The knowhow of Research at service of Industry

Alberto Fornaser
2010-2011 (early): first idea of StartUp from the results obtained in European projects

2010: Ph.D. school

2012: SeedMoney

2012 (November): Robosense was founded\funded

2014: Ph.D. defence

... ...

Today
OUR STORY SO FAR
European projects

Protoypes for lab:
• Object identification for logistic
• Dense motion capture structure

MIRO
Measurement Instrumentation and Robotics

AGILE
VERITAS
2005-2011
NEW SOLUTIONS need NEW OPPORTUNITIES

Seed Money 2012

9° place on 40 proposals

113.000€ of funding

Technological innovativeness

Business proposal

Hire
Academic Research StartUp

- Product Mockup/Idea
- Limited knowledge of the market
- No active partnerships

Academic StartUp

- Product/s
- Knowledge and experience of the market
- Active partnerships
- Customers
Acquire technologies
Development
Networking
Consultancy
PH.D. Education - Devices

**Camera**
- Wide field of view
- Graphic features

**2D laser scanner**
- Deep field of view
- Geometric features
- Accurate

**3D Time of Flight camera**
- Image & 3D Depth map
- Innovative technology
AGILE – Eurostars Project

Research project for the development of technologies aimed at increasing the level of automation in the automatic logistics, the versatility of mobile robots, and the destructuration of the plants.

The project has led to the realization of a prototypal device able to autonomously identify a pallet and plan the manoeuvre of picking for an AGV.
Logistic plant

Automatic logistic plant

COMPLEXITY: interaction between AGV and workers, plant, AGVs.
900 identifications

Accuracy (95%ci):
± 0.8 cm transverse
± 0.4 cm longitudinal
± 0.5° Attitude
3D technology
More than 1000 AGV installed each Year in Europe

World Robotics 2011
Il grafico mostra i costi associati ai diversi campi di intervento. Ogni barra rappresenta un campo specifico di gestione e il suo costo in percentuale. I costi sono suddivisi in cinque anni: 1° anno, 2° anno, 3° anno, 4° anno e 5° anno. Ogni anno presenta diverse attività gestionali.

- **1° anno**: Acquisto 2 AGV + 1 turno
- **2° anno**: Manutenzione AGV + 2 turni
- **3° anno**: Manutenzione AGV + modifica layout impianto + 3 turni
- **4° anno**: Manutenzione AGV + modifica layout impianto + 3 turni
- **5° anno**: Manutenzione AGV + modifica layout impianto + 3 turni

I costi sono raggruppati in categorie: AGV (Automated Guided Vehicles) e Operatore/i. Il grafico evidenzia la progressione dei costi e l'evoluzione delle attività nel tempo.
**Constraints mean costs.**
An automatic logistic plants costs hundreds of thousands of Euros. **The modern technology uses complex plants to manages vehicles with a low grade of artificial intelligence on board!**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Costs</th>
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<tbody>
<tr>
<td>AGVs</td>
<td>N x 60.000€</td>
</tr>
<tr>
<td>CAD + Path planner</td>
<td>~80.000€</td>
</tr>
<tr>
<td>CAD + Localization system</td>
<td>~50.000€</td>
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<tr>
<td>Pallet management: machines for the load/unload</td>
<td>+100.000€</td>
</tr>
<tr>
<td>Design and organization of the plant</td>
<td>+100.000€</td>
</tr>
<tr>
<td>Expert operator for the interaction with the AGVs</td>
<td>+</td>
</tr>
<tr>
<td>Time</td>
<td>+</td>
</tr>
<tr>
<td>...</td>
<td>+</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>&gt;400-500.000€</strong></td>
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A *smarter AGV* would reduce many of the fixed cost related to the technology used today.
Our first Business plan - Pessimistic

<table>
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<tr>
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<th>Anno 0</th>
<th>Anno 1</th>
<th>Anno 2</th>
<th>Anno 3</th>
<th>Anno 4</th>
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<tbody>
<tr>
<td>Unità Smart Finder</td>
<td>0</td>
<td>5</td>
<td>8</td>
<td>15</td>
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![Cash Flow Graph](image-url)
Our first Business plan - Optimistic

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<tr>
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<td>8</td>
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Cash Flow

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<th>Anno 5</th>
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<tbody>
<tr>
<td>Cassa Finale</td>
<td>€25,175</td>
<td>-€7,991</td>
<td>€61,872</td>
<td>€90,363</td>
<td>€95,467</td>
<td>€58,788</td>
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</table>
Seed money 2012 → 113,000€
Smart finder sold till today:

0
Did we survived?
How?
Projects obtained thanks to SmartFinder

Some

The initial prevision was definitely not correct.

Does the market need the SmartFinder? Probably not.

But it needs some minor stuffs that are part of the KnowHow included in the SmartFinder!
Be versatile!

From a product different ones can be derived. There are 3 kind of «better» products:

• The ones that do more
• The ones that do better
• The ones that cost less
We made a system for 2D pallet recognition and picking. Ok, not so successful...

<table>
<thead>
<tr>
<th>We derived:</th>
<th>We used:</th>
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<tbody>
<tr>
<td>• Object recognition system</td>
<td>• New technologies</td>
</tr>
<tr>
<td>• Path planning</td>
<td>• Industrialized technologies</td>
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<tr>
<td>• Vehicle navigation</td>
<td>• Mixed solutions</td>
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<tr>
<td>• Scanning systems</td>
<td></td>
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<tr>
<td>• 2D/3D measurements</td>
<td></td>
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<tr>
<td>• Shape analysis</td>
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</table>
0 Smart finder..

BUT a demo of SmartFinder in action allowed us to sign our first contract with a customer (more than 100,000€).

The main results were:

- the engineering of functional modules for mobile robotics, calibration and object recognition.
- the development of a SmartFinder 2.0 based on 3D technology
- The first customer! creation of contacts and a commercial network!
2016 New Product! 😊

Low level control library for autonomous navigation and control for industrial forklift.

- Strong collaboration with PLC producers.
- Integration of algorithms on industrial hardware
- Modular solutions
VERITAS – FP7 Project

Research project aimed at **modelling physical disabilities** resulting from pathological states or diseases in order to structure a simulation environment/assisted CAD.

Within the project Unitn developed a multi-camera system dedicated to the measurement of body’s shapes and motions.
• Full body scanion is very complex and expensive
• Many competitors
• Not a very big market

The body scanner technology was and is a «dream» technology. *Every one wants it, but no one wants to pay its price (nightmare)..

Solution: *do something simple and focused on a specific part of the market!*
Knock to the door of experts (users, technicians and developers)
Sometimes new technologies change the scenario.
And the market...

In 2013 our device was the most competitive one (about 12.000€).
In 2014 we became too expensive...
The **needs** of the customers changed according to the new price of a similar technology.
Again...
But sometimes we can change the situation again: we know both the market both the initial «real» needs of the customers.

Our main issue with Morphos was the hardware costs.

Morphos 3D 2.0
Low cost torso 3D scanner
The identification of transversal applications is a very good practice! → “low” cost 3D scanner (low depends on the application and field!!!!)
Sometimes, from a simple talk, some bright ideas can born..

One of our customer was working in the airport field. One of its devices did not completely satisfy the requirements, so he asked us if we were able to create something better.

We did it.
We also did some interesting networking activities!
Our initial idea of possible market
automated logistic

OURS markets
Automated logistics
Robotic navigation
Airports
Orthopaedics
StartUp!

Academic
Research StartUp

2012

Acquire devices
Development
Networking
Consultancies
2016

Academic Research StartUp
Our Business Today

Consultancy

Products > Consultancy
Our future

At the end of 3 years we managed to create a commercial network.

2016 is the first year during which the customers began to contact us for new proposals (instead of being us the propositive part).

We need more incomes, our objective is 200.000€/year. This target can be achieved by:

- acquiring new customers
- working together with our current customers in the identification of new market possibilities
- developing new products/solutions
- strengthen the consultancy activity

→ Once the 200.000€/year goal is achieved, the next step will be hiring a new member.
SOME IDEAS FROM OUR EXPERIENCE
“Go big or go home”

Yea.. Nice slogan.. But I always heard it from subjects that do not have a StartUp and usually have instead a salary...

Easy to say, very difficult to make in practice..
The motto is correct, but are we in the right place (nation)?

Maybe yes, maybe not..

What is the meaning FOR YOU of “going big”? 
An **elevator pitch**, elevator speech or elevator statement is a short summary used to *quickly and simply* define a process, product, service, organization, or event and its value proposition.

The name 'elevator pitch' reflects the idea that it should be possible to deliver the summary in the time span of an elevator ride, or approximately thirty seconds to two minutes and is widely credited to Ilene Rosenzweig and Michael Caruso (while he was editor for Vanity Fair) for its origin. The term itself comes from a scenario of an accidental meeting with someone important in the elevator. If the conversation inside the elevator in those few seconds is interesting and value adding, the conversation will either continue after the elevator ride, or end in exchange of business cards or a scheduled meeting. A variety of people, including project managers, salespeople, evangelists, and policy-makers, commonly rehearse and use elevator pitches to get their points across quickly.
“Pitch is (almost) everything”

Learn how to pitch properly

Usually the subjects that are very good in doing stuffs are very, very, very bad in presenting them. They tend to present the development instead of the product ...

If you are not good at speaking.. Find someone that it is. Build a team!
KEEP CALM AND PITCH LIKE A BOSS
“Explain why, not how!”

Persons that have habit in developing and doing research usually speaks on the methods and technical details of their solutions.

99.99% of customer ARE NOT INTERESTED in the details (probably they do not even understand them). If you are proposing a technological solution it is implied that it is good, so you must focus only on showing to your customers why they need what you are offering!

99.99% of the times are not the “details” that make a solution a good product!
“There are no competitors..”

A very common assumption... better call it MISTAKE..
If there are no competitors.. you are probably doing something useless... and so wasting your time, resources and energy.

Motivations:
1. Failure in searching competitors
2. Working on something that has no market
3. Repeating the errors of someone else (back to 1)
4. Your idea could be too new(back to 2) or too old(back to 1)
“Sell cocaine, not aspirin”

a) If a customer has a problem you aim is to solve it.
b) If a customer has a problem your aim is to solve it, but at the same time make such customer dependent on you!

The difference between the 2 options will be your money over time, so the stability of your business.
“Understand your business”

What is your business? What are you offering?

Products, Solutions, Services?

The only one that can give you the answer is yourself.
You MUST understand it before understanding your customers.
We offer 3 kinds of services

GOOD - CHEAP - FAST

But you can pick only two

GOOD & CHEAP won’t be FAST

FAST & GOOD won’t be CHEAP

CHEAP & FAST won’t be GOOD

Choose what YOU want to offer
Discuss it with your customers
There are two rules for success:
1. Never reveal everything you know

R. Lincoln

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