Calculating ROI for Software Product Lines

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What is ROI?
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*Return of Investment* - the ratio of money gained or lost on an investment relative to the amount of money invested
Establishing A Product Line

\[ C_{\text{org}} + C_{\text{cab}} + \sum_{i=1}^{n_1} (C_{\text{unique}}(p_i) + C_{\text{reuse}}(p_i)) \]
Our Actors

Kurt – Manager

Sebastian – Consultant
Kurt, the manager, wants to find a better way of handling updates for his company's products. It takes all the effort his company can manage to just barely keep up with the demand.

Sebastian, a consultant, informs Kurt that it would be in his best interest to consider converting to a product line. Kurt believes that they have already done this, but Sebastian corrects him by saying that his definition of a product line is a bit confused.

A product line should take advantage of product's commonalities and control the differences. The differences are what makes a unique product.
Sebastian informs Kurt that he didn't properly take advantage of all that software reuse offers. The company was using opportunistic reuse.

What is the problem with that?
The key to successful product line development is in the development of core assets.

What are some examples of core assets?

Sebastian and Kurt estimated that there is about 70 percent commonality between the products that they develop. If they invest in creating the common elements and reusing them effectively, then the investment would eventually pay off.

However, the initial start-up cost to build the core assets has been estimated to be about 1.5 times of what the cost would be to start from scratch.
As the figure shows, the adaptation of a product line costs much more in the beginning. But the costs do not increase as dramatically as from traditional methods.
ROI

ROI = Cost Savings / Cost of Investment

What is cost savings?
\[ \sum_{i=1}^{15} C_{evo_i} - \left( C_{org} + C_{cab} + \sum_{i=1}^{15} C_{pl\_evo_i} \right) \]

\[ \frac{\left( C_{org} + C_{cab} \right)}{} \]
Thoughts

This paper shows how an organization can calculate the benefit of properly developing a product line. There is a lot of investment in the beginning, but if there are multiple releases planned, the benefits will be seen sooner than with traditional methods.
Why did the authors say that the more products you build, then the more you can amortize the investment cost of the family product?

By the discussion, it seems that the initial investment cost for the building of the core assets will eventually pay for itself in the returns.

The core assets are built once, so they are only paid for once.
Questions

What does “order-of-magnitude economic improvement” mean?

With each subsequent release of a product in the product line, the ROI increases each time.
What are the benefits and drawbacks?

The benefits are in the money and time that the company will save by adopting the product line. They have 15 products, so their savings will quickly grow.

The drawbacks are that it costs much more up-front than traditional development and this will only be an appropriate model if there are many products in the product line to be developed.
Questions

How can this method be applied practically? Where are these numbers coming from? How can new companies apply this?

The answers are “It depends”. Not just anyone can determine these numbers. It varies on the experience of the managers, the experience of the staff, the complexity of the project, etc. In our scenario, the manager was very familiar with the products, so he could make good estimates of time and effort.

For unknowns, it would be best to have the services of an experienced project manager, which can make good “ballpark” estimates.