



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

EPFL



Technology Innovation for Sustainable Development

Hello. These images were taken from a project to develop a diagnostic radiology system for low income contexts. Let us assume that you have a project idea which involves technology innovation to tackle a development issue. Your goal is to generate a positive impact for people living in poverty. How should you proceed to maximize your chances of success? What are the steps you need to consider? And the tools at your disposal? What are the hurdles? What are the good practices that you can take advantage of? In this video we will give you an overview of the process. It will lead us from a very early stage, when all you have is a rough idea, all the way up to deployment and scaling up of your technology. Before we look at the process itself we would like to briefly discuss the question of profit versus impact. First, we should remember that the impact we want to make must not only be positively affecting a large number of people, but it must also be sustainable. The problem is that at the end of the day someone will have to pay for the technology. Funds will be needed for manufacturing, maintaining and servicing the technology, as well as for commissioning and training of the users.

Notes

Summary



0m 16s



Profit vs Impact



Not for
profit

For
profit

Technology Innovation for Sustainable Development

This is why two things are necessary. One - a sustainable source of funds, and two - a vehicle responsible for implementing the technology innovation. This vehicle could be a company or some other form which may or may not involve profit generation. But it must be sustainable. Entrepreneurship can be a great way to generate a positive and sustainable improvement for the poor. In the traditional view, we have two worlds, which are completely separate from each other. On the right there are the traditional for-profit companies, which only strive to maximize shareholder value. And on the left we have not-for-profit organizations, such as foundations and NGOs, which depend on subsidies and are only interested in impact. In this view, the former are sustainable, but do not necessarily bring a positive impact. While the latter are more likely to bring a positive impact, but are not necessarily sustainable. This is a very outdated view. Indeed, one should rather see things as a button slider. Since there are many possibilities in between those two extremes. These intermediate models, which are sometimes called social businesses, strive to leverage market forces in order to generate a sustainable impact.

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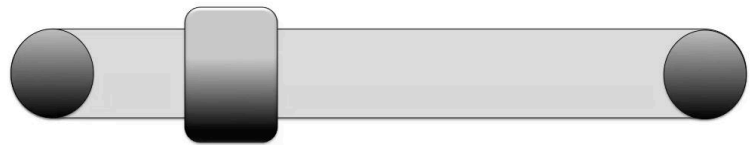
Summary



1m 37s



Profit vs Impact



Not for
profit

For
profit

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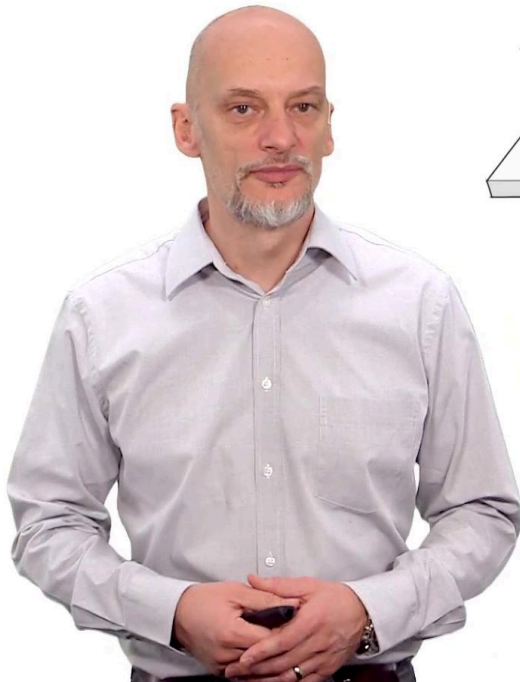
We believe that this offers great opportunities, but also some difficulties. As an entrepreneur using this kind of model, you may be confronted with a difficult choice. Do you prefer to maximize impact? Or profit? You will have to decide. Fundamentally, there's nothing inherently bad about making profit if we provide solutions to unmet needs. On the contrary, if you're able to combine profit and impact, this is a situation where you can generate your own fuel for growth and extend the reach of your impact. Making profit is required anyway, if you need initial or later stage funding from investors. For this course, we will consider that the slider in this figure will not be at either of the two extremes. It's somewhere in between. In conclusion, let us take into consideration that achieving a sustainable and large scale impact will involve developing a profitable business model.

Notes

Summary



3m 03s



Technology Innovation for Sustainable Development

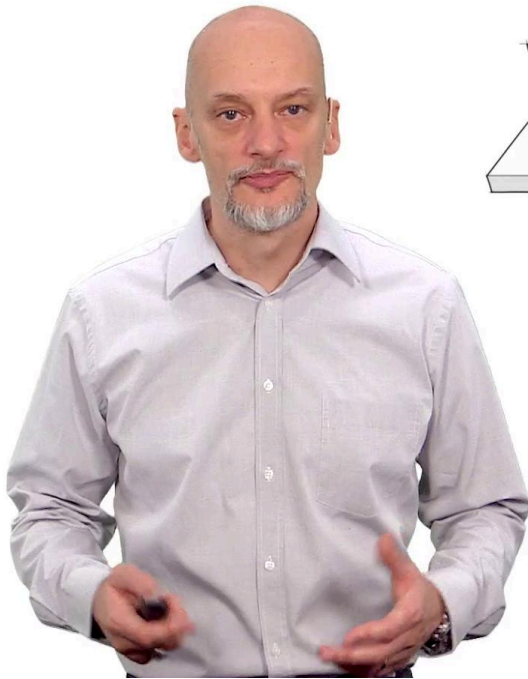
Let's move on and discuss the process. We will look at all the steps in detail in later videos, but for now let us keep a helicopter view and discuss general principles. Here you can see the three main phases of the process, with the impact we're trying to achieve at the end. The process starts with a choice of a development challenge, which we want to solve using a technology innovation. We then develop a concept which we validate through some feasibility prototyping and various tests. Finally, we move to implementation, which includes deploying our solution scaling it up, so that it sustainably reaches as many beneficiaries as possible. Looks simple, doesn't it? As always things are a bit more complicated than that. And we will get there. But prior to that, let me make a few general remarks. We need to remember that innovation necessarily involves change. For example, changing behaviors or habits. Bringing about change is hard and it follows that innovation inherently includes risk. Obviously, the risk of failing is highest at the beginning, when the only thing we know is what kind of development issue we want to tackle. At that stage we know very little about how to generate this much desired impact.

Notes

Summary



4m 09s



Learn
Cooperate
Be agile

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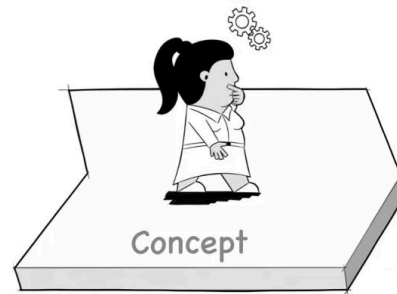
As we move forward in the project, we learn about the context, the needs of the people we are trying to help. The social, political and cultural background. And so on. The more we know, the more control we have on the risk of failure. As a consequence, this is essentially a learning process. The best way to learn is to cooperate with people who know the needs and the context. Third, due to the high level of unknowns at the start, one thing we can be sure of is that the process won't be linear or smooth. The unfolding of the project will most certainly involve many iterations, trials and errors, and sometimes a complete change of strategy. This is why we need to be agile and adjust quickly.

Notes

Summary



5m 39s



Choose pilot country
Engage local partners
Take stock of alternatives
Define specs

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Let us now look at each phase starting with the concept. We have to start by identifying the target beneficiaries. Once we have done that, we need to select a pilot country or region or community. It is important that our project has both an ambitious and, if possible, a global impact goal. But also, that it is strongly ingrained in local knowledge. This is the only way we can learn all we need to know for our project. We need to identify local stake holders and experts in the specific field that we want to address. And to involve them in the project. For example, for diagnostic imaging we selected Cameroon as the pilot country. And we identified as a key stakeholder, the head of the diagnostic imaging division at the main university hospital there. In this phase we also need to honestly and painstakingly take stock of existing solutions or alternatives. We need to understand what works and what does not work. And why it does not work. Finally, we need to define detailed requirement specifications for our technology innovation. These specs need to be quantitative. For example, the diagnostic imaging system must allow to diagnose 40 patients per day and still work at temperatures of 45 degrees C.

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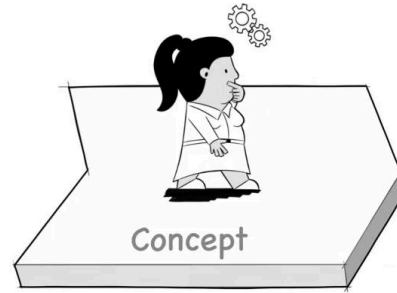
Summary



6m 28s



Process: Concept



Choose pilot country
Engage local partners
Take stock of alternatives
Define specs

Define your Theory of Change

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As we will see, all of this information will allow us to establish the long-term goal we want to reach and also the pathway to get there. This is commonly referred to as the theory of change. And it is discussed in more detail later in this course.

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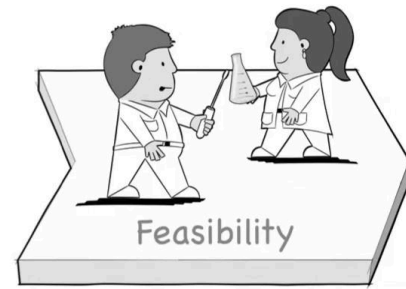
Summary



7m 56s



Process: feasibility



Technology & Business Model

Test & adjust strategy

Involve locals & aim for global

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In the second phase we will essentially want to develop solutions and test them as much as possible together without partners. This really involves 1) developing the technology and 2) developing a sustainable business model. In both cases we will have to go through multiple trial and error loops. It is crucial to test our hypotheses in our pilot country. And with the key stakeholders we have identified. It is great practice to build simple and cheap models which can be put to test and deliver quick answers. We need to be agile and to quickly adjust the strategy when needed. Sometimes, as for medical devices or pharmaceutical drugs, real tests can't be performed on patients, because at that stage the technology has neither been approved yet by the regulatory authorities, nor has it demonstrated its compliance to applicable norms and standards. Nevertheless, many aspects can still be tested. Without applying the technology to actual patients. Finally, we need to closely involve key opinion leaders and stakeholders into our project early on. This will not only improve our decision making, but also facilitate uptake of the solution later in the implementation phase.

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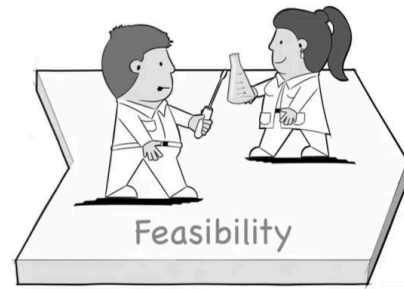
Summary



8m 14s



Process: feasibility



Technology & Business Model

Test & adjust strategy

Involve locals & aim for global

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However, we need to keep the global objective in mind. Will our solution also be adapted to all the communities? Because, what we want is as much of a global impact as possible. The two key deliverables in this phase are: 1) a prototype of the technology demonstrating that it is feasible, 2) a complete business model. Both deliverables are closely related and they will have been subjected to as many real life tests as possible. At that stage we have to decide between two main strategies. Either the technology will be implemented by an existing company, or we decide to create our own venture. For the rest of this course we will consider the second option. Yet the methodology applies equally well if the implementation is made through an existing company.

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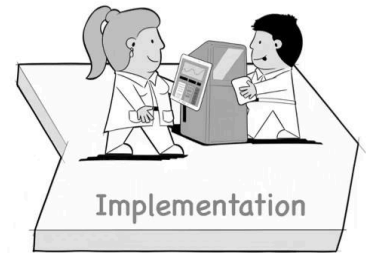
Summary



9m 36s



Process: Implementation



Break even

Grow and Scale-up

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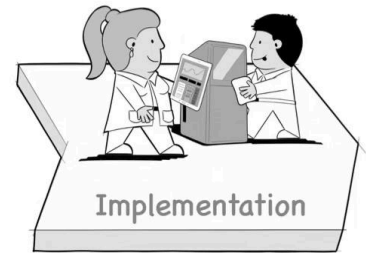
The last phase is when the rubber hits the road. At that stage we have demonstrated feasibility of both our technology and our business model. However, it does not mean that there is no more risk involved, of course. But it will have been reduced as much as possible. We can now go talk to investors. They'll come on board if they foresee a sufficient financial return. And if the related level of risk is deemed acceptable. The technology is then made into an industrial product, which can be replicated and sold. It needs to be made compliant to safety standards and regulatory constraints which can be quite a lot of work. The implementation of the business model also requires resources, such as personnel, office space and material. The first crucial success will come when our initiative stops losing money and reaches what is called break-even. After that the more we grow and scale up, the more our investors will be happy. And ideally the more impact we will have. When investors are involved, the question of both maximizing sustainable impact and profitability will always remain an important concern. Ideally, there needs to be a direct link between the amounts of our technology deployed and the impact generated.

Notes

Summary



10m 26s



Break even

Grow and Scale-up

Monitor impact

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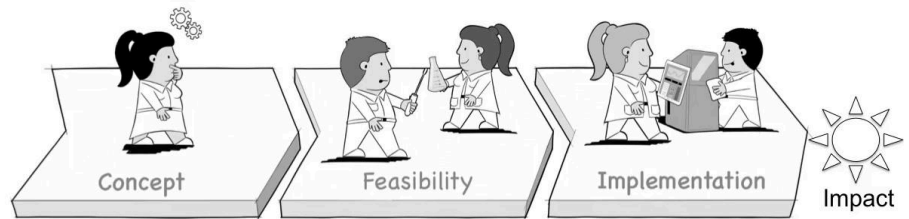
If this is the case, then the more products we sell, the more impact we have. This is a somewhat idealized situation and things can derail very quickly. For example, when our beneficial impact is outweighed by environmental concerns, or when our initiative is finally so attractive in rich countries that the initial intent to serve the poor is lost. This is the reason why we must closely monitor impact at all times. We will discuss this in more details later. Since accurately characterizing impact often represents an important challenge. Finally, let's go back and look at the whole process again.

Notes

Summary



11m 56s



Learn
Cooperate
Be agile

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In general, as we said in the beginning this is not a linear or smooth process. And that is also what is exciting about it. As we have said, this is about reducing risk and about learning. As a consequence, the best practice to remember is to make many tests, fail often, fail cheap and fail early. We must make many rough and ready trials. Both for the technology and the business model. At all times, we must remain focused on impact and have our impact metrics defined in detail. All of this requires strong determination. You must be convinced that there's not only plan A and plan B, but all of the 26 letters of the alphabet. If that's not enough, be ready to start with the Chinese alphabet as well. As a conclusion to this video, let me remind you of the three key guiding principles of this process. 1. This is a learning process. We need to acquire knowledge to mitigate risk. 2. It requires cooperation. We need to involve local stakeholders and beneficiaries. 3. We need to be determined and agile. We need to experiment a lot & adjust without losing sight of the goal. Goodbye.

Notes

Summary



12m 39s