

2 Material and Method

The process underlying the Pomodoro Technique consists of five stages:

What	When	Why
Planning	at the start of the day	to decide on the day's activities
Tracking	throughout the day	to gather raw data on the effort expended and other metrics of interest
Recording	at the end of the day	to compile an archive of daily observations
Processing	at the end of the day	to transform raw data into information
Visualizing	at the end of the day	to present the information in a format that facilitates understanding and clarifies paths to improvement

Table 2.1 The Stages of the Pomodoro Technique

Note The basic iteration of the Pomodoro Technique lasts one day, but it could also be less. In this case, the five stages would take place more frequently.



Figure 2.1 The Pomodoro

To implement the Pomodoro Technique, all you need is the following:

- A Pomodoro: a kitchen timer (fig. 2.1)
- A To Do Today Sheet (Appendix 2), filled in at the start of each day with the following:
 - A heading with place, date, and author
 - A list of the things to do during the day, in order of priority
 - A section labelled Unplanned & Urgent Activities where any unexpected tasks that have to be dealt with should be listed as they come up. These activities could potentially modify the day's plan.
- An Activity Inventory Sheet (Appendix 3), consisting of:
 - A heading with the name of the author
 - A number of lines where various activities are noted down as they come up. At the end of the day, the ones that have been completed are checked off.
- A Records Sheet: This is the set of raw data needed to produce pertinent reports and graphics. Depending on the objectives in question, this contains different sets of boxes. Normally, this sheet would include the date, description, and the number of Pomodoros worth of effort needed to accomplish a task. This sheet is updated at least once a day, usually at the end of the day.

In the simple examples shown in this paper, the Recording, Processing and Visualizing stages are done directly on the Records Sheet.

Note Due to typographical constraints, the sheets used in this paper only show the entries relating to the topic in question. Simple models of the sheets described here are provided in the Appendices, and can be used to practice the Technique.

An evolutionary approach to the use of the Pomodoro Technique is provided below, oriented toward a progressive experimentation of the Technique itself. Clearly, the incremental nature of the Technique means the objectives should be achieved in the order they are given here.

2.1 Objective I: Find Out How Much Effort an Activity Requires

The traditional Pomodoro is 30 minutes long: 25 minutes of work plus a 5-minute break. At the beginning of each day, choose the tasks you want to tackle from the Activity Inventory Sheet, prioritize them, and write them down in the To Do Today Sheet (Fig. 2.2).

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on <i>How to Learn Music</i> (max 10 pps)	
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> to 3 pps	

Figure 2.2 To Do Today Sheet

2.1.1 Start the First Pomodoro

Set the Pomodoro for 25 minutes and start the first activity on the To Do Today Sheet. Whoever is using the Pomodoro, whether one person or more than one, should always be able to clearly see how much time is left (fig. 2.3).



Figure 2.3 The Pomodoro: The time remaining should always be visible.

A Pomodoro can't be interrupted; it marks 25 minutes of pure work. A Pomodoro can't be split up; there is no such thing as half of a Pomodoro or a quarter of a Pomodoro. The atomic unit of time is a Pomodoro. (Rule: A Pomodoro Is Indivisible.) If a Pomodoro is definitively interrupted by someone or something, that Pomodoro should be considered void, as if it had never been set; then you should make a fresh start with a new Pomodoro. When the Pomodoro rings, mark an X next to the activity you've been working on and take a break for 3-5 minutes.

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write the article on <i>How to Learn Music</i> (max 10 pps)	X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> down to 3 pps	

Figure 2.4 To Do Today Sheet: the first Pomodoro.

When the Pomodoro rings, this signals that the current activity is preemptorily (though temporarily) finished. You're not allowed to keep on working "just for a few more minutes", even if you're convinced that in those few minutes you could complete the task at hand.

The 3-5 minute break gives you the time you need to "disconnect" from your work. This allows the mind to assimilate what's been learned in the last 25 minutes, and also provides

you with the chance to do something good for your health, which will help you to do your best during the next Pomodoro. During this break you can stand up and walk around the room, have a drink of water, or fantasize about where you'll go on your next vacation. You can do some deep breathing or stretching exercises. If you work with other people, you can swap a joke or two, and so on.

During this quick break, it's not a good idea to engage in activities that call for any significant mental effort. For example, don't start talking about work-related issues with a colleague; don't write important emails or make imperative phone calls, etc. Doing these kinds of things would block the constructive mental integration that you need in order to feel alert and ready for the start of the next Pomodoro. You should include these activities in your Activity Inventory, and earmark specific Pomodoros to do them. Clearly, during this break you shouldn't continue thinking about what you've done during the last Pomodoros. Once the break is over, set the Pomodoro to 25 minutes and continue the activity at hand until the next time it rings. Then mark another X on the To Do Today Sheet (fig. 2.5).

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write the article on <i>How to Learn Music</i> (max 10 pps)	X X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> down to 3 pps	

Figure 2.5 To Do Today Sheet: The second Pomodoro.

Next comes the 3-5 minute break, and then a new Pomodoro.

2.1.2 Every Four Pomodoros

Every four Pomodoros, stop the activity you're working on and take a longer break, from 15 to 30 minutes.

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write the article on <i>How to Learn Music</i> (max 10 pps)	X X X X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> down to 3 pps	

Figure 2.6 To Do Today Sheet: The end of the first set of Pomodoros.

The 15-30 minute break is the ideal opportunity to tidy up your desk, take a trip to the coffee machine, listen to voice mail, check incoming emails, or simply rest and do breathing exercises or take a quick walk. The important thing is not to do anything complex, otherwise your mind won't be able to reorganize and integrate what you've learned, and as a result you won't be able to give the next Pomodoro your best effort. Obviously, during this break too you need to stop thinking about what you did during the last Pomodoros.

2.1.3 Completing an Activity

Keep on working, Pomodoro after Pomodoro, until the task at hand is finished, and then cross it out on the To Do Today Sheet (fig. 2.7).

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on <i>How to Learn Music</i> (max 10 pps)	X X X X X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> down to 3 pps	

Figure 2.7 To Do Today Sheet: Completing an activity.

Specific cases should be handled with common sense:

- If you finish a task while the Pomodoro is still ticking, the following rule applies: If a Pomodoro Begins, It Has to Ring. It's a good idea to take advantage of the opportunity for *overlearning* (17), using the remaining portion of the Pomodoro to review or repeat what

you've done, make small improvements, and note down what you've learned until the Pomodoro rings.

- If you finish an activity in the first five minutes of the Pomodoro and you feel like the task was actually already finished during the previous Pomodoro and revision wouldn't be worthwhile, as an exception to the rule the current Pomodoro doesn't have to be included in the Pomodoro count.

Once the current activity has been successfully completed, move on to the next one on your list, then the next, taking breaks between every Pomodoro and every four Pomodoros (fig. 2.8)

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on How to Learn Music (max 10 pps)	X X X X X
	Finetune How to Learn Music by reading it out loud	X X
	Condense How to Learn Music down to 3 pps	X X X

Figure 2.8 To Do Today: Completing several activities.

2.1.4 Recording

At the end of every day, the completed Pomodoros can be transferred in a hard-copy archive. As an alternative, it may be more convenient to use an electronic spreadsheet or a database, and delete the completed activities from the Activity Inventory Sheet.

What you track and record depends on what you want to observe and the kind of reports that you want to generate. The initial aim of tracking and later recording could simply be to present a report with the number of Pomodoros completed per task. In other words, you may want to show the effort expended to accomplish each activity. To do so, the following boxes can be used: the date, start time, type of activity, description of the activity, the actual number of Pomodoros, a short note on the results achieved, and possible room for improvement, or problems that may have come up (fig. 2.9). This initial recording model actually represents the report you want. It's easy to draw up, even on paper.

RECORDS					Marco Rossi
Date	Time	Type	Activity	Actual Pomodoros	Notes
12 July 2006	08:30	Writing	How to Learn Music	5	7 pps
12 July 2006	11:30	Finetuning	How to Learn Music	2	
12 July 2006	14:00	Condensing	How to Learn Music	3	from 7 to 3 pps

Figure 2.9 Records Sheet

How did Marco fill in the time he began an activity if he didn't track it? With the Pomodoro Technique, it's not essential to track the start time for an activity (or for every Pomodoro). What's important is to track the number of Pomodoros actually completed: the real effort. This point is the key to fully understanding the Pomodoro Technique. Since tracking is done at least once a day, remembering and reconstructing the start times for activities isn't difficult; in fact, this kind of recall is a beneficial mental exercise.

Note A useful technique for remembering start times is to do a rundown of the day beginning with the most recent activity and moving backwards to the first one.

2.1.5 Improvement

Recording provides an effective tool for people who apply the Pomodoro Technique in terms of self-observation and decision-making aimed at process improvement. For example, you can ask yourself how many Pomodoros a week you spend on work activities and on explorative activities, or how many Pomodoros you do on an average day of the week, etc. You can also

ascertain if the stages in the process are all effective, or if one could be eliminated while still achieving the same results.

For instance, we can see in Figure 2.9 that it took Mark ten Pomodoros to write, finetune, and condense the article *How to Learn Music*. That seems like too many. Mark would really like to get the same result with nine Pomodoros or less. Then he would have one or more Pomodoros for free time for other activities. “I’d like to try to write the next article with the same quality and less effort. How? What should I cut out? What activities are really useful? How can I reorganize them to be more effective?” This is the type of question that enables people to improve, or at least to try to improve, their work or study processes. At the end of the day, the activity of recording and later looking for ways to improve should not take more than one Pomodoro.

2.1.6 The Nature of the Pomodoro

The Pomodoro marks the passage of time, and so it is itself a measure of the dimension of time. It becomes a measure of the dimension of effort when it is combined with the number of people involved in an activity. Depending on this number, we can say that a given task was accomplished with a certain number of Person Pomodoros or Pair Pomodoros or Team Pomodoros, where these units measure effort. The quantities of effort relative to different numbers of people are not homogeneous; they can’t be added together or compared with one another. The work of an individual, a pair or a group represents a different way of combining production factors and also diverse means of communication. There are no formulas for converting Person Pomodoros to Pair Pomodoros or Team Pomodoros.

Note Let’s say we want to measure the cost of an activity performed by more than one person, either individually, in pairs, or in teams. By applying a monetary measurement it’s clear we can compare and add up the different amounts of effort. For example, let’s take an activity that’s achieved by the effort of 2 Person Pomodoros and 3 Pair Pomodoros. In terms of effort, these amounts can not be directly compared or summed in any way. However, by assigning a monetary value for the effort of one Pomodoro, for example €10.00, we can actually say that the activity costs $2 \times € 10.00 + 3 \times 2 \times € 10.00 = € 80.00$.

Nota The paper *Applying the Pomodoro Technique in Teams* explains how to track and record pair or group work.

2.2 Objective II: Cut Down on Interruptions

The length of a Pomodoro, 25 minutes, seems short enough to make it possible to resist being distracted by various kinds of interruptions. But experience shows that once you’ve started using the Pomodoro Technique, interruptions can become a real problem. That’s why an effective strategy is needed for minimizing unhandled interruptions and progressively increasing the number of Pomodoros that can be accomplished consistently without interruptions. There are two kinds of interruptions: internal and external.

2.2.1 Internal Interruptions – We Interrupt Ourselves

Even though a Pomodoro only lasts 25 minutes, it won’t be easy for everyone to finish the first few Pomodoros without giving in to some immediate need to interrupt the activity at hand: the need to stand up and get something to eat or drink, or to make a call that suddenly seems terribly urgent, or to look up something on the Internet this minute (it may be related or unrelated to the task at hand) or to check email this instant. Lastly, we might even need to rethink how we’ve prioritized this particular activity; we’re constantly second-guessing our daily planning or our decisions.

These kinds of distractions, or ways to procrastinate on the activity at hand, are called internal interruptions. They generally disguise our fear of not being able to finish what we’re working on the way we want and when we want. Internal interruptions are often associated with having little ability to concentrate.

How can we free ourselves from these internal interruptions?

We have to work on two fronts simultaneously:

- Make these interruptions clearly visible. Every time you feel a potential interruption coming on, put an apostrophe (‘) on the sheet where you record your Pomodoros. Then do one of the following:
 - Write down the new activity on the To Do Today Sheet under Unplanned & Urgent if you think it’s imminent and can’t be put off.
 - Write it down in the Activity Inventory, marking it with a “U” (unplanned); add a deadline if need be.
- Intensify your determination to finish the current Pomodoro. Once you’ve marked down the apostrophe, continue working on the given task till the Pomodoro rings. (Rule: Once a Pomodoro Begins, It Has to Ring.)

The aim is to accept the fact that needs do emerge, and they shouldn’t be neglected. Look at them objectively and if possible reschedule them for another time.

2.2.2 Scenario

An example will help clarify the dynamic of handling internal interruptions. During the second Pomodoro for writing the article on How to Learn Music, Mark suddenly feels he has to call his friend Carol to find out when his favorite rock group is having its next concert. Mark asks himself: “Is this really urgent? Do I have to do it today? No, I can put it off. Maybe an hour or two. Maybe even until tomorrow!” Mark puts an apostrophe on the To Do Today Sheet next to the current activity (fig. 2.10), adds an item to the Activity Inventory for unplanned activities (marked with a “U” – fig. 2.11) and continues with the Pomodoro.

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on <i>How to Learn Music</i> (max 10 pps)	‘
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> to 3 pps	

Figure 2.10 To Do Today Sheet: An internal interruption.

	ACTIVITY INVENTORY	Mark Ross
	...	
N	Call Carol: When’s the next rock concert?	
	...	

Figure 2.11 Activity Inventory Sheet: An unplanned activity.

Then Mark asks himself: “Does this activity have to be done by tomorrow? No, it just has to be done by the end of the week.” Mark adds this deadline in brackets next to the “U” (fig. 2.12).

	ACTIVITY INVENTORY	Mark Ross
	...	
N [14 July]	Call Carol: When’s the next rock concert?	
	...	

Figure 2.12 Activity Inventory Sheet: An unplanned activity with a deadline.

If Mark gets a sudden craving for a pizza 10 minutes later, he’ll mark down another apostrophe but this time he’ll note this activity on the To Do Today Sheet under Unplanned & Urgent (fig. 2.13). Then Mark continues with his Pomodoro.

It should come as no surprise that many of these distractions later prove to be anything but urgent, even to the person who wrote them down. Most likely at the end of the Pomodoro or the activity or the day, several items marked urgent or absolute priority will be handled in different ways.

- They'll be moved to the Activity Inventory. Maybe we can pick out a bike tomorrow.
- They'll be done during longer breaks. That's the time to look up jazz concerts in Rome in July, for example.
- They'll be deleted. Does Mark really want to order a pizza along with spring rolls and Peking duck? He might even realize he doesn't want to order anything and he'll eat at the end of the day.

It's a different mind that reads over those items at the end of a Pomodoro, or a set of four, or at the end of the day, and it's sometimes surprising. Truly urgent tasks are always highlighted on the To Do Today Sheet. The aim of the Pomodoro Technique is to ensure that the current Pomodoro isn't interrupted by these activities. Instead, the following options are available:

- They can be done during the next Pomodoro (but still measured by a Pomodoro), in place of other activities.
- They can be re-scheduled sometime during the day, in place of other activities.
- They can be moved from Pomodoro to Pomodoro if possible till the end of the day. This helps us gradually learn to recognize what's really urgent.

If and when unplanned urgent activities are done during the day, the relative Pomodoros are marked down in the proper space (fig. 2.16). In all the cases discussed so far, the interruptions can be considered handled. Note that the mechanism for handling interruptions consists of inverting the dependency on internal interruptions, and consequently making these interruptions depend on the Pomodoros we decide to slot them into.

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on <i>How to Learn Music</i> (max 10 pps) X X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> to 3 pps	
	UNPLANNED & URGENT	
	Order a pizza	
	Choose a bike to buy	
	Read article on learning music in Asia	X
	Look for jazz happenings in July in Rome on Internet	
	Check email	
	Order Chinese takeout	
	Tidy up desk drawers	
	Sharpen pencils	

Figure 2.16 To Do Today Sheet: Unplanned activity done during the day.

If you have to interrupt a Pomodoro, either because you give in to temptation or something really urgent comes up, there's only one thing to do: void the current Pomodoro, even if it's about to ring. (Rule: A Pomodoro Is Indivisible.) Then mark down an apostrophe where Pomodoros are recorded to keep track of the interrupted Pomodoro. Obviously, you can't mark the unfinished Pomodoro - which didn't actually ring - with an X. So, take a 5-minute break and start with a new Pomodoro.

The Next Pomodoro Will Go Better.

The first objective to achieve in cutting down on interruptions is to be aware of the number and type of internal interruptions. Observe them, accept them, and schedule them or delete them, as the case may be.

2.2.3 External Interruptions – We’re Interrupted by Others

People who work in social environments can be interrupted: your study partner asks you to explain a paragraph or suggests going to a movie after dinner; a phone call doesn’t get effectively filtered by the secretary; a colleague asks you how to compile a report; an email program constantly beeps every time a new message comes in. What should you do?

External interruptions call for the ability to “protect” the ticking Pomodoro. Up till now a major effort has been made to eliminate internal interruptions. Now the risk is that someone on the outside prevents you from having the pleasure of marking an X on your To Do Today Sheet.

The main difference between internal and external interruptions is that with the latter we need to interact with other people: we need to communicate. The mechanism for dealing with external interruptions is the same as that for internal ones: invert the dependency on interruptions, and make the interruptions depend on us.

A few examples are helpful to clarify what we actually need to do. Incoming phone calls can always be taken by the answering machine and messages listened to later. Emails can keep coming in without distracting our attention simply by deactivating acoustic signals for incoming messages. If a colleague or study partner comes over, you can politely say you’re busy and can’t be interrupted. (Some people use the humorous expression “I’m in the middle of a Pomodoro.”) Then tell the person that you’d rather call them back in 25 minutes, or in a few hours, or tomorrow, depending on how urgent and important the matter is.

Speaking from experience, true emergencies that need to be dealt with instantly are rare in real life. A 25-minute or 2-hour delay (four Pomodoros) is almost always possible for activities that are commonly considered urgent. This delay isn’t usually detrimental to the person who wants to communicate with you, but gives you an enormous advantage in terms of making your mind work effectively, finishing activities the way you want to and rescheduling urgent tasks. With practice, you’ll come to realize how often apparently urgent activities can even be postponed till the following day while still satisfying the person making the request.

So, Protect the Pomodoro means: inform effectively, negotiate quickly to reschedule the interruption, and call back the person who interrupted you as agreed. The Inform, Negotiate, Call Back Strategy enables you to control external interruptions by simply rescheduling them in a later Pomodoro the same day or another day according to the degree of urgency. The dependency inversion for interruptions lies in this mechanism: We’re no longer dependent on interruptions, interruptions depend on us (i.e. the Pomodoros we allocate for calling back).

The feedback from people who start applying the Pomodoro Technique is often the same: they discover they can have up to 10 or even 15 external interruptions during a single Pomodoro (25 minutes). If the people doing the interrupting learn that you’ll really call them back, and you’re not just putting them off, it won’t take long to see our habitual interrupters actually protecting the Pomodoro too. Many people who work with Pomodoro users say they have the feeling they’re working or studying with people who know how to appreciate the value of their own time. In operational terms, handling this type of interruption is like dealing with internal interruptions. In this case, too, we work on two fronts simultaneously:

- Make these interruptions clearly visible. Every time someone or something tries to interrupt a Pomodoro, put a dash (-) on the sheet where you record your Pomodoros, apply the Inform, Negotiate, and Call Strategy. Then do one of the following:
 - Write down the new activity on the To Do Today Sheet under Unplanned & Urgent if it has to be done today, adding the promised deadline in brackets in the left-hand margin.
 - Write it down in the Activity Inventory, marking it with a “U” (unplanned); add a deadline in brackets if need be.
- Intensify your determination to finish the current Pomodoro. Once you’ve marked down the dash, continue working on the given task till the Pomodoro rings.

This way, you’ll achieve the objective of remembering the commitment you made, as well as measuring daily external interruptions, without interrupting the Pomodoro. The example below shows two external interruptions handled in different ways during the second Pomodoro of Write an Article on *How to Learn Music* (fig. 2.17 and 2.18).

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	Write article on <i>How to Learn Music</i> (max 10 pps)	-- X
	Finetune <i>How to Learn Music</i> by reading it out loud	
	Condense <i>How to Learn Music</i> to 3 pps	
	UNPLANNED & URGENT:	
[15.40]	Email draft of article to Luke	

Figure 2.17 Things To Do Today Sheet: An unplanned urgent activity.

	ACTIVITY INVENTORY	Mark Ross
	...	
U[13July]	Make an appointment with Maestro Neri for interview	
	...	

Figure 2.18 Activity Inventory Sheet: An unplanned activity with a deadline.

If a Pomodoro absolutely has to be interrupted, either due to human weakness or for a real emergency, there's only one thing to do: void the current Pomodoro, even if it's about to ring. (Rule: A Pomodoro is Indivisible.) Then put a dash where you record Pomodoros to keep track of interrupted Pomodoros, and record the description and the deadline for the activity in the Unplanned & Urgent section. Then start the first Pomodoro for the urgent activity.

The Next Pomodoro Will Go Better.

The second objective to achieve in order to cut down on interruptions is to be aware of the number and type of external interruptions. Negotiate them and reschedule them depending on the real degree of urgency.

2.2.4 Systematic Interruptions

When applying the Pomodoro Technique, the first tangible consequence of having to systematically deal with internal and external interruptions is that Pomodoros earmarked for organizational activities emerge (emails, phone calls, meetings, etc.). The most natural and most common decision is to set aside one Pomodoro a day (or more if need be) to take care of urgent interruptions. The dependency inversion mechanism applied to protect the current Pomodoro actually serves to turn interruptions into Pomodoros dedicated to forms of communication. We should emphasize that Pomodoro users have the following objectives:

- To successfully delay these Pomodoros as far as possible, downgrading the degree of apparent urgency and incrementing the extent to which these activities can be controlled and scheduled
- To gradually cut down on the number of Pomodoros used for organizing the interruptions that come up throughout the day

People who start applying the Pomodoro Technique are always amazed when they measure the Pomodoros spent on work and study (without unhandled interruptions) and those used for organizational activities (which in part come from dealing with interruptions). In some teams, members start off with no more than 2-3 Pomodoros actually dedicated to work per day per person; the remaining Pomodoros are spent on meetings, phone calls, and emails.

2.2.5 Recording: Qualitative Estimation Errors in Planning

Look at the activities recorded daily and marked with a "U" in the Activity Inventory, and the ones marked Unplanned & Urgent on the To Do Today Sheet. By doing so, during the planning phase you can assess your ability to identify the number and type of activity that's most effective in reaching a given objective. The greater the number of unplanned activities involved, the greater the qualitative error in your initial estimate. So, you can measure the unplanned activities done to attain a certain objective. Clearly, you can also include the total number of internal and external interruptions on the Records Sheet to observe them and try to minimize them over time.

2.3 Objective III: Estimate the Effort for Activities

Once you've begun to master the technique and you've reached the first two objectives, you can start working on quantitative estimates. The long-term objective here is to successfully predict the effort that an activity requires.

The Activity Inventory lists all the activities that need to be done. These tasks come from planning, which is needed to identify ways to reach your objectives (for example, at the beginning of a project) and to deal with interruptions. Some activities lose their purpose over time, so they can be deleted from the Inventory.

At the start of each day, estimate how many Pomodoros each activity in the Inventory will take. Revise previous estimates, if need be. Record the estimated number of Pomodoros on the relative line (fig. 2.19). The Pomodoro estimate actually represents the number of Pomodoros needed for a certain number of people to accomplish an activity. So, this is a measure of effort. However, in the simple examples that follow, the number of Pomodoros always refers to one person.

	ACTIVITY INVENTORY	Lucy Banks
	...	
	Answer questions on thermodynamics in Ch 4	2
	Repeat laws of thermodynamics out loud to Mark	3
	Summarize laws of thermodynamics in writing	3
	Call Laura: invite her to the seminar on thermodynamics	
	Call Mark: give me my laptop back soon!	
	Call Andrew: buy tickets to concert?	
	Email Nick: how do you do ex. 2, p. 24?	
	...	

Figure 2.19 Activity Inventory Sheet: Daily estimate.

Estimates must always be based on complete Pomodoros, so figures like 5 ½ Pomodoro aren't allowed. In this case, count 6 Pomodoros. If an estimate is greater than 5-7 Pomodoros, this means that the activity in question is too complex. It's better to break it down into several activities; estimate these activities separately, and write them down on several lines in the Activity Inventory. The rule is: If It Takes More Than 5-7 Pomodoros, Break It Down. By doing so, not only do single activities become less complex, but estimates are also more accurate. This effect is magnified when the breakdown involves incremental activities, not simply smaller activities. (Incremental activities deliver a little bit of value at a time.)

If the estimate is less than one Pomodoro (e.g. the time it takes to call Laura to invite her to the thermodynamics seminar, or to call Mark to ask him to give back the laptop), similar activities should be combined till they add up to one Pomodoro of effort. The rule is: If It Takes Less Than One Pomodoro, Add It Up. So, there are two options for activities estimated to last less than one Pomodoro.

- Find and combine similar activities from the Activity Inventory until they add up to one Pomodoro of effort (fig 2.20).
- Leave the activity without an estimate and indicate that you'll combine it with another activity when you fill in the To Do Today Sheet.

	ACTIVITY INVENTORY	Lucy Banks
	...	
	Answer questions on thermodynamics in Ch 4	2
	Repeat laws of thermodynamics out loud to Mark	3
	Summarize laws of thermodynamics in writing	3
	Call Laura: invite her to the seminar on thermodynamics	
	Call Mark: give me my laptop back soon! + Call Andrew: buy tickets to concert?	1
	Email Nick: how do you do ex. 2, p. 24?	
	...	

Figure 2.20 Activity Inventory Sheet: Activities estimated at less than one Pomodoro.

In choosing one of the two possible strategies, remember that one of the functions of the Activity Inventory is to facilitate the choice of activities To Do Today. Take the first option if the activities in question are very similar or complementary; leave the other tasks without an estimate and combine them later. In any case, the greater the number of useful activities you have in the Activity Inventory, the simpler it will be to choose which strategy to use and how to combine the various tasks.

Note Any changes to the Activity Inventory can be made with a good pencil and an excellent eraser.

2.3.1 Available Pomodoros

Now that you have an estimate of the number of Pomodoros for each activity, you can decide to put together a set of activities that doesn't exceed the number of Pomodoros available in a day. Record these Available Pomodoros on the To Do Today Sheet; you would normally do so before actually listing the things to do. Figure 2.21 shows an example of eight Pomodoros available on July 12. Then, pick out the tasks to do for the day, combining activities if necessary. (Rule: If It Lasts Less Than One Pomodoro, Add It Up.) Write the activities you've chosen in order of priority on the To Do Today Sheet. For each one, every estimated Pomodoro is represented by an empty box (fig. 2.21).

	TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input type="checkbox"/> <input type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Summarize laws of thermodynamics in writing	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2.21 To Do Today Sheet: Estimated Pomodoros.

There's no point in adding activities beyond the total estimated eight Pomodoros. If the number of estimated Pomodoros is higher than the number of Pomodoros actually needed to complete the activities, the remaining number of Pomodoros can only be considered once you're finished. Then you can choose tasks from the Inventory to fill in that extra time.

2.3.2 Possible Scenarios

Set the timer, and as always, begin with the first activity on your list. Every time the Pomodoro rings, put an X in the first empty box (fig. 2.22).

	TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Summarize laws of thermodynamics in writing	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2.22 To Do Today Sheet: First Pomodoro estimated and accomplished.

If you finish the activity in the exact number of estimated Pomodoros, cross out the description of the activity as in Figure 2.23.

	TO DO TODAY	Roma, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Summarize laws of thermodynamics in writing	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2.23 To Do Today Sheet: Activities done in the exact number of estimated Pomodoros.

If you finish the activity in fewer Pomodoros than you estimated (overestimation error), again, cross out the description of the activity (fig. 2.24).

	THINGS TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
	Summarize laws of thermodynamics in writing	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2.24 To Do Today Sheet: Underestimation.

If you've used up the estimated Pomodoros and you still need more Pomodoros to finish the task you're working on (quantitative underestimation error), you can do one of two things:

- Continue and mark down the next Pomodoros without taking into account new estimates. Below is an example of a case where another Pomodoro is needed to complete an activity (fig. 2.25).

	TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
	Summarize laws of Thermodynamics in writing	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> X

Figure 2.25 To Do Today Sheet: Overestimation.

- Make a new estimate, in Pomodoros, and mark these new estimated Pomorodos to the right of the last estimated and completed Pomodoro using a different color or shape. This way, you can highlight the need for second or third estimates and verify relative error (fig. 2.26).

	TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
	Summarize laws of thermodynamics in writing	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2.26 To Do Today Sheet: Second estimate.

As you can see from Figure 2.27, the summary took Lucy four Pomodoros, three of which were originally estimated (underestimation) and only one of the two estimated later (overestimation).

	TO DO TODAY	Rome, 12 July 2006 Lucy Banks Available Pomodoros: 8
	Answer questions on thermodynamics in Ch 4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	Repeat laws of thermodynamics out loud to Mark	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
	Summarize laws of Thermodynamics in writing	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>

Figure 2.27 To Do Today Sheet: Finishing the activity with the second estimate.

Since tasks don't usually tend to last more than seven estimated Pomodoros (Rule: If It Lasts More Than 5-7 Pomodoros, Break It Down.), usually there are no more than three estimates. All the activities that require a third estimate have to be carefully reconsidered to understand the reasons why estimating was so complicated.

2.3.3 Recording Estimates

Clearly, now that we've introduced the concept of quantitative estimates, the objectives of the reporting system can be more ambitious. New objectives could be:

- To measure the accuracy of estimates, analyzing the gap between estimated effort and actual effort (estimation error) for every activity
- To show where more estimates were needed (second or third estimates)

Now the Records Sheet has to be modified. Depending on the case in question, the report could show estimates, actual effort and related error. Below two simple options for visualizing this information are provided.

Date	Time	Type of Activity	Description of Activity	Estimate	Real	Diff.
12 July 2006	10:00	Study	Answer questions on thermodynamics in Ch 4	2	2	0
12 July 2006	11:30	Repeat	Repeat laws of thermodynamics out loud to Mark	3	2	-1
12 July 2006	14:00	Summarize	Summarize laws of thermodynamics in writing	3	4	1

Figure 2.28 Records Sheet: Only first estimate.

Date	Time	Type of Activity	Description of Activity	Estimate	Real	Diff I	Diff II
12 July 2006	10:00	Study	Answer questions on thermodynamics in Ch 4	2	2	0	
12 July 2006	11:30	Repeat	Repeat laws of thermodynamics out loud to Mark	3	2	1	
12 July 2006	14:00	Summarize	Summarize laws of thermodynamics in writing	3+2	4	-1	1

Figure 2.29 Records Sheet: First and second estimates.

There are many possible ways to present the results that you're tracking. The complexity of the reporting objectives is not yet too high, and reports can be had directly from the records sheet with just a few calculations done by hand. The more complex the calculations,

the more you'll want to make use of databases, spreadsheets and *ad hoc* software applications. Remember: always keep recording activity as simple as possible.

The first objective of improving quantitative estimates lies in eliminating the third estimate, and keeping the overall margin of error small. The next objective is to eliminate the second estimate, again keeping the overall margin of error small. The final objective is to reduce the margin of error in the first estimate.

2.3.4 Managing Exploration

Not every activity can be estimated. At the outset of a new project or a study activity, it's especially beneficial to spend time on exploration: look for new sources, get an idea of the structure of the texts you have to study or consult, define your objectives more clearly. To guide exploration, it's worthwhile to apply the concept of time-boxing. Decide on a number of Pomodoros for completing your exploration. When these Pomodoros are finished, set up your real work plan or start in on a specific activity or decide if you want to keep on exploring and what direction you want to take.

2.4 Objective IV: Make the Pomodoro More Effective

When you can systematically use the Pomodoro without interruptions, and you start to master estimating, you can evolve the Pomodoro Technique even further.

2.4.1 The Structure of the Pomodoro

The first evolution has to do with the structure of the Pomodoro. The first three to five minutes of each Pomodoro can be used to briefly repeat what you've learned since the beginning of the activity (not just the last Pomodoro), and then to print this in your memory. The last three to five minutes of a Pomodoro can be used to quickly review what you've done (if possible, with an effect-cause procedure, starting from the last activities and going back to your initial motivations).

Note These last few minutes of the Pomodoro serve to review what you've done. If you want to check the quality and methods of your work to pinpoint potential improvement, you should plan one or two Pomodoros to do so. (Quicker observations are made daily during the recording Pomodoro.)

These changes don't require variations in the length of the 25-minute Pomodoro. The enhanced awareness of time you can achieve by using the Pomodoro will enable you to physiologically sense the 3-5 minute intervals mentioned above. If you have a hard time doing so, this may be a sign that you haven't yet mastered the basic technique.

2.4.2 The Structure of the Pomodoro Set

There is a second evolution that has to do with the four-Pomodoro set. As above, the first Pomodoro in a set of four, or part of this first Pomodoro, can be used to repeat what you've done so far. Likewise, all or part of the last Pomodoro in the set can be used to review what you've accomplished. Repetition and revision activities are more effective if you do them out loud or by talking with a partner or member of your team. Systematic repetition and revision stimulates the effects of *overlearning*, facilitating the acquisition of new information.

2.5 Objective V: Set Up a Timetable

There are a number of reasons why you should never underestimate the importance of defining and respecting a timetable.

- A timetable sets a limit. Limits (when they're truly understood as inviolable) help us to be concrete, to do things. They motivate us to do our best to complete the tasks before us within a set period of time. The same thing happens when the Pomodoro rings.

- A timetable delineates the separation between work time and free time; the latter is best defined as time set aside for non-goal oriented or *unplanned activities* (15). This leisure time is fuel for our minds. Without it, creativity, interest, and curiosity are lost, and we run ourselves down until our energy is depleted. Without gas, the engine won't run. (4)
- A timetable measures the results of the day. Once we've written up the To Do Today Sheet, our goal is to carry out the activities listed on it with the highest possible quality within the set timeframe. If time runs out and these activities aren't done, we try to understand what went wrong. In the meantime, we already have an invaluable piece of information: how many Pomodoros we managed to work that day.

With the Pomodoro Technique, figuring out how much time is wasted isn't important; how many Pomodoros we've accomplished is. The next day, keep that number in mind when deciding how many Pomodoros are available, and write down activities to fill only those Pomodoros.

The main risk with the timetable is in underestimating how important it is; it's easy to fall in the trap of not respecting it. For example, let's say it's 3 PM. You've lost time during the day, and you know you haven't produced as much as you could have or as much as you expected. So you tell yourself: "Today I'll work late to make up for lost time." A combination of heroism and guilt makes you breach the limit set by the timetable; as a result your performance is ineffective tonight, then tomorrow night, and then the night after. The more the timetable is systematically prolonged, the more overall results will diminish. Guilt intensifies. Why? Isn't playing the hero enough? Don't the hours sacrificed in the name of work assuage the guilt?

Actually what emerges is a dangerous vicious circle: the timetable protracts, fatigue increases, productivity drops, the timetable protracts. First and foremost, an effective timetable has to be respected. Respecting a timetable means developing immunity to the Five More Minutes Syndrome. When your work time is up, just like when the Pomodoro rings, all activity stops. Secondly, an effective timetable has to allow for the free time that's needed to recoup.

Note It may happen that an important deadline comes up and you find yourself having to work longer hours. This overtime can be factored in to your timetable to momentarily increase productivity. Typically to achieve positive results and avoid the risk of the vicious circle mentioned above, you shouldn't work overtime for more than five days. Establish an *ad hoc* timetable for this period, and set aside a recovery period to deal with the drop in productivity that will inevitably follow.

2.5.1 The Best Case Scenario

Let's use the following timetable as an example: 8:30-1:00 / 2:00-5:30. It's 8:30 AM. Albert winds up the first Pomodoro of the day. He might use this Pomodoro to look over all the things he did the day before, to skim over the Activity Inventory and fill in the To Do Today Sheet, which will also include this planning activity. In this same organizational Pomodoro, Albert checks that everything on his desk is in place and ready, and tidies up if it's not. The Pomodoro rings, X, break.

Another Pomodoro begins, the first operational Pomodoro. And on it goes for two more Pomodoros. The four-Pomodoro set is over; a longer break. Despite the fact that he really wants to keep on working, Albert decides to take a bit more downtime in anticipation of the intense work day ahead. After 20 minutes or so, he winds up a new Pomodoro. He continues for a total of four Pomodoros, and then checks his watch. It's 12:53. He has just enough time to tidy up his desk again, put away any papers that need filing and check that the To Do Today Sheet is clear and properly filled out, and then he goes to lunch.

By 2:00 Albert is at his desk again. He winds up the Pomodoro and gets back to work. He doesn't take much of a break between one Pomodoro and the next. But after four rings he starts feeling tired. He still has a few more Pomodoros to go. He wants to get a good rest, and he tries to detach as best he can by taking a little walk. Thirty minutes later, Albert winds up a new Pomodoro. It rings, X, break. Albert sets aside the last Pomodoro to look over what he got done during the day, fill in the Records Sheet, jot down some comments on potential room for improvement, makes notes on the To Do Today Sheet for the next day, and tidies up his desk. The Pomodoro rings. Quick break. Albert looks at his watch. It's 5:27. He straightens any papers that are out of place, and puts the activity sheets in order. At 5:30 free time begins.

Two comments on this scenario:

- The operational Pomodoros never coincide with the number of work/study hours. With eight hours of work/study, two Pomodoros are earmarked for organizational activities (one hour) and twelve (six hours) for operational activities.
- The time that goes by is always a secondary factor with the Pomodoro Technique. If there are no unhandled interruptions, the end of the morning or afternoon will be determined simply by the succession of Pomodoros. The timetable is reinforced by sets of Pomodoros. It doesn't matter what time it is, because our guide is the sequence of Pomodoros with respective breaks. In terms of the timetable in our example, we have $[1+3], [4]:[4], [1+1]$.

2.5.2 A Scenario With Interruptions

Let's say it's the second Pomodoro in the second set of the scenario above.

Albert gets interrupted and can't deal with the interruption. That can happen. The Pomodoro is void. Finally Albert is free to get back to work again. He checks the time. It's 12:20. In a few seconds he reorganizes the last session; at this point there's only one Pomodoro left to do. He still takes a quick break before setting the next Pomodoro. In fact, he decides to take a bit more time to try to find his focus. When he feels ready, Albert winds up the Pomodoro and starts with the second Pomodoro in the set. (The first one was interrupted.)

In the afternoon, at the end of the third set of four Pomodoros, Albert feels like he needs more than a 3-5 minute break. He decides to take a half-hour walk. Before going out, he quickly modifies the last set, which was originally two Pomodoros long, to just one organizational Pomodoro. If there's extra time, he'll tidy up his desk and check his incoming emails. Albert gets back from his walk at 4:47. He winds up the Pomodoro...it rings, X, break. Free time.

2.5.3 Optimizing Your Timetable

A work day contains several Pomodoros. How should you organize them to make the day more effective? Optimizing your work schedule is the result of a continual process of observation and feedback. The objective is to reinforce the concept of a regular succession of activity as much as possible.

For people who have an entire day to study, an initial timetable might be: 8:30-12:30, 1:30-5:30. Two sets made up of four and three Pomodoros respectively in the morning, and two sets consisting of four and three Pomodoros respectively in the afternoon: $[4], [3]:[4], [3]$. The sets determine when to take breaks.

The Pomodoros within each set can be organized even further. For example, you could earmark the first Pomodoro in the first session for planning your day, and the following three for studying new topics, along with the next two Pomodoros from the second set. The last Pomodoro in the second group is set aside for checking and answering emails, listening to voice mail, and calling classmates, if need be. This is a way to respond effectively to possible interruptions intercepted during the morning. The first Pomodoro of the third set is for looking over what you did in the morning. The next three Pomodoros are to spend on studying. The first two Pomodoros of the fourth set are used to revise what you've learned today and in the past few days. The last Pomodoro of the day is destined for tracking and analyzing data. So, your timetable looks something like this: $[1+3], [2+1]:[1+3], [2+1]$.

The basic assumptions with this study schedule are that usually people are more productive in the morning, and more importantly the afternoon hours just after lunch are not very effective. Clearly, these assumptions are subjective. Why do we refer to an initial timetable? Because by gathering information on how you work/how you're working, in other words by tracking metrics of Pomodoros completed and other indicators every day, students can learn to pinpoint which set of Pomodoros is most productive for studying, revising, or being creative. Knowing this, they can consciously modify their study schedule, starting earlier or later, extending certain sets and reducing others, learning to know themselves better.

Here's the key to organizing a timetable: make conscious decisions on how to set it up. Up to this point, sets of four Pomodoros have been used because this amount is usually considered most effective. But you can also use longer or shorter sets lasting, say, three or five Pomodoros. At the end of the set comes a 15-30 minute break. In order to be effective, a timetable should also have the following features: it should be destined to change over time, and

it can be made of sets of differing numbers of Pomodoros, giving preference to those lasting four Pomodoros.

Note Experience teaches that when the seasons change, your timetable needs to change too.

2.6 Other Possible Objectives

Up to this point, this paper has described the basic Pomodoro Technique. Until now, by simple tracking and recording activities, and with very little processing, we've come up with useful reports on effort per activity, and on errors in qualitative or quantitative estimates. Clearly, if we want to improve, the reporting objectives will change over time. It wouldn't be useful to track and record every possible metric, obviously, but only the ones that enable us to observe what we want to consolidate or improve. The Pomodoro Technique was conceived to be flexible in the face of these kinds of changes. To make tracking and recording new metrics possible, we have to modify the different sheets, as shown in the previous paragraphs. While making these alterations, it's essential to keep some key criteria in mind that serve to preserve the adaptive capability of the Technique. In order of importance:

1. Always remember that using technology means an increase in complexity due to the relative learning curve, and less flexibility as compared to paper, pencil, and eraser.
2. Keep Tracking at the lowest possible level of complexity (even delegating small tasks to Recording). Choose simple tools for this activity: using paper, pencil and eraser serves as a useful mental exercise.
3. Keep recording simple by using the tools best suited to the complexity you have to manage. Before turning to a spreadsheet or a database, see if there's a more effective way to do Recording with paper, pencil, and eraser. Before using ad hoc software, see if there's a more effective way to do Recording with a spreadsheet or a database.
4. If Processing and Visualizing become difficult, complex, and repetitive, you first have to ask yourself if all the metrics you're observing are really necessary. If so, you should consider using spreadsheets, a database, or an ad hoc software program. A simple excel sheet can readily handle operations such as: reclassifying activities by type, filtering activities by word, grouping and applying calculations to selected activities.
5. Imagination is the most powerful tool for preventing complexity from growing.

For example, in the previous paragraphs, we looked at a case with a single objective: writing an article on How to Learn Music. This objective is achieved by means of a series of tasks. But you might find yourself having to consider a number of objectives to achieve simultaneously. How to you distinguish between them?

Depending on the circumstances, you can change how you write the description, so as to highlight the objective (Fig. 2.30). Another option is to include a new box labeled Objectives in the Activity Inventory, on the To Do Today Sheet, and on the Records Sheet, where you can write down a description of the objective, or an abbreviation or code that stands for it. To calculate the total effort expended to achieve a given objective, add up the effort it took to do the related activities.

	TO DO TODAY	Rome, 12 July 2006 Mark Ross
	<i>How to Learn Music: write article (max 10 pps)</i>	
	<i>How to Learn Music: finetune by reading out loud</i>	
	<i>How to Learn Music: condense to 3 pps</i>	

Figure 2.30 To Do Today Sheet

You might want to calculate how long it takes to reach certain objectives or perform given activities (2). To do so, you simply measure the time from the date of completion back to the date when you wrote in or assigned the activity. Since you already have the completion date for the activity (on the To Do Today Sheet), in the first case you'll need to track the date you slotted that activity into the Activity Inventory; in the second case, track the date you wrote it on the To Do Today Sheet. On the Records Sheet you can track Pomodoros of effort over several days for the same activity.

In any case, choosing which metrics to track and record has to be subordinate to the choice of improvement objectives. In this case, the metrics system will grow incrementally on the basis of real need, keeping tracking complexity to a minimum.