Exercise on Cash Flow

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The goal of this exercise is using the cash flow forecast to understand the financial needs of a project.

In particular, suppose we are developing software for a customer, using SCRUM and with the following effort (costs) projections:

- **Duration:** 10 sprints of one month each
- **Effort:** 2 people full time and 2 people at 50% for the whole duration of the project.
- **Resource Cost:** direct costs of resources is 3000 €/month; overhead is computed as 20% of personnel costs.
- **Additional Costs:** we need to get a javascript geo-charting tool which we will use for some functions of our software. We selected Highcharts; the cost is 2250 USD (~ € 1600); we also have € 400 on M1 to buy a new computer and € 200 for additional software services we use for the project[1].
- **Profit:** profit is 10% on top of the project costs[2].

Concerning payments, we agreed on the following schema:

- 30% advance payment at project start
- 70% one month after the end of the project

Determine the financial needs over time of the project, if any.

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1 Notice that the cost of "additional software services" are often accounted for in the "overhead" costs (unless the services we are budgeting are specific to the project). Similarly for the "hardware" item.

2 In some situations, profits are "embedded" in the tariffs of personnel, since it makes sense to profit only on the value we add to the project (namely, our work); thus, in many situations, the tariffs of personnel are computed so that they already "embed" a profit. We assume this is not the case for this exercise.

Solution

The techniques are discussed in "[Costing and Budgeting](#)" and in "[Project Pricing](#)".

The first step is computing the **project costs** and **allocating them over time**.

We choose a simple CES, with the following items:

- **Personnel Costs**
- **Indirect Costs (overhead)**
- **Other costs (software, hardware, ...)**

Concerning the reporting period, we choose the granularity of one month, since this is the periodicity with which we pay our team.

The projection of costs is as follows:

CES	M1	M2	M3	M4	M5	M6	M7	M8	M9
Personnel (effort)	3	3	3	3	3	3	3	3	
Personnel (unitary cost)	€ 3,000.00	€ 3,000.00	€ 3,000.00	€ 3,000.00	€ 3,000.00	€ 3,000.00	€ 3,000.00	€ 3,000.00	
Personnel costs	€ 9,000.00	€ 9,000.00	€ 9,000.00	€ 9,000.00	€ 9,000.00	€ 9,000.00	€ 9,000.00	€ 9,000.00	
Indirect Costs	€ 1,800.00	€ 1,800.00	€ 1,800.00	€ 1,800.00	€ 1,800.00	€ 1,800.00	€ 1,800.00	€ 1,800.00	
Other Costs	€ 1,600.00								
	€ 400.00								
	€ 200.00	€ 200.00	€ 200.00	€ 200.00	€ 200.00	€ 200.00	€ 200.00	€ 200.00	
Total Costs	**€ 13,000.00**	**€ 11,000.00**	**€ 11,000.00**	**€ 11,000.00**	**€ 11,000.00**	**€ 11,000.00**	**€ 11,000.00**	**€ 11,000.00**	
Cumulative	€ 13,000.00	€ 24,000.00	€ 35,000.00	€ 46,000.00	€ 57,000.00	€ 68,000.00	€ 79,000.00	€ 90,000.00	

Concerning payments, first we compute the money we are going to ask to our client. This is computed as 10% on the project costs, as specified in the text of the exercise, that is, € 99.000.

The payment and financial needs can now be easily computed. They are recapped in the following table and chart:

| CES	M1	M2	M3	M4	M5	M6	M7	M8	M9	Total
Costs	€ 13,000.00	€ 11,000.00	€ 11,000.00	€ 11,000.00	€ 11,000.00	€ 11,000.00	€ 11,000.00	€ 11,000.00	€ 0.00	**€ 90,000.00**
Payments	€ 29,700.00								€ 69,300.00	**€ 99,000.00**
Balance	€ 16,700.00	-€ 11,000.00	-€ 11,000.00	-€ 11,000.00	-€ 11,000.00	-€ 11,000.00	-€ 11,000.00	-€ 11,000.00	€ 69,300.00	
Financial Needs	€ 16,700.00	€ 5,700.00	-€ 5,300.00	-€ 16,300.00	-€ 27,300.00	-€ 38,300.00	-€ 49,300.00	-€ 60,300.00	€ 9,000.00	
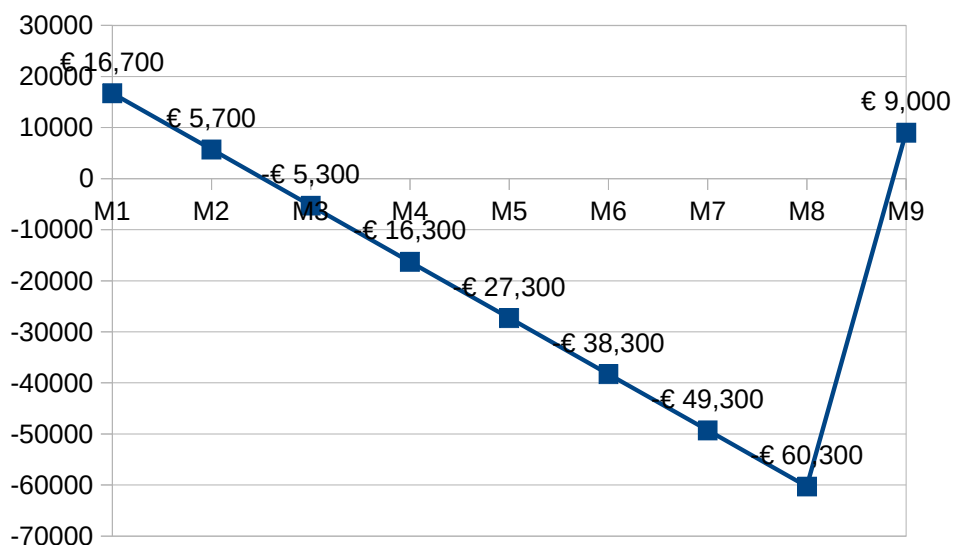
as it can be seen, from M3 the project starts needing cash to continue operations. At M8 we will have invested about € 60,000 of our money. The client has an advance payment of € 17,600 and, of course, a final payment of the remaining amount.

If the investment required by the project is an issue (as it could be the case for small enterprises), a different payment schema has to be chosen.

Some possible alternatives include:

- Further increase the amount paid in advance. For instance we could try with 40%. This will contribute to reduce both the period during which we are financially exposed and the amount for which we will be exposed. The client, however, might not be willing to pay such amount before any result is produced.

- Add additional intermediate payments. For instance, we could include a payment at mid-project (M4) of an additional 20%, reducing the exposure (see chart below). To make it reasonable for the client, the payment could be bound to a specific project achievement (e.g., the release of a significant version of the system).
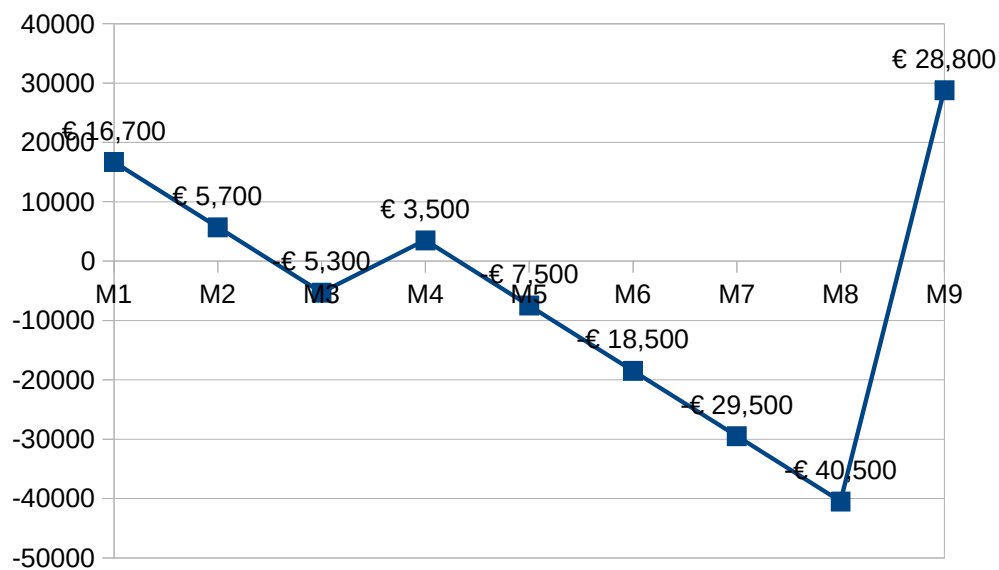
Finally, notice that agile development projects are "naturally" fit to schema in which reduce the financial exposure. In fact, since each sprint ends with a "potentially shippable product", we could foresee a payment at the end of each sprint. One possible approach is "time and materials", according to which the client pays for the expenses sustained at the and of each sprint.