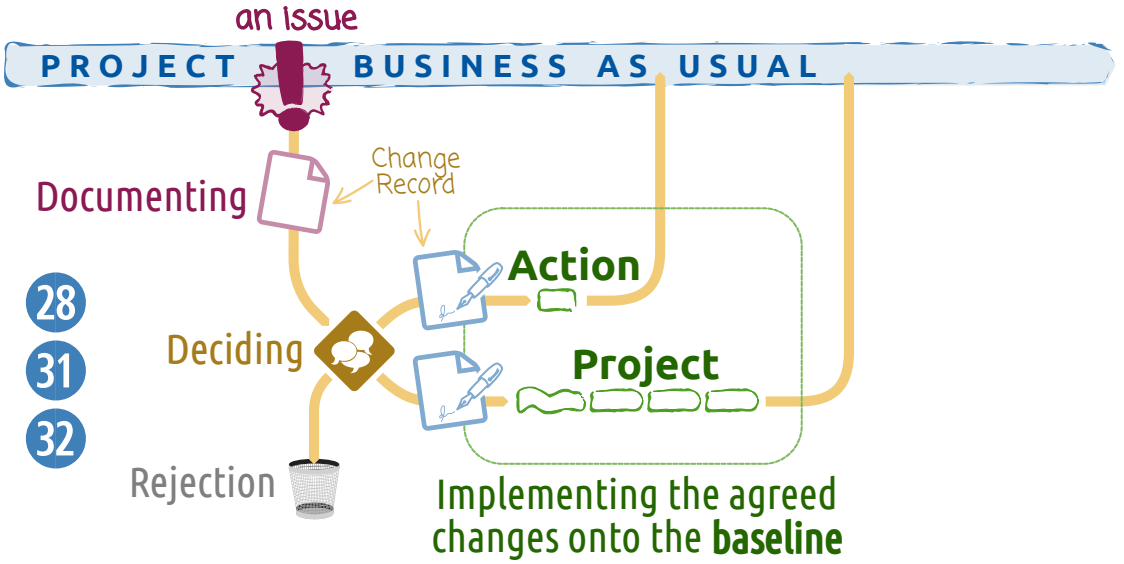
28 Incorporate **changes** in a timely manner

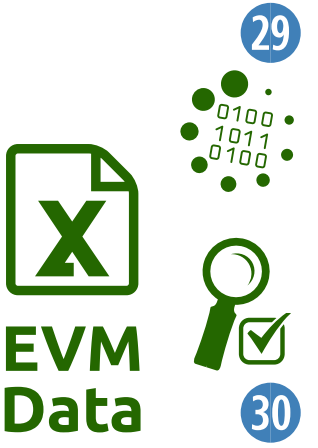
29 Reconcile **current budgets** with **prior budgets**

30 Control **retroactive adjustments** (commercial and economical fluctuations)

31 Prevent all but authorized budget changes

32 Document changes to the performance measurement baseline

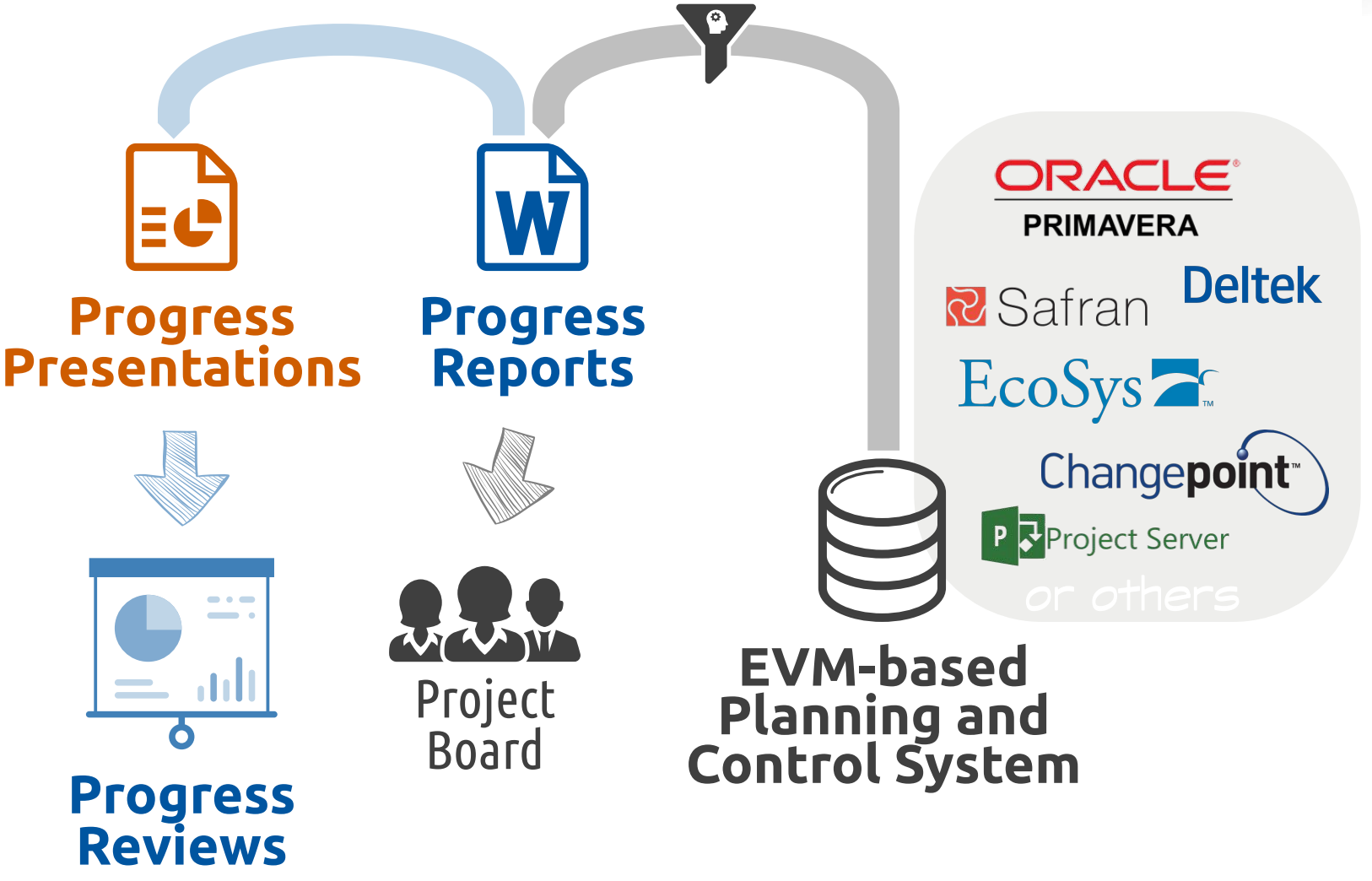




Project Control and Follow-up

The 'advanced toolbox'

ADVANCED approach



At **CERN**

Beam-facility related projects or large infrastructure projects

Progress Presentations

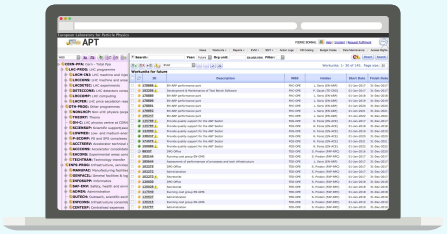
Progress Reports

Progress Reviews

Project Board

EVM-based Planning and Control System

APT



Contact
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Project Control and Follow-up

The 'advanced features'

ADVANCED approach

- **Deliverable**-oriented earned value management approach
- Dealing with **price escalation**, **inflation**, the **economical context**
- Augmenting earned value with **earned schedule**
- **Buffer**-based schedule progress monitoring
- Using stochastic models, vector machines, machine learning, etc. to derive **more accurate estimates at completion**

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