4 .HOW IS IT APPLIED?

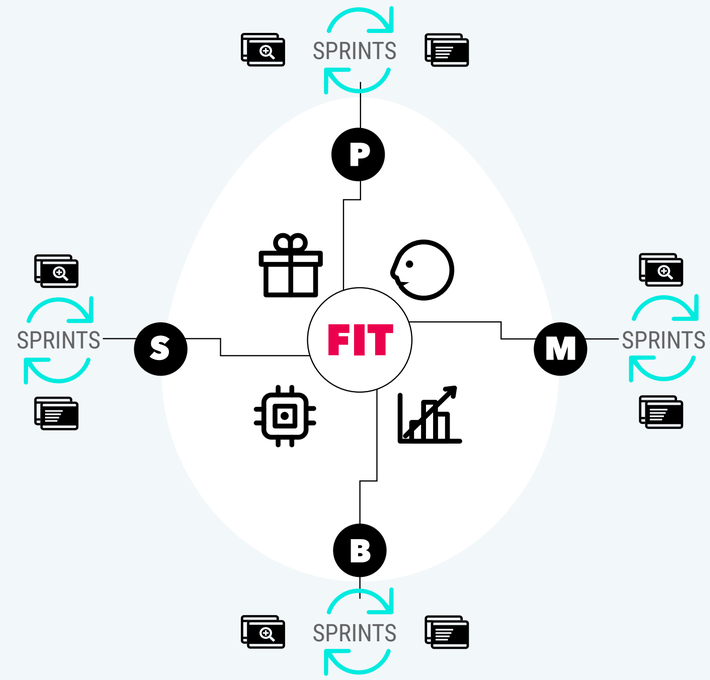
S4S: Shell for Startups

The S4S as an application of the principles of Scientific Entrepreneurship is based on iterative processes of hypothesis formulation and validation, like C.S. Peirce's abductive method[6]. The S4S proposes to find a fit between a well-defined problem and a solution that demonstrably solves the problem and is also financially sustainable (problem-solution fit). Thus the S4S consists of a circuit of real experiments designed to validate the solution in terms of four pillars: (i) a specific customer segment with clear pain points; (ii) an objective value proposition; (iii) a set of functionalities that make the value proposition tangible; and (iv) a minimum of economics that can stay on its feet.

Why do we call it a shell? Instead of suggesting a single path or sequence of phases, as traditional methodologies do, we prefer to emphasize the multiple processes that occur in parallel and can be sequenced in different ways. This is what we mean by a shell. The inspiration came from computing, a universe in which the term is defined as a user interface that permits access to the services of an operating system.

The shell comprises four processes that guide the development of early-stage startups: **P** discovering customers and their main pain points; **S** iteratively validating the product with users until a clear-cut use case is reached; **B** understanding and planning expectations regarding sales, costs and capital requirements; and **M** closing the first sales.

S4S



6. Veja mais nas referências, pág. 25

4 .HOW IS IT APPLIED?

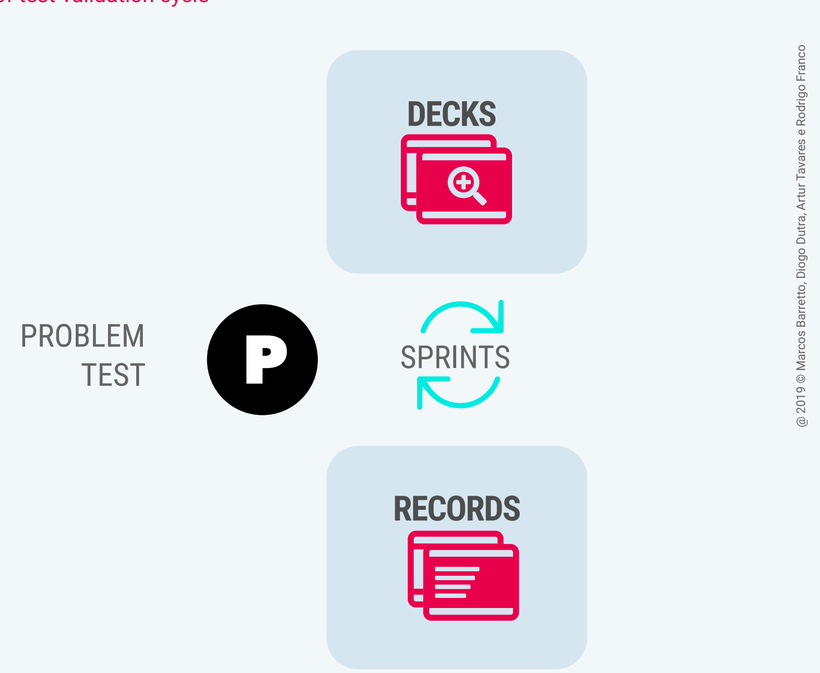
structure but a sales approach proper to innovative solutions unknown to the consumer.

Using a set of Decks, the entrepreneurs are prompted to organize their hypotheses and discoveries. The Records are a second collection of tools for use in planning and recording incursions, interviews and experiments with users/customers. The cycles consist of weekly or fortnightly sprints with intensive field activities to validate the hypotheses. Just as Agile methodologies, from which the term sprint is borrowed, propose the figure of an Agile coach, the Scientific Entrepreneurship methodology also relies on the figure of a coach, who considerably speeds up the process of learning and convergence by the entrepreneurs compared with autodidactic processes using a standard canvas[8].

Sprint rituals, therefore, are supported by Decks and Records, which are evaluated and restructured in sprint review sessions, sprint planning sessions, and coaching sessions. In principle the cycles can be executed in any order or even skipped. The natural sequence of execution is P > S > B > M.

However, not a few successful startups perform the P cycle in a shortened version, especially when their focus is on problems that have already been solved in other environments belonging to the S. cycle. The B and M cycles are often executed in parallel

Example of test-validation cycle



8. The combination of this methodology with the figure of the coach also entails the structuring of a pedagogy to prepare this key participant in the process.

4 .HOW IS IT APPLIED?

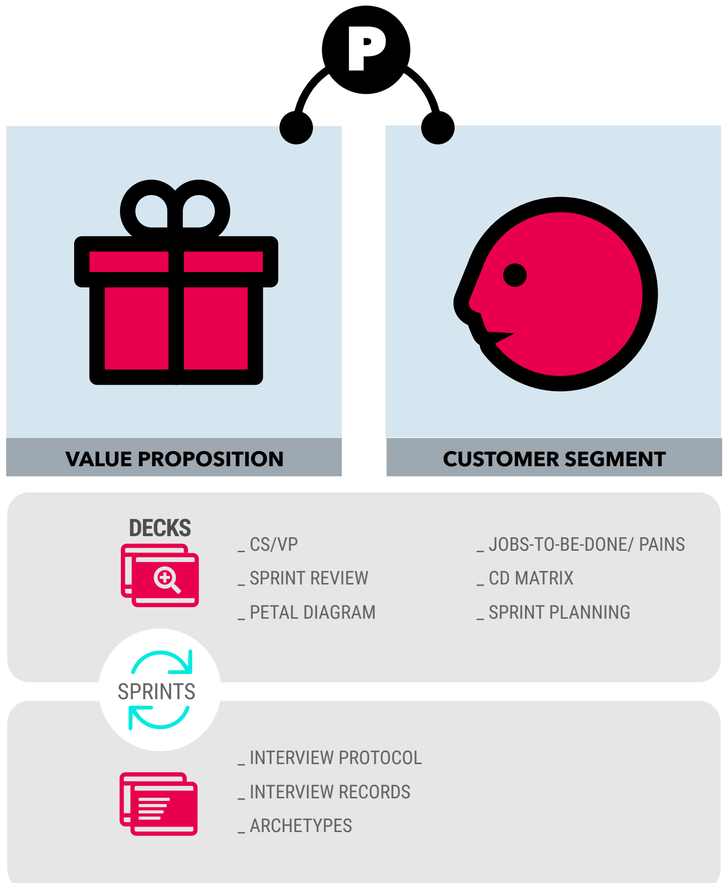
4.1 Problem Test Cycle P

This is a stage involving many interviews, in which the entrepreneurs go out into the field to investigate their hypotheses by talking to the people they think have a relevant pain to be resolved. The core idea is organizing and discovering a beachhead market, i.e. a market that is relatively easy to enter, normally one with a glaringly unsolved problem. The guidance provided during this cycle helps the entrepreneurs both investigate other markets and possibilities, and focus on finding a niche market with potential customers willing to pay for an innovation.

Here we introduce the concept of “hair on fire”, an idiomatic expression used in the startup context by investing partners at Sequoia Capital. The idea is that if you give a brick to someone whose hair is on fire, they will use it to put the flames out even if they have to hit themselves on the head. In other words, the focus is on finding such a relevant pain that the customer will pay even for a half-baked (unfinished) version.

In this cycle the Deck contains six frameworks that help the organization maintain the founders’ focus: (i) value proposition x customer segment canvas; (ii) sprint review; (iii) petal diagram; (iv) jobs-to-be-done framework; (v) CD matrix; and (vi) sprint planning.

The Records in this phase consist of three tools to support the interviews and learning records: (i) interview protocol; (ii) interview record canvas; and (iii) archetypes.



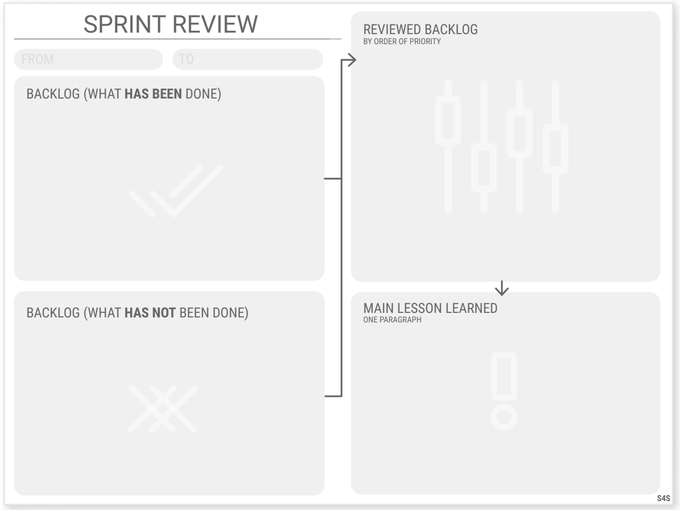
4 .HOW IS IT APPLIED?

4.1 Problem Test Cycle

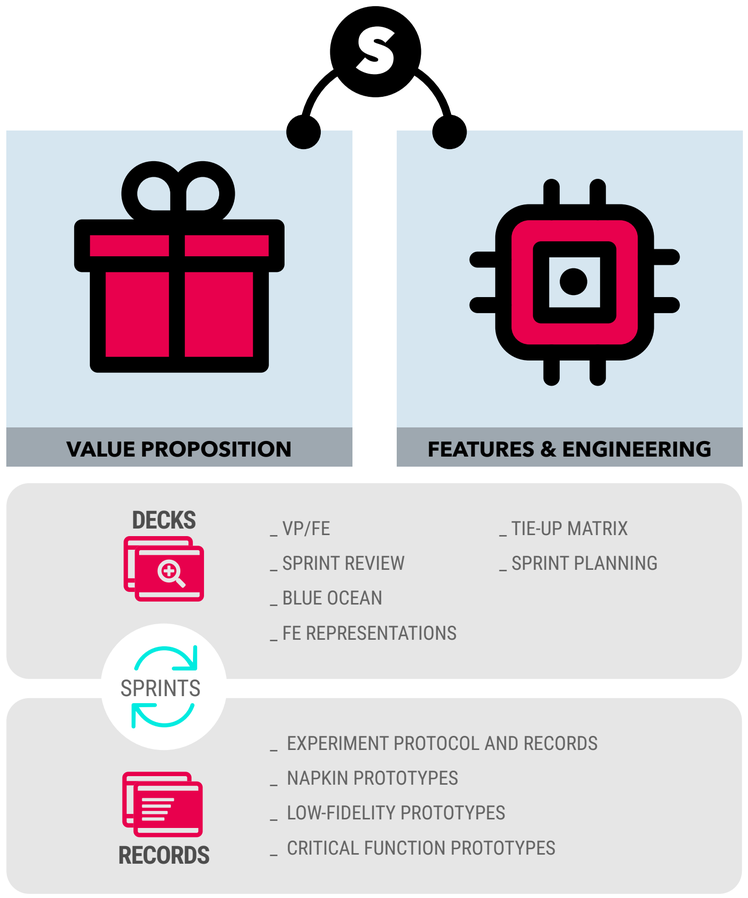
CASE STUDY • ROAD LABS

RoadLabs is an example of a proposal that makes experienced Brazilian entrepreneurs and investors turn up their noses: a solution for customers in the public sector. The founders developed a technology to detect potholes on roads and said to themselves, “Why not sell it to governments and cities?” When we heard, we were horrified! Selling to the public sector in Brazil is a complex undertaking full of uncertainty. However, we have a rule that says we do not dictate what should be done; we offer guidance. Here it is worth stressing that a good coach makes sure the entrepreneurs (i) talk to the right people, (ii) ask the right questions, and (iii) learn as they go. With the petal diagram, the group was advised to explore other markets and do a lot of interviews. A major insight popped up from one of the interviews: they discovered that toll road operators pay heavy fines for potholes. This is very painful. The fines pile up. They cost millions, and the customer is a private-sector company or consortium, subject to competitive bidding procedures like any player in a B2B market. So they decided to take the plunge. After several interviews they had acquired a detailed understanding of the toll road operators’ expectations. Before they even produced a prototype, they were already making progress on the negotiation of paid contracts. It is interesting that even now RoadLabs still does problem test exercises as part of the product development process. It continues to grow and innovate in a market with a shortage of technological solutions.

EXAMPLES OF TOOLS



4 .HOW IS IT APPLIED?



4.2 Solution Test Cycle

In this cycle, real experiments are conducted in which the entrepreneurs have to validate the main functionalities and value propositions required by prospective customers. They test various minimum viable products (MVPs), which can range from solving the problem manually using an Excel spreadsheet to building hardware for initial testing.

In addition, throughout the validation process the entrepreneurs begin choosing the requirements and engineering designs to be implemented at the end of the cycle. This is the first version of the solution, which we call the Critical Function Prototype.

In this phase of the cycle the Deck also contains six frameworks: (i) value proposition x function & engineering canvas; (ii) sprint review; (iii) blue ocean framework; (iv) calculation records and representations/ engineering designs; (v) tie-up matrix; and (vi) sprint planning.
The Records in this phase consist of three tools to support the experiment/prototype creation process: (i) experiment protocol and records, (ii) napkin prototypes, (iii) low-fidelity prototypes, and (iv) critical function prototypes.

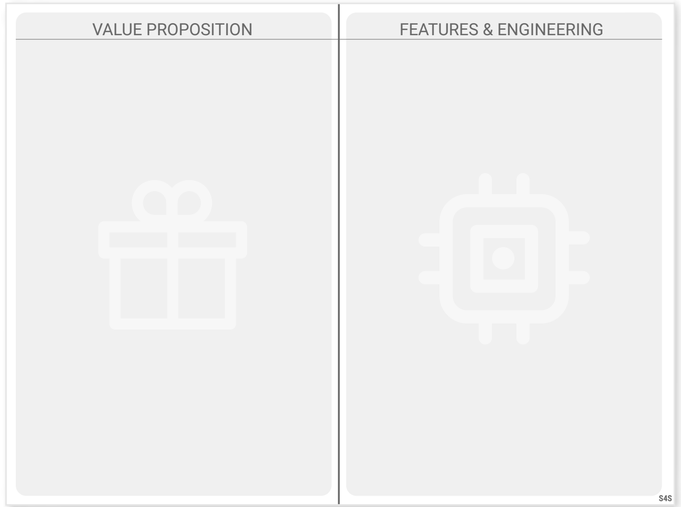
4 .HOW IS IT APPLIED?

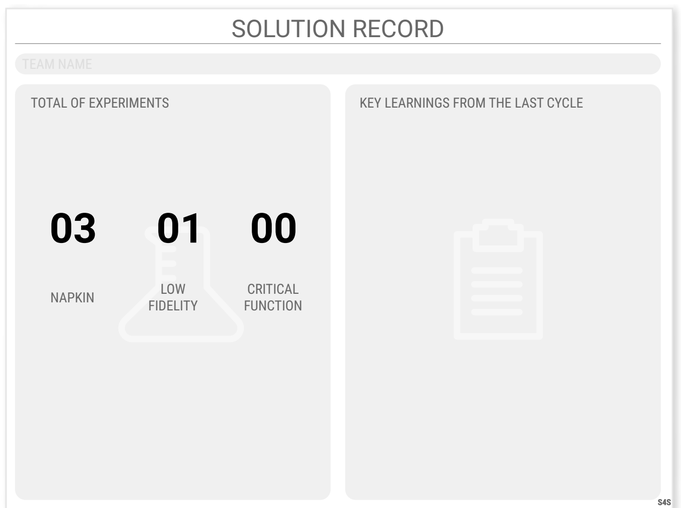
4.2 Solution Test Cycle

CASE STUDY • E-SPORTSE

The E-sportse project was born as a hardware device designed to guarantee accuracy in timing runners on street races. After the problem test phase, the group perceived a more significant pain point in the judgment of race results for competitive examinations, which have to be even more accurate. Having located a customer “with hair on fire”, the entrepreneurs moved on to the Solution Test phase, in which they planned the largest possible number of experiments. The first and cheapest experiment consisted of a PowerPoint presentation of the solution. This produced feedback on the solution then used by the market and the indicators that should be added to measure results in an actual competitive exam. Next they built a low-fidelity prototype, which was installed on a bike and tested in an open sports court. They took the prototype to a prospective customer and showed on a computer screen the accuracy, precision and numbers the customer expected to see – the same as those discovered in the first experiment using PowerPoint. The customer was excited by this performance and called in the firm’s senior management to take a look. Until then the entrepreneurs had not dared to present such a raw prototype for fear of spoiling their chances with the customer. This is the most important lesson of this cycle: the customer “with hair on fire” accepts half-baked versions, so take the plunge! They then moved on to prototype development, producing a pilot batch under contract with the customer: ten devices to be fitted to the runners’ race bibs. The secret of this phase lies in going into the street without fear, always thinking up the smallest possible experiment or trial, and knowing what needs to be learned from it. With this in mind, the experiments steadily mature until you reach real tests and pilots with paying customers. Some months later the group closed a contract for a good price to implement the solution on a larger scale. The solution is now used in various parts of Brazil, and is being constantly improved.

EXAMPLES OF TOOLS





4 .HOW IS IT APPLIED?

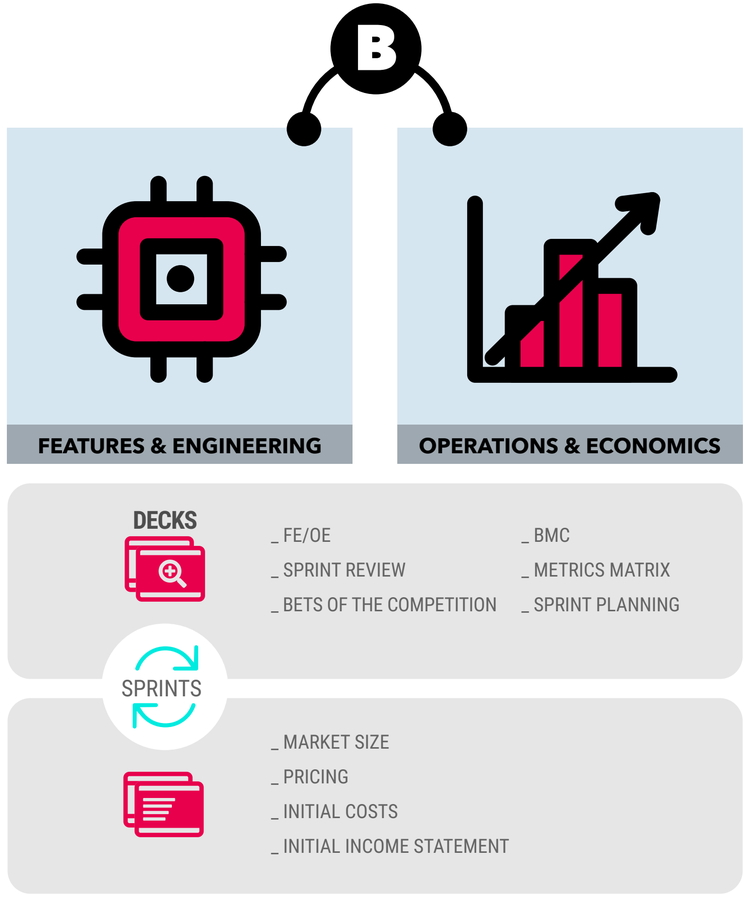
4.3 Business Model Test Cycle B

In this cycle the goal is to validate the main elements of the business model, such as pricing, cost structure and financial planning for the first few months of operations.

This phase requires a more in-depth and quantitative analysis as part of the discussion of the business venture. The logic of growth and the numbers must be properly aligned over time. To this end, the entrepreneurs are encouraged to test and validate the business model with experts, and to perform a painstaking evaluation of pricing with customers. It is most important to study competitors and suppliers in great detail in this phase, both to compare cost structures and to work on pricing.

The Deck for this cycle contains the following frameworks: (i) features & engineering x operations & economics canvas; (ii) sprint review; (iii) bets of the competition; (iv) Business Model Canvas (BMC); (v) metrics matrix; and (vi) sprint planning.

The Records for this cycle contain a financial modeling spreadsheet with: (i) market size calculation; (ii) basic pricing study; (iii) initial cost structure; and (iv) financial flow (revenue and expenditure) projected for the next six months.



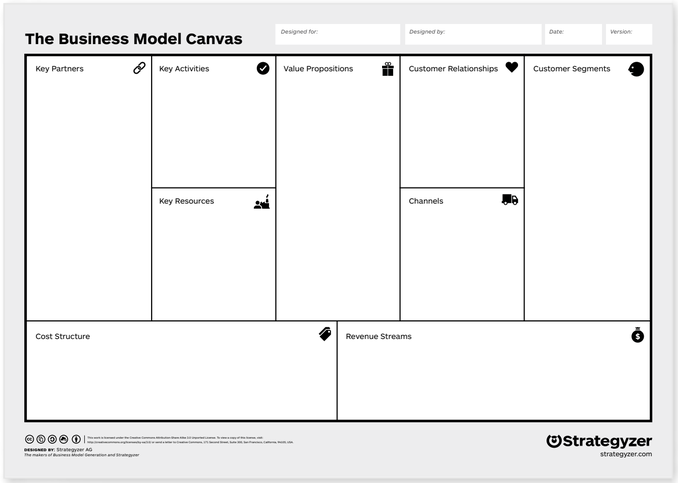
4 .HOW IS IT APPLIED?

4.3 Business Model Test Cycle

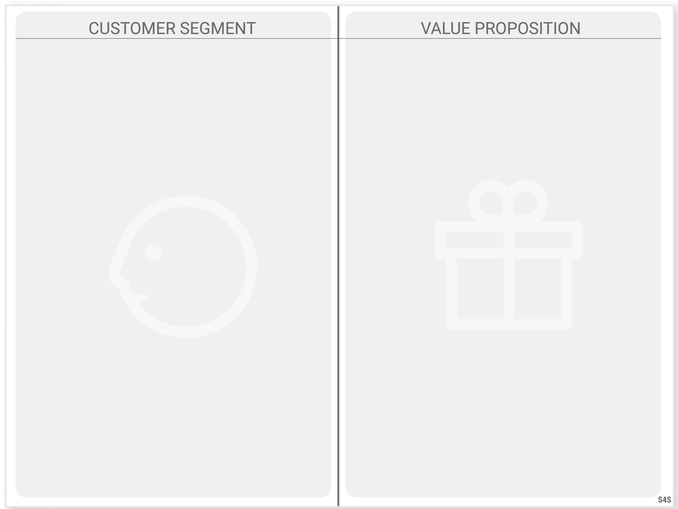
CASE STUDY • MVISIA

Particularly for high-tech markets, the context of the business model is most important. Not only is it necessary to think about the value proposition and customer segment, but each decision on distribution channels, partners, key resources and key activities can affect the future of the organization. Tech entrepreneurs are often found to have an excellent understanding of the solution but no idea how to pay their bills at the end of the month, how to build healthy relationships with suppliers, or how to finance the business over time without neglecting new product development. The case of MVISIA is a good illustration of the usefulness of a systemic approach to **designing the business**. The entrepreneurs began with the understanding that machine learning and computer vision could be used to select agricultural products in an automated manner with conveyor belts and smart cameras. At the time this selection was done manually by workers, with low productivity and occupational health problems. Given the obvious benefits to be gained from automation, it was not hard to find customers. But how can the creation of such a robust technology be made viable if the entrepreneurs lack financial resources? MVISIA performed several exercises in this phase, exploring possible markets for expansion to boost revenue, validating the development of the solution with multiple suppliers to optimize costs, machining and manufacturing, producing plans to develop the solution, and presenting its proposals in many competitions for access to funding. As a result their understanding of the distribution chain matured, they gained detailed insights into costing and pricing, and they built a network of partners and strategic supporters. The result? They won the 2015 Santander Prize, the 2016 Odebrecht Prize and the 2017 Inovacana Price. They also won grants from the São Paulo State Research Agency (FAPESP) via its Innovative Research in Small Business program (PIPE), and from the Brazilian government via its innovation agency (FINEP). The prizes and funding guaranteed hundreds of thousands of dollars for the development of new technologies and expansion into larger markets.

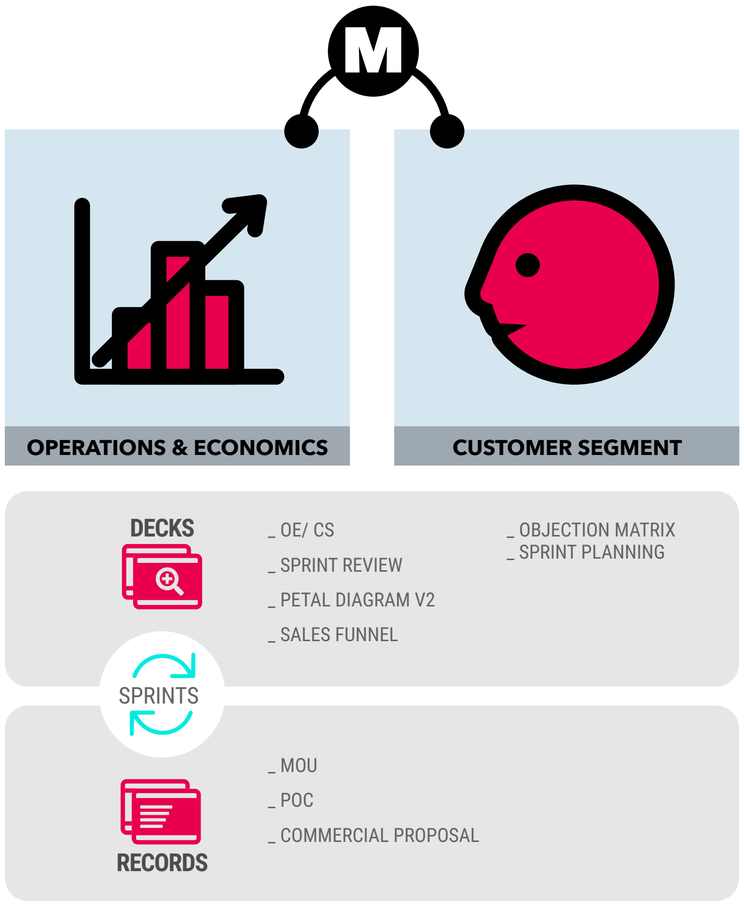
EXAMPLES OF TOOLS



Source: https://www.strategyzer.com/canvas/business-model-canvas



4 .HOW IS IT APPLIED?



4.4 Market Test Cycle

The focus is on closing at least one sale. This process ends up being intensive once the team has put energy and discipline into a minimum sales funnel. Here the entrepreneurs are introduced to the concept of commercial follow-up and its importance in this phase of the innovation. Closing a sale, a pilot program or a co-development are goals to be pursued, as the venture gains traction with its first customer, helping the founders avoid losing energy and giving up too soon.

Closing the first sale requires the development of credibility and a growing commitment by both parties. Many risks are involved for both the first buyer and the nascent startup, and the objections that arise during the process need to be addressed and surmounted.

The Deck for this cycle contains the following frameworks: (i) customer segment x operations & economics canvas; (ii) sprint review; (iii) petal diagram v2; (iv) sales funnel; (v) objection matrix; and (vi) sprint planning.

The Records present a basic framework for organization of the first proposals: (i) memorandum of understanding (MoU); (ii) proof of concept proposal (PoC); and (iii) commercial proposal.

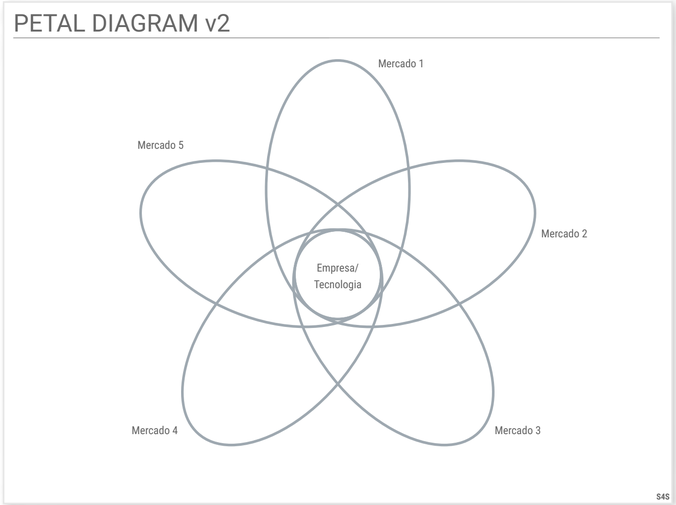
4 .HOW IS IT APPLIED?

4.4 Market Test Cycle

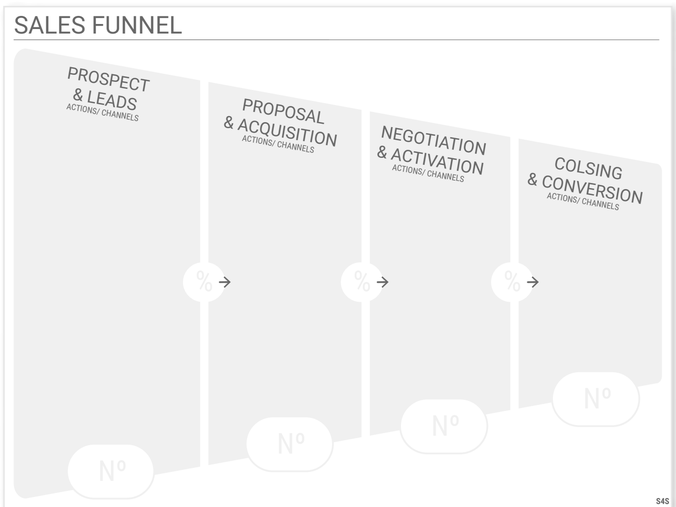
CASO STUDY • CENTRICS

Centrics is a good case to illustrate the importance of the Market Test. The startup identified an opportunity in the difficulty of adopting after-sales management solutions in traditional markets (Customer Success concept). The entrepreneurs wanted to give offline companies a chance to obtain the same customer satisfaction performance as software companies, which use data-based tools. After the maturation period they went out and tried to sell, and rather than waiting for the technology to be entirely ready, they produced the first reports for the first customers manually, completing Excel spreadsheets on their computers and delivering value to those who were willing to pay. In this cycle, Centrics set out to understand the main obstacles that were stopping new customers from buying its solution, and designed a sales funnel to guide its efforts. The tool was updated with each iteration. The phase of focusing on sales is also important for the team to mature: the involvement of everyone with exclusive dedication shows who is really on the ball and who is going to drop out. Centrics now has a more mature product that evolves with each new customer. This has helped the leaders of the venture understand a truth learned by few: product-market fit happens only when sales are recurring and predictable. The challenges continue, and the firm seeks to extract data on how to keep existing customers active, which is helping the team prioritize activities, concentrating only on what is important and avoiding “scope creep” – many functions the customer does not want – and it is also helping them understand the customer profile that will drive recurring sales.

EXAMPLES OF TOOLS



Source: https://steveblank.com/2013/11/08/a-new-way-to-look-at-competitors/



SHELL for
SCIENTIFIC ENTREPRENERUSHIP
v1.7

PROBLEM TEST

_ CS/VP
_ SPRINT REVIEW
_ PETAL DIAGRAM
_ JOBS-TO-BE-DONE/ PAINS
_ CD MATRIX
_ SPRINT PLANNING

DECKS

SPRINTS

RECORDS

INTERVIEW PROTOCOL _
INTERVIEW RECORDS _
ARCHETYPES _

P

VALUE PROPOSITION
VP

CUSTOMER SEGMENT
CS

FIT

SOLUTION TEST

_ VP/FE
_ SPRINT REVIEW
_ BLUE OCEAN
_ FE REPRESENTATIONS
_ TIE-UP MATRIX
_ SPRINT PLANNING

DECKS

SPRINTS

S

RECORDS

_ EXPERIMENT PROT. & REC.
_ EXPERIMENTS
_ NAPKIN PROTOTYPES
_ LOW-FIDELITY PROTOTYPES
_ CRITICAL FUNCT. PROTOTYPES

MARKET TEST

_ OE/CS
_ SPRINT REVIEW
_ PETAL DIAGRAM V2
_ SALES FUNNEL
_ OBJECTION MATRIX
_ SPRINT PLANNING

DECKS

SPRINTS

M

RECORDS

_ COMMERCIAL PROPOSAL
_ MOU
_ POC

FE
FEATURES & ENGINEERING

OE
OPERATIONS & ECONOMICS

B

_ FE/OE
_ SPRINT REVIEW
_ BETS OF THE COMPETITION
_ BMC
_ METRICS MATRIX
_ SPRINT PLANNING

DECKS

SPRINTS

RECORDS

MARKET SIZE _
PRICING _
INITIAL COSTS _
INITIAL INCOME STATEMENT _

BUSINESS MODEL TEST

DECKS
_ tools for synthesis and organization of learning and sprint planning

RECORDS
_ tools for recording and archiving data collected and results achieved

SPRINTS
_ Iteractive search / development process with a period of 1 to 2 weeks