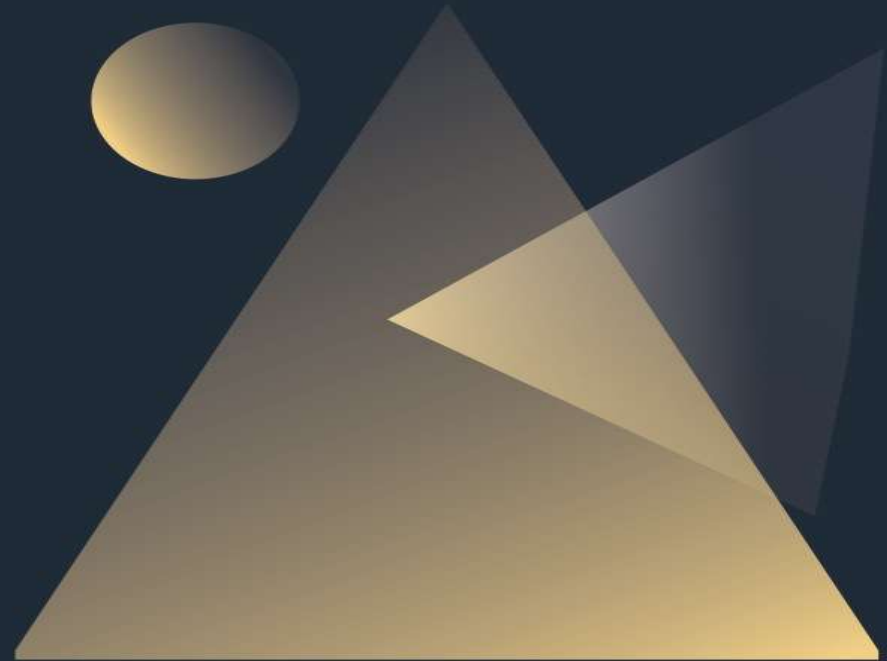


Presenter's webcam image

*Startups, from a dream and hope to
a public policy.*

*Jorge Pedrals
Partner
Pedrals & Cía.*



Mining Engineer

Universidad de Chile
Master in History



With 35 years of experience, of which 30 have been holding key management positions in mining, energy and consultancy companies. He led as the C.E.O. the last 10 years two projects; a coal open pit mine – port facility in a remote island (Mina Invierno in Isla Riesco, with an investment of USD 600 million) in the south of Chile, and the expansion of "El Teniente" (Nuevo Nivel Mina, today Andes Norte, with an investment of USD 4 billion), the biggest underground mine in the world. Highly experienced in leading project work teams, strongly oriented to results in environments of high uncertainty.

Member of the Board of Instituto de Ingenieros de Chile (2020 - 2021).

President of the Mining Policy Commission of Instituto de Ingenieros de Minas de Chile.

He is currently dedicated to academia, consulting and business management.

Presenter's webcam image

Opinions given in this lecture are the sole responsibility of Jorge Pedrals

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Chile

Presenter's webcam image

- Population 19.458.310 (INE).
- GDP per capita USD 15.855 (International Monetary Fund).
- Gini Index 44,7 (World Bank).
- 48% of exports are mining products (El Mercurio).
- Chile represents 28% of world copper production (Minería Chilena 16/03/2020)
- Mining represents around 10% of the GDP, the highest figure in the last 20 years was 21% (Cochilco).
- Mining taxes are the most important taxes in Chile, excepting VAT; equivalent to the add of many other activities (P. Meller La Viga Maestra y el Sueldo de Chile).



North



Central



South

Presenter's webcam image

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Presenter's webcam image

“A Startup is a team of entrepreneurial talent developing new innovations, in identifiable and investable form, in progress to validate and capture the value of the created innovation - with ambition to grow fast with scalable business model for maximum impact.”

<https://www.startupcommons.org/what-is-a-startup.html>

Our agenda

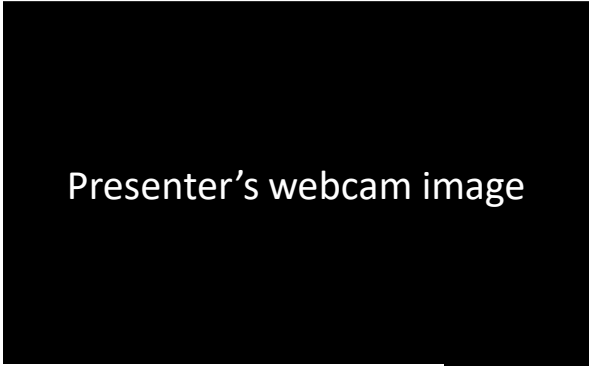
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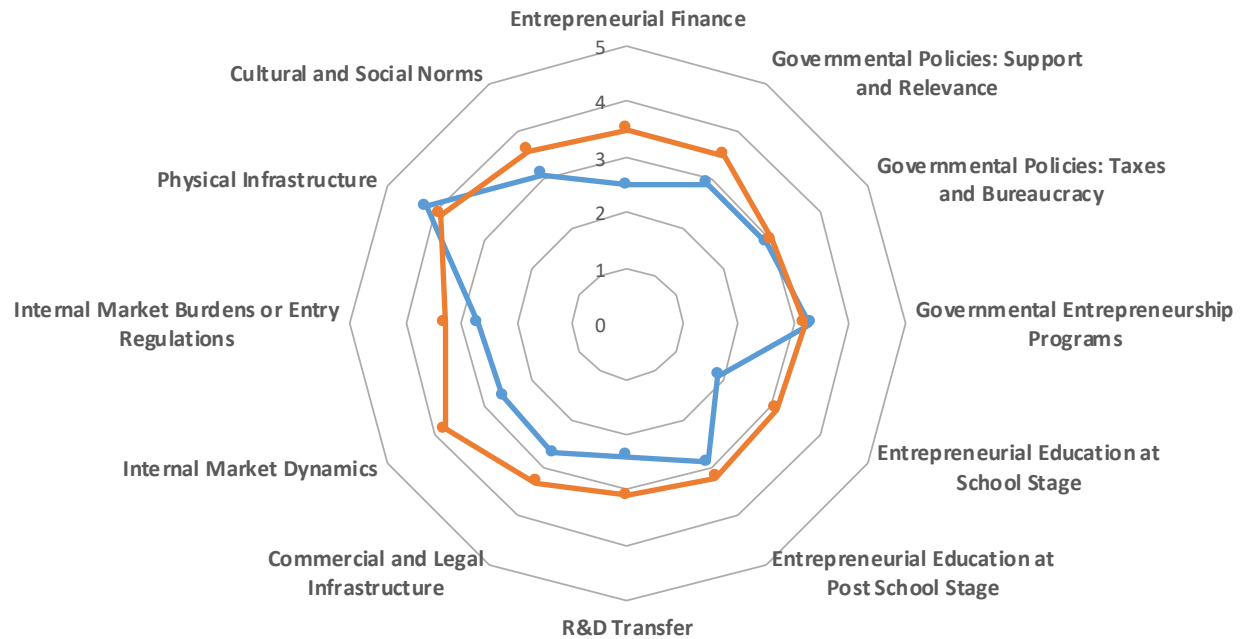


GEM is a consortium of national country teams, primarily associated with top academic institutions, that carries out survey-based research on entrepreneurship around the world. GEM is the only global research source collecting data directly from individual entrepreneurs!

<https://www.gemconsortium.org>



—●— Chile —●— India



Institution:
Entrepreneurship Development Institute of India (EDII), Ahmedabad
 Survey Vendor:
IMRB International
 Funders:
Centre for Research in Entrepreneurship Education and Development (CREED)

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Ecosystem

Knowledge:

- ✓ Universities.
- ✓ Main suppliers.
- ✓ Others.

Capital:

- ✓ Boot strapping.
- ✓ Venture capitals.
- ✓ Angel investors.
- ✓ Credit banks.

Companies:

- ✓ Owner innovation unknown.
- ✓ Owner challenges.
- ✓ Business as usual.

**Private and
Government
Agencies**

**A big
challenge**

Presenter's webcam image

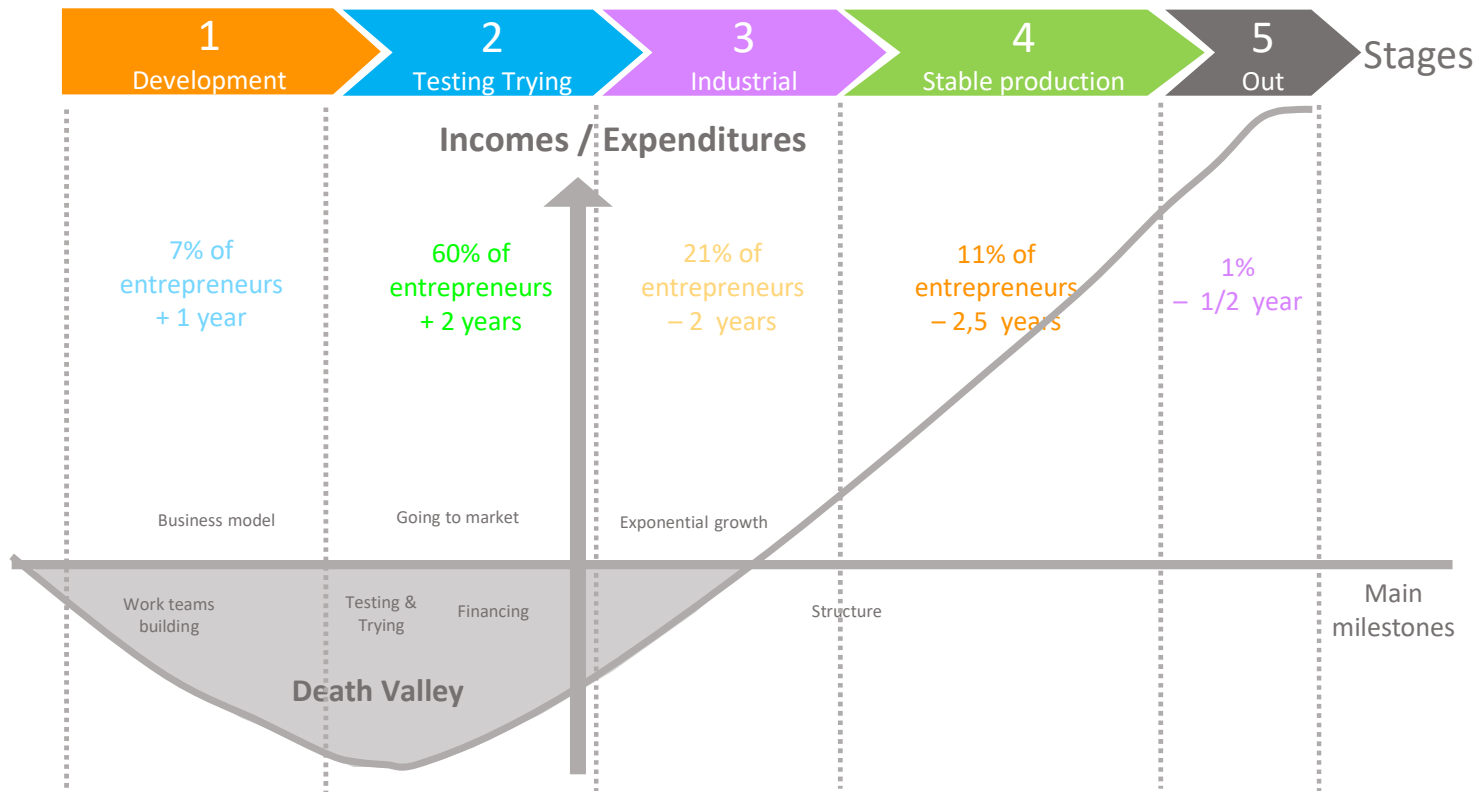
Madurity – Sales

Product industrial launch

**Definition of
MVP / testing &
validation**

**Concept
Development**

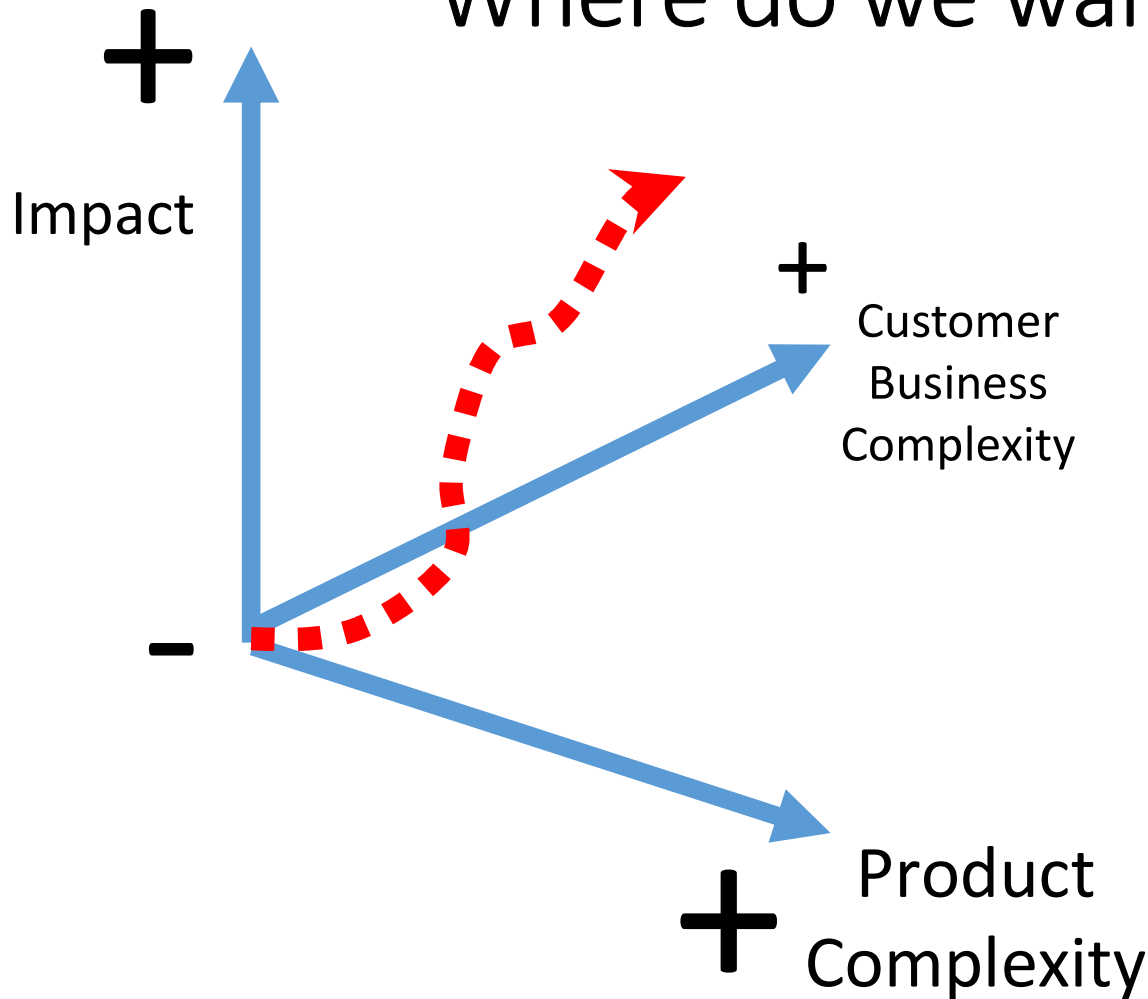
Stages and milestones of startup cycle life in mining



Presenter's webcam image

Source:
Expande Minería
(www.expandemineria.cl)

Where do we want to go?

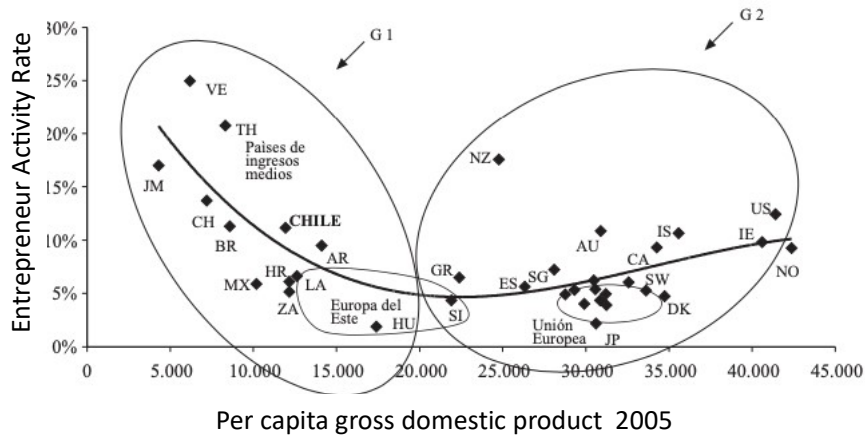


Presenter's webcam image

*Dynamic Complexity
the only way to understand
and manage companies
and problems in the
Society today.*

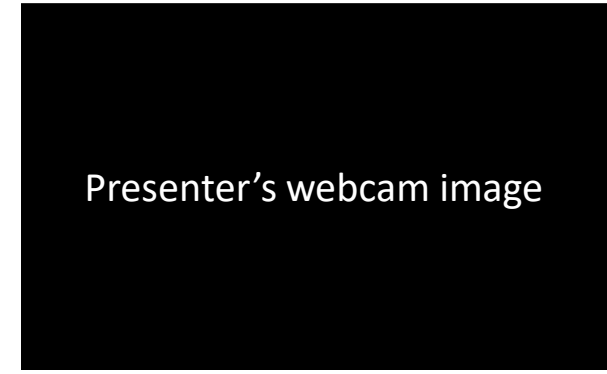
What can I expect (or plan) in accordance with my country?

Relationship between EAR and per capita income (2005)



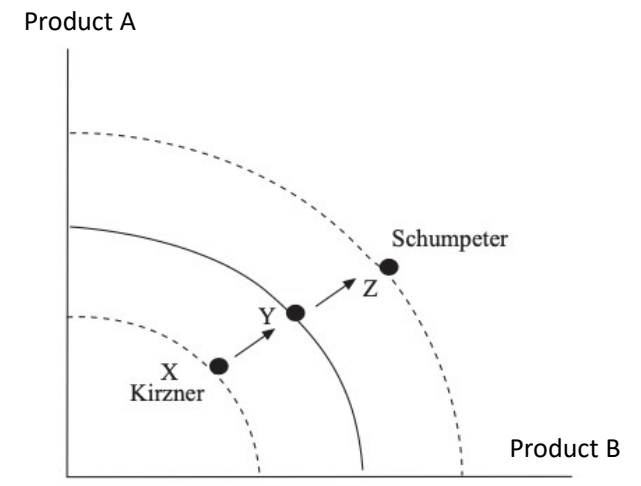
- | | | |
|---------------|-------------------|--------------------|
| AR: Argentina | HU: Hungría | SG: Singapur |
| AU: Australia | IE: Irlanda | SI: Eslovenia |
| BR: Brasil | IS: Islandia | SW: Suiza |
| CA: Canadá | JA: Jamaica | TH: Tailandia |
| CH: China | JP: Japón | US: Estados Unidos |
| DK: Dinamarca | LA: Letonia | VE: Venezuela |
| ES: España | MX: México | ZA: Sudáfrica |
| GR: Grecia | NO: Noruega | |
| HR: Croacia | NZ: Nueva Zelanda | |

Minniti, M. (2006): "Entrepreneurs Examined". En *Business Strategy Review*, London Business School.
 Minniti, M., W. D. Bygrave y E. Autio (2006): "Global Entrepreneurship Monitor- Executive Report 2005". Babson Park, MA; London: Babson College, London Business School.



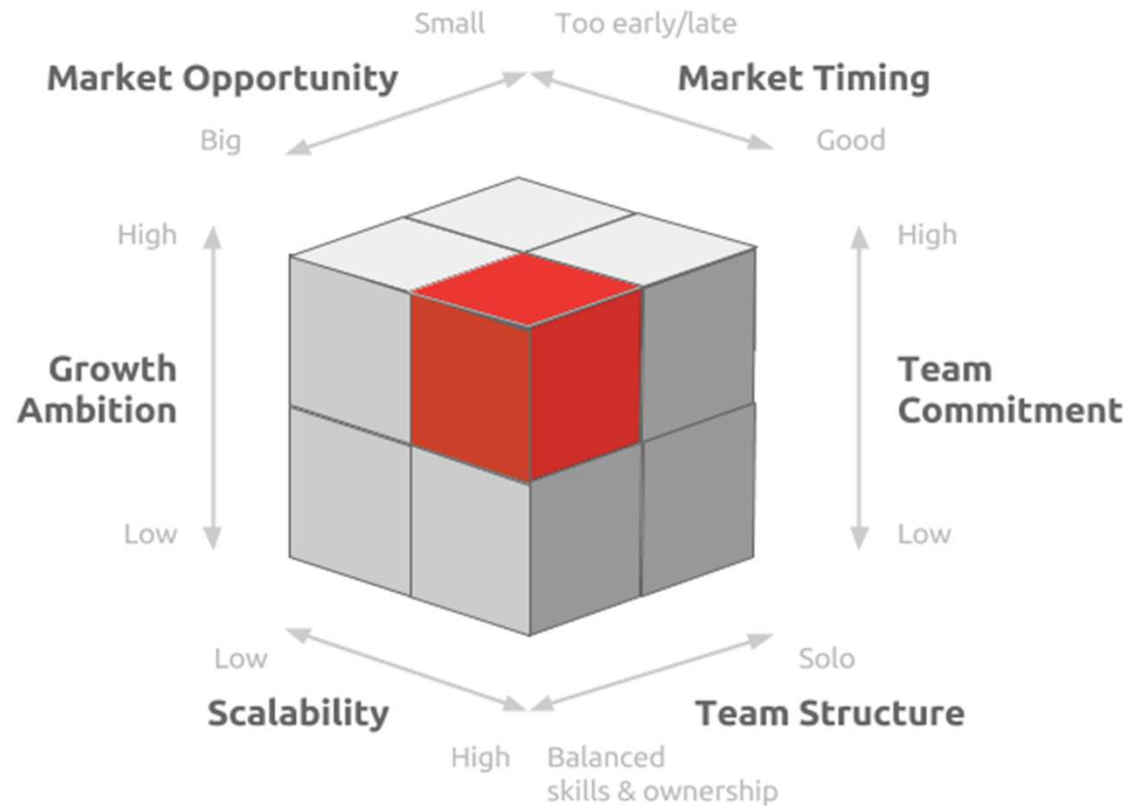
Presenter's webcam image

Effect of entrepreneurship on the production possibilities frontier according to Schumpeter and Kirzner



Source: Landström, H. (1999): "The Roots of Entrepreneurship Research". En *New England Journal of Entrepreneurship*, Vol. 2 No 2, Fall.

Evaluating Startup Potential



A Startup - Evaluating startup potential

by www.startupcommons.org



Chilean mining ecosystem

Presenter's webcam image



CORPORATIVO

- INICIO
- SOBRE EXPANDE
- CASOS DE INNOVACIÓN
- DESAFÍOS
- RECURSOS PARA EL INNOVADOR

- INSCRIBE TU SOLUCIÓN
- NETWORK / REDES
- EQUIPO
- PUBLICACIONES

COMUNIDAD

- NOTICIAS
- AGENDA
- BLOG: MINING FUTURE



Apply ▾

EN ES



INCÚBATE CON...

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Presenter's webcam image

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Startup – Chile definitions (2010)

Presenter's webcam image

Objectives:

1. Increase entrepreneurship with high global potential in Chile.
2. Strengthen the ecosystem of entrepreneurship in Chile.
3. Position Chile as a pole of innovation and entrepreneurship

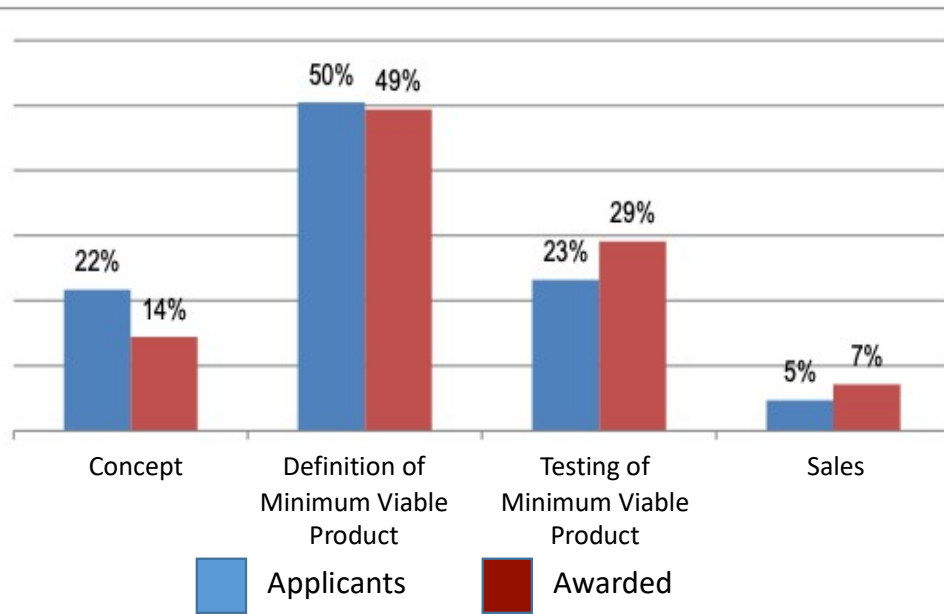
Scope:

- a. Attraction / retention: World-class entrepreneurs develop high-potential global ventures in Chile that operate in the country.
- b. Development of capacities and networks: Local entrepreneurs (beneficiaries and non-beneficiaries) develop knowledge and skills, improve their networks and their global vision.
- c. Strengthening of actors: Other actors of the Chilean entrepreneurship ecosystem (investors, entrepreneurs, academic institutions) improve their access to information and their predisposition to innovate and undertake.
- d. Country-brand: The international community related to innovation and entrepreneurship improves its perception of the Chilean ecosystem.

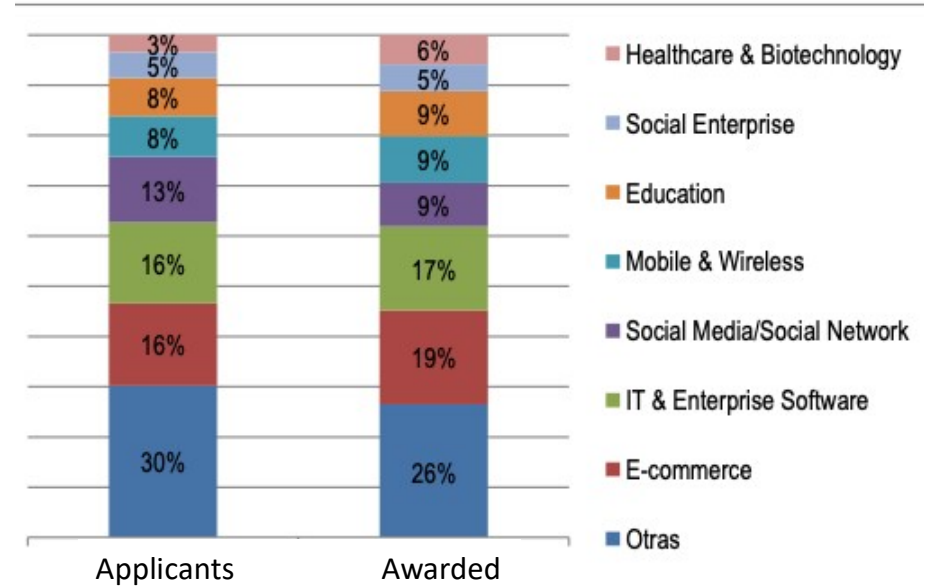
Some results



Stage of development at the application form



Applicants industry focus



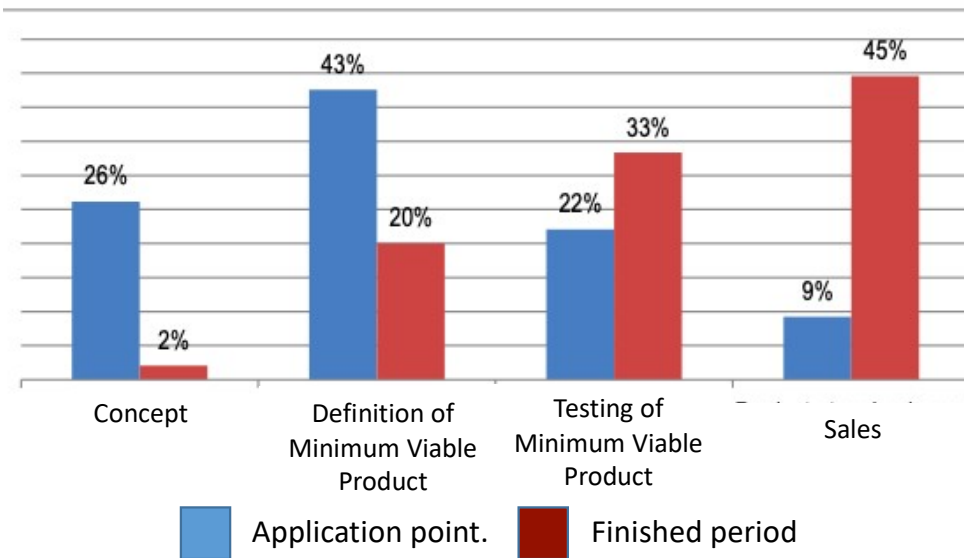
No mining??

(based on EVALUACIÓN DEL PROGRAMA START-UP CHILE DE CORFO, INFORME FINAL, 29 de abril de 2016, Educación, Verde, Ciencia e Innovación. (<http://ctie.economia.cl/wp-content/uploads/2017/07/Evaluaci%C3%B3n-Start-Up-Chile-2016.pdf>))

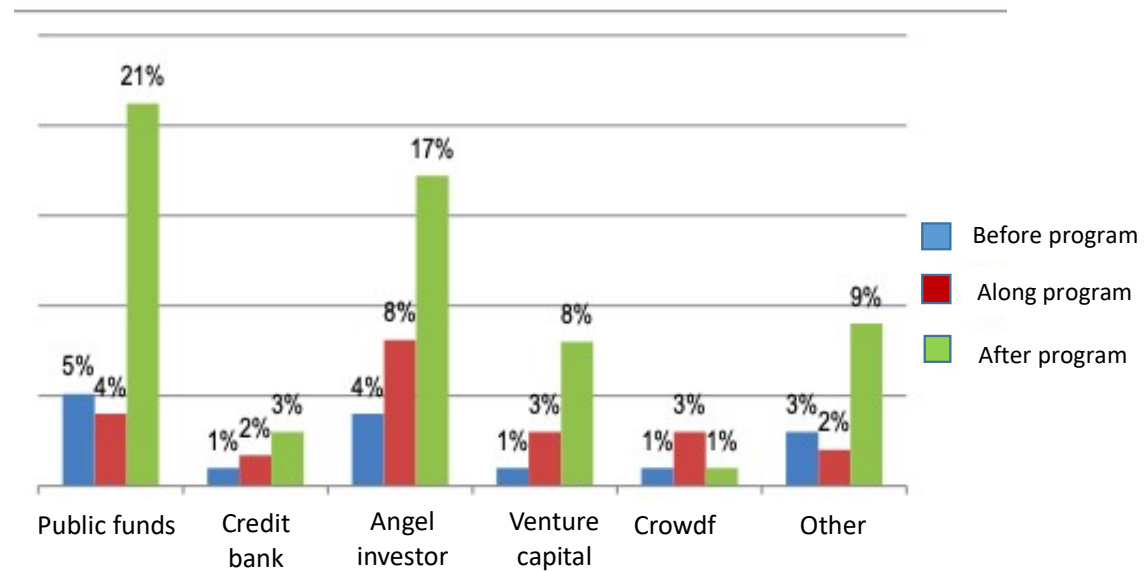
Some results

Presenter's webcam image

Stage of development accomplished



Capital and / or investment raised in addition to the subsidy



(based on EVALUACIÓN DEL PROGRAMA START-UP CHILE DE CORFO, INFORME FINAL, 29 de abril de 2016, Educación, Verde, Ciencia e Innovación. (<http://ctie.economia.cl/wp-content/uploads/2017/07/Evaluaci%C3%B3n-Start-Up-Chile-2016.pdf>))

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Post evaluation 1/2

(based on EVALUACIÓN DEL PROGRAMA START-UP CHILE DE CORFO, INFORME FINAL, 29 de abril de 2016, Educación, Verde, Ciencia e Innovación. (<http://ctie.economia.cl/wp-content/uploads/2017/07/Evaluaci%C3%B3n-Start-Up-Chile-2016.pdf>))

Presenter's webcam image

1. The program formulation is based on the existence of market failures that hinder the creation and development of high-potential enterprises, which, if they occur, could positively impact the growth and competitiveness of the Chilean economy.
2. Although public policies should be based on a logical framework approach, it is not, as well as many other public policies.
3. **The program did not have a statistically significant impact for the projects in terms of: startup continuity, creation and establishing companies in Chile, new sales and exports, new employment opportunities, more startups...**

Post evaluation 2/2

Presenter's webcam image

4. **In accordance with CORFO up to 2020 there are 1.960 startups, whom 47% are active and raised US\$ 2,1 billion.**
5. The Chilean image was improved related to startups and also the ecosystem and the startups' culture.

Recommendations:

- ✓ Stick to a Logical Framework matrix.
- ✓ Define as the sole purpose that world-class entrepreneurs develop high-potential global ventures that set up operations in the country.

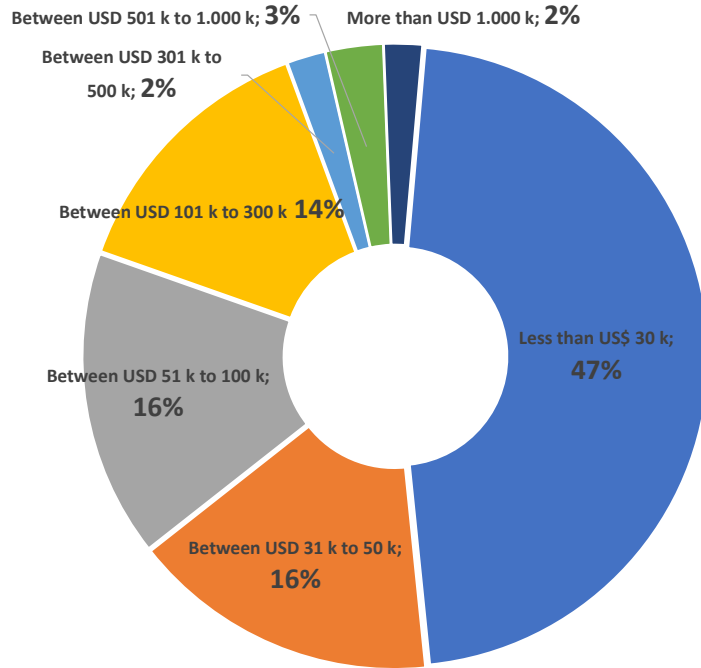
Our agenda

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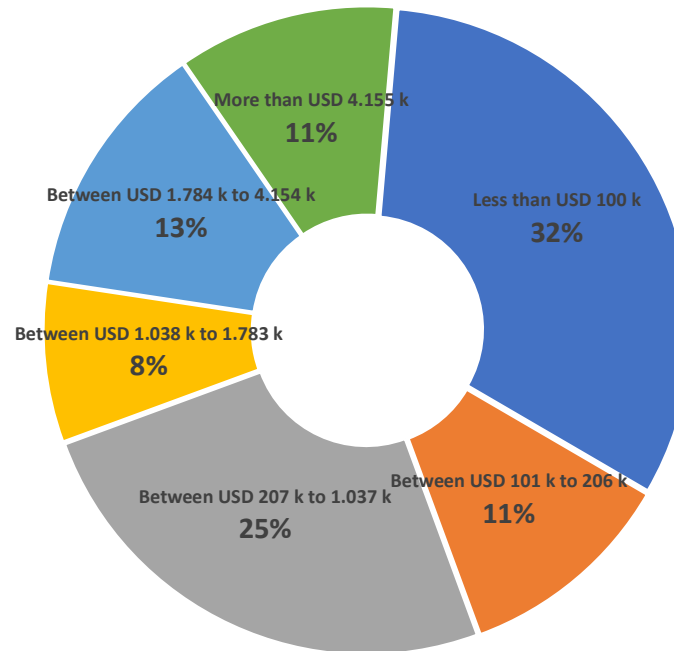
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Expande Minería

(www.expandemineria.cl)



Initial Investment

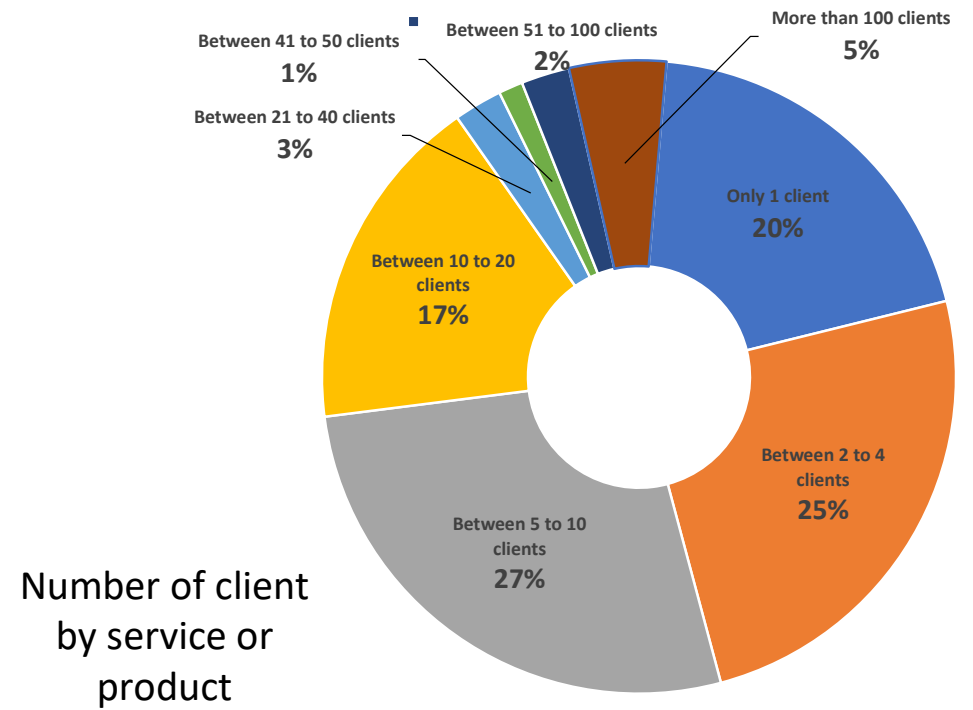
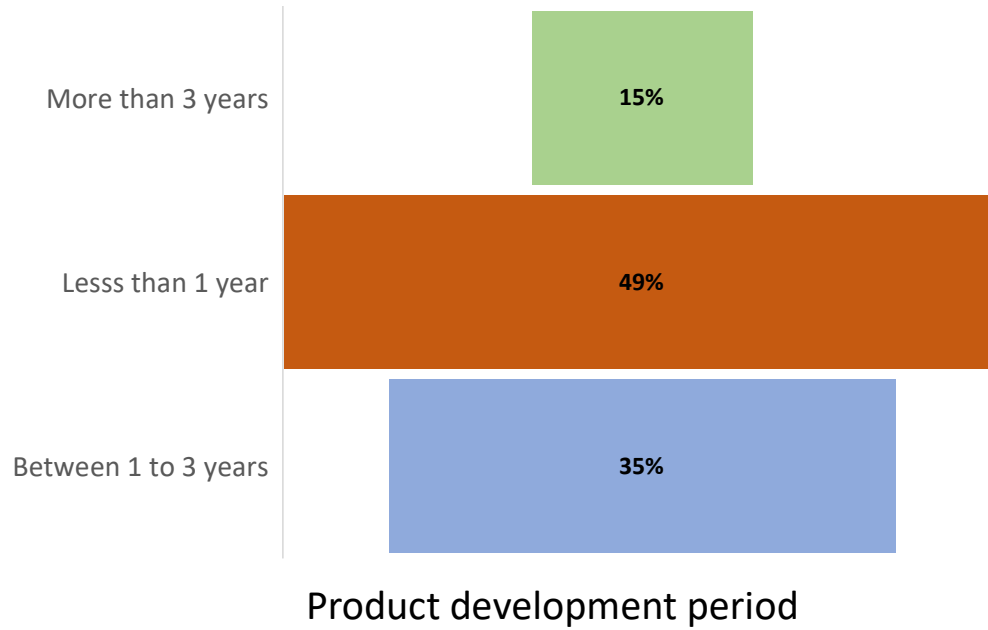


Sales 2nd year

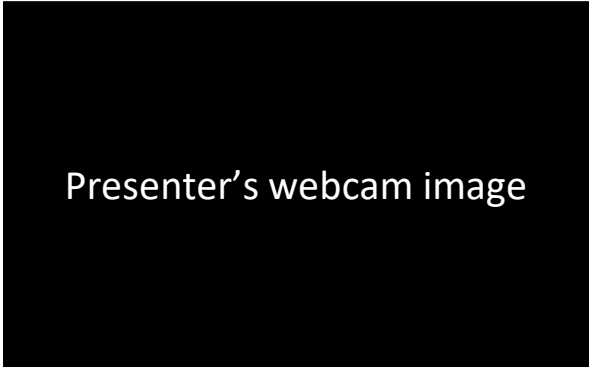
Presenter's webcam image

- Started in 2015, with the assistance of Inter – American Bank (IAD).
- Results based on 100 interviews with startups with 2 years old.
- There are government facilitating agencies, consultancies companies, mining companies, and IAD.
- From geological explorations, through open pit and underground operation, planning, smelting, and processing products and services.

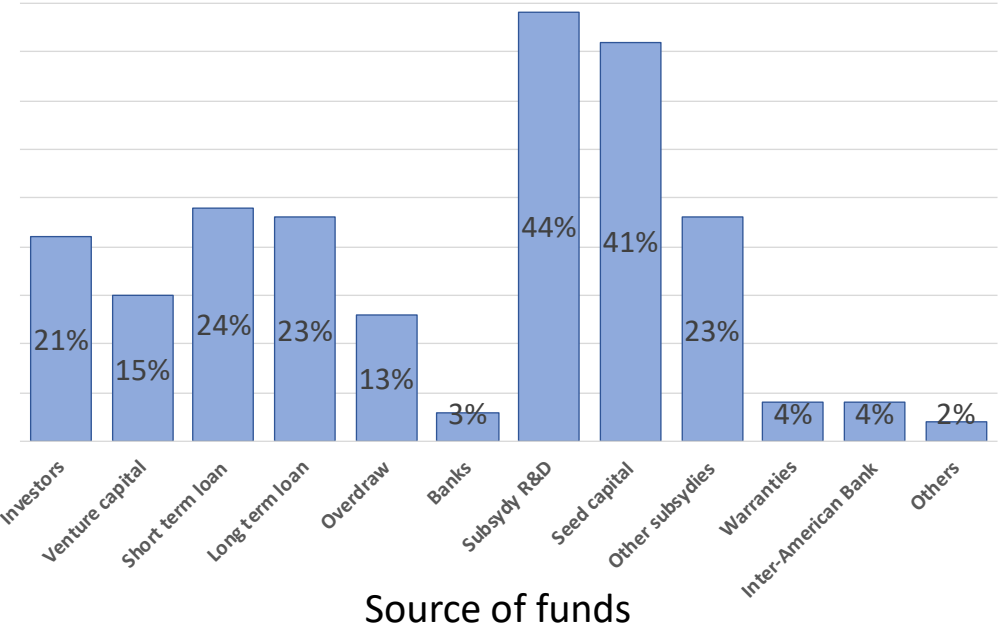
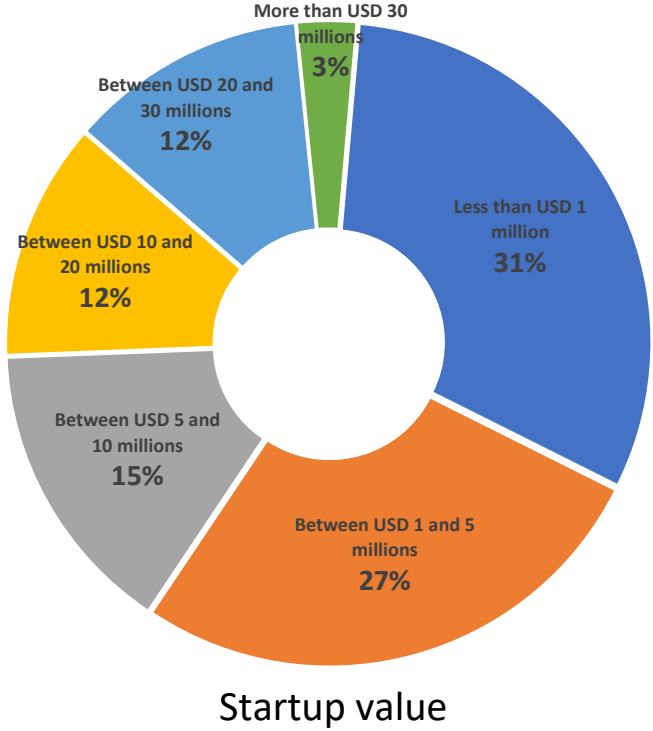
Source:
Expande Minería
(www.expandemineria.cl)



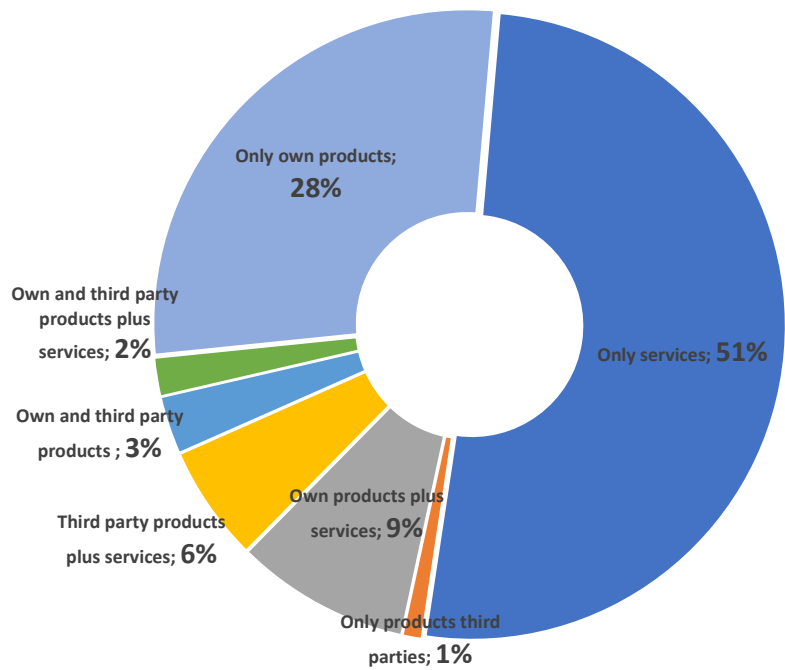
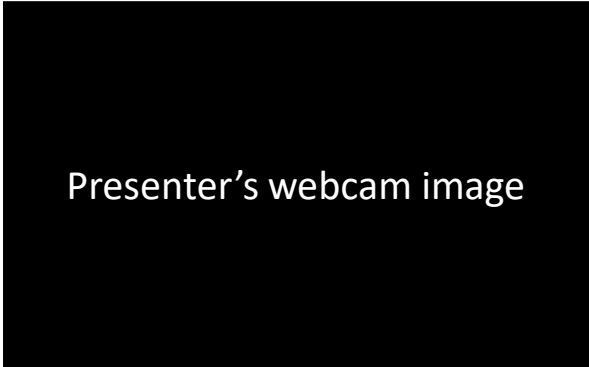
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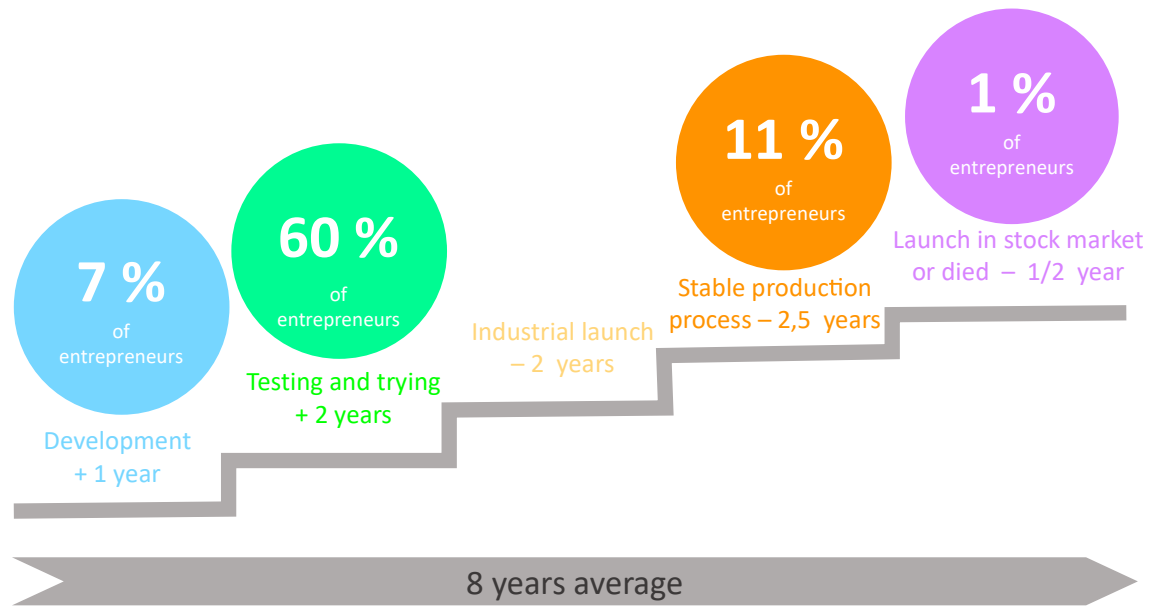


Source:
Expande Minería
(www.expandemineria.cl)



Product and Services delivered 1st year

Startup Technological Cycle life in mining



Source:
 Expande Minería
 (www.expandemineria.cl)

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Presenter's webcam image



Some figures:

30% growth each year on average.

Last year, grow by 130% in people.

Today 18 people of 4 nationalities, in 3 cities of Chile.

More than 4.4 millions tons and 23 billions dollars in product managed.

At least 20% more productivity and 100% less paper.

Antara Mining Timeline

2012: Foundation in Antofagasta, Chile.

2014 – 2015: Start of commercial activity, first developer engineers are incorporated. Release of version Antara MP 2.0. The first packaged version of its first platform. **First journey to Australia**, to know the reality of the METS industry.

2016: Opening of the commercial and R&D office in Santiago, Chile.

2017: **Alliance with a main telecommunication company** to create the 1st Cloud digital platform for geological drilling, based in our 2nd solution, Antara DGS (Drilling and Geological Samples).

2018: **Our team overcame the valley of death (it was very hard!).**

2019: The design and development of the 2nd platform, Antara MI (Maintenable Items), begins. Marketing work in social networks with an external marketing agency. **Alliance with Microsoft** for developing software solutions (Microsoft Partner).

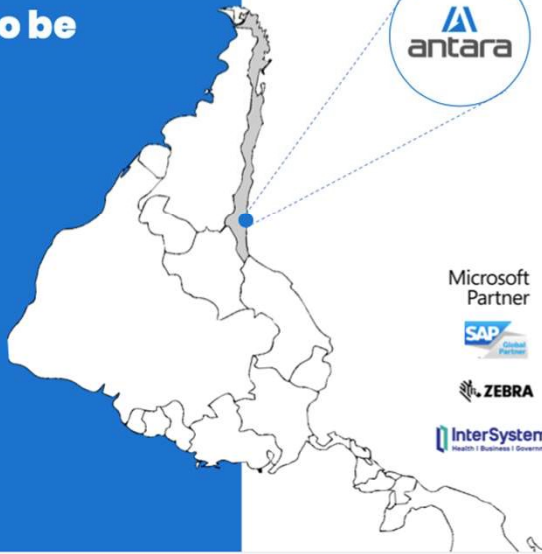
2020: Commercial Chief Officer, Finance Leader, and HR Chief Officer have been incorporated.

Alliance with many different software developers, ERP and analytic services companies, some of them world players.

Antara MI transforms in Sherpath (www.sherpath.io).

We help our clients to be more efficient, productive and sustainable

Antara Mining is a Chilean company that for 8 years from Antofagasta has been generating software solutions based on task automation, traceability and increased productivity, for a more efficient and sustainable global mining industry.



MIEMBRO DE:
endeavor

Presenter's webcam image





ALL INFORMATION

IN ONE PLACE
WHEN AND WHERE YOU NEED



ALL CONECTED

TO THE SAME
INFORMATION

 antara

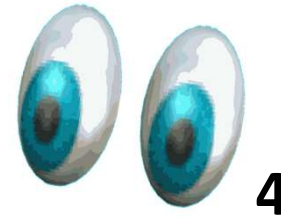
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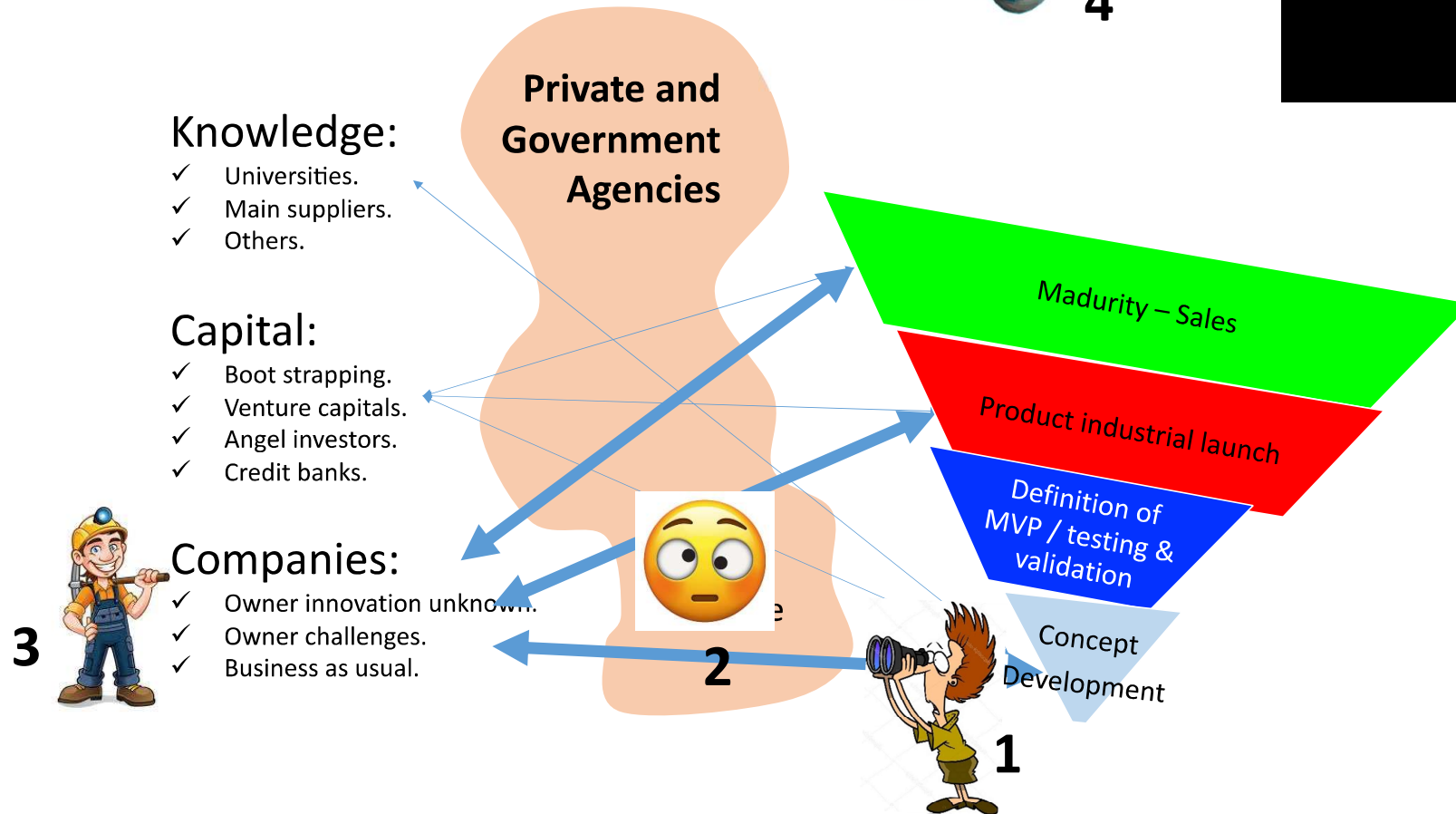
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Ecosystem - Government



Presenter's webcam image



Potential questions...

1. Entrepreneur:

What, why, where, whom, how, etc.

2. Private and government “facilitating” agencies:

- i. Private: each actor will define their own questions, considering the “market” and the environment.
- ii. Government or local county: what are the final and specific objectives, what are the wanted results and the Action plan? (through decision making with a Analytical Hierarchy Process).

3. Mining Companies:

- i. Why and for what?
- ii. What do we win?

Answers...

1. Entrepreneur:

There are too many questions, too many entrepreneurs that start from the point of having an idea, so it is not possible to think like them, there is only to understand, define and nurture the ecosystem.

2. Private and government “facilitating” agencies:

- i. Private (incubators and accelerators): be careful with the incentives (if there is any), there is a market and profits, so information and education is crucial due to asymmetries.
- ii. Government or local county: think that you are trying to improve some market failures, so define thin and focus organizations with the help of specialized non-governmental organizations.

3. Mining Companies:

- i. Social license, acknowledge and acceptance.
- ii. **Healthy start and growth – build relationship with the communities and the country.**

Presenter's webcam image

Some barriers...

1. Mining production continuity a key asset.
2. Keeping the machine running – weak innovation culture mining industry.
3. Weak collaboration culture between mining companies.
4. Asymmetry between national companies and worldwide suppliers.
5. Asymmetry between the startups and mining companies.
6. Venture capital availability.
7. Copyright issues.
8. Access to knowledge.

Sources:

- Mainly my conclusions, and...
- Innovación Colaborativa UAI www.colaboramineria.cl
- Expande Minería www.expandemineria.cl
- Startup Chile www.startupchile.org

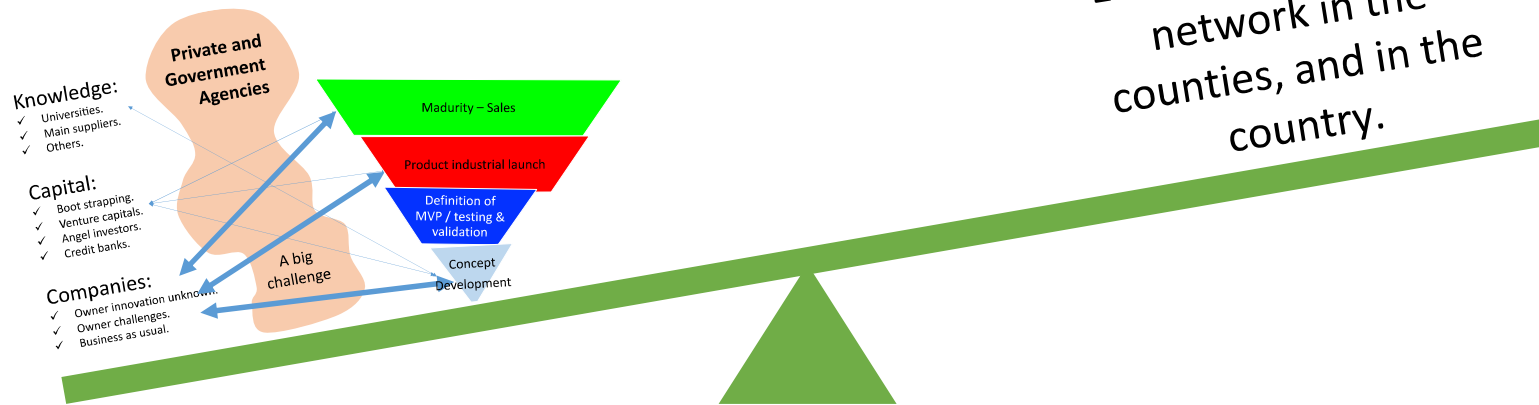
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The State, a bigger picture.

Presenter's webcam image



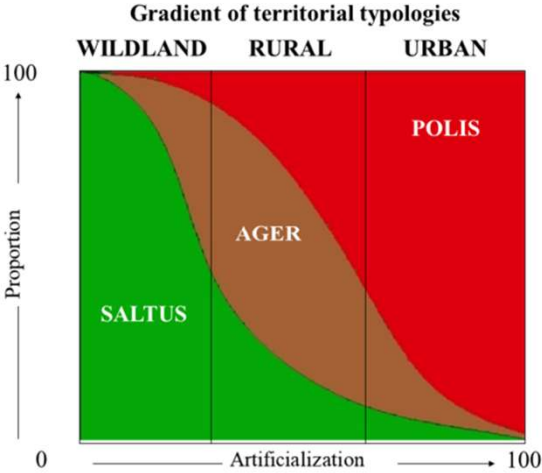
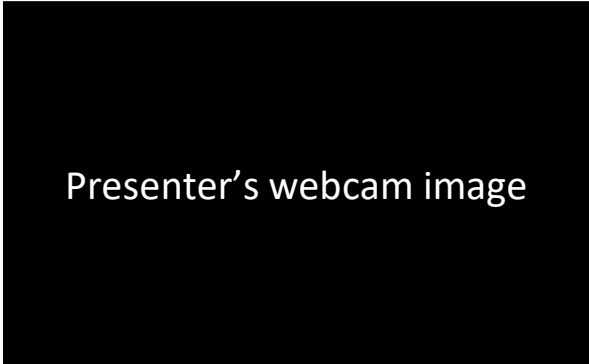
More value
More Education
Finally, more Culture
(this process is not by chance)

How can we build it?

Presenter's webcam image

1. The vision for the future through the concept of **Cultural Landscape**.
2. Managing through the concept of **Dynamic Complexity**.

Cultural Landscape

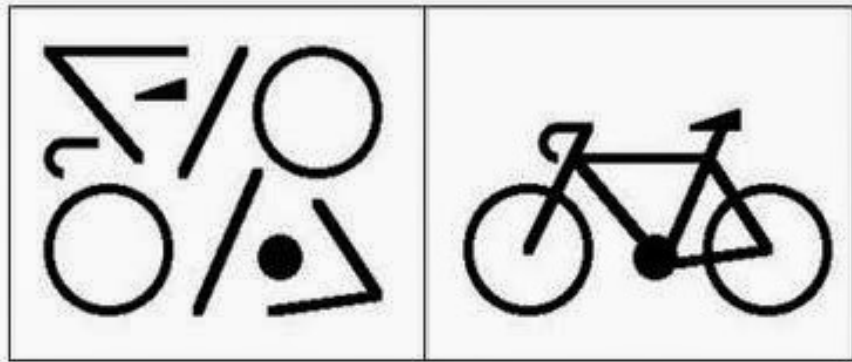


Construction and Metabolism of Cultural Landscapes for Sustainability in the Anthropocene, D. Subercaseaux, J. Gastó et al, Centro de Desarrollo Local, UC, 2020.



Dynamic Complexity

Presenter's webcam image



What are the dimensions to plan a strategy for startups?

Consilience, The Unity of Knowledge, Edward O. Wilson, Vintage Books, New York, 1999.

Review

Construction and Metabolism of Cultural Landscapes for Sustainability in the Anthropocene

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Abstract: In the Anthropocene, humans have become the dominant force behind the transformation of the planet and its cultural landscapes. In recent decades, there has been a paradigm shift in the sciences, changing the focus from the study of separate components to the study of wholes. In light of this, several fields of study have attempted to address the dichotomous paradigm of nature versus society by developing integrative concepts, such as ‘social metabolism’, to explain the inextricable interrelations between nature and society for building a sustainable future. In this paper, we examine the metabolism of cultural landscapes, considering the actions of social actors in their territories. Cultural landscapes emerge from the artificialization of nature and the opening of the land, resulting in a landscape that conforms to the culture and the availability of technologies, thus creating a whole system with either higher or lower levels of life quality and sustainability. Three central elements operate interactively in the construction of cultural landscapes: the territory, the social actors who act in the territory, and the articulators (e.g., technology and regulations). The construction of cultural landscapes gives rise to a gradient of territorial typologies, including wildland, rural and urban, which have different requirements and consumption of resources and energy. In the Anthropocene, many cultural landscapes have been constructed in such a way that they require and consume increasing amounts of energy. We describe carrying capacity, polycentricity, and Universal Lawfulness as three of the main considerations for the design of sustainable cultural landscapes.

Keywords: carrying capacity; complexity; nature artificialization; polycentricity; universal lawfulness; landscape design; social metabolism

<https://centrodesarrollolocal.uc.cl/index.php/publicaciones-2/739-construction-and-metabolism-of-cultural-landscapes-for-sustainability-in-the-anthropocene>

Management of Dynamic Complexity in Mining Projects, redefining the concept of Uncertainty and recommendations for the Corporate Governance.

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ABSTRACT: This paper aims at providing an explanation as to why certain mining projects face major difficulties that can lead to their failure, even when a considerable share of the investments has already been made. This research reviews the literature on the topic and was developed after the author led two projects of a very different nature. The first one was a mining-port investment –amounting to US\$ 600 million– in a remote and uninhabited island in Magallanes (Riesco Island), including an open pit coal mine and port facilities which have been in operation for the last six years and export to different countries around the world and to Chile’s north region. The second project was the expansion of CODELCO’s El Teniente Mine (New Mine Level), a project worth more than US\$ 4 billion, and which involved a thorough reformulation that led to a new structure to address risks differently, capturing the complexities inherent to megaprojects. The common ground in such different projects is Dynamic Complexity and a new understanding of uncertainties. Given the speed in information and societal changes, there is a need to introduce new tools and/or adapt existing ones to support the way a firm’s corporate governance can manage uncertainties and Dynamic Complexity.

Key words: Mining projects, Dynamic Complexity, Corporate Governance, Uncertainties, Site Investment, Geotechnical Baseline Report, Risk Management, Megaprojects, Environment, Learning Process.

https://www.researchgate.net/publication/335472925_Dynamic_Complexity_in_Mining_Projects

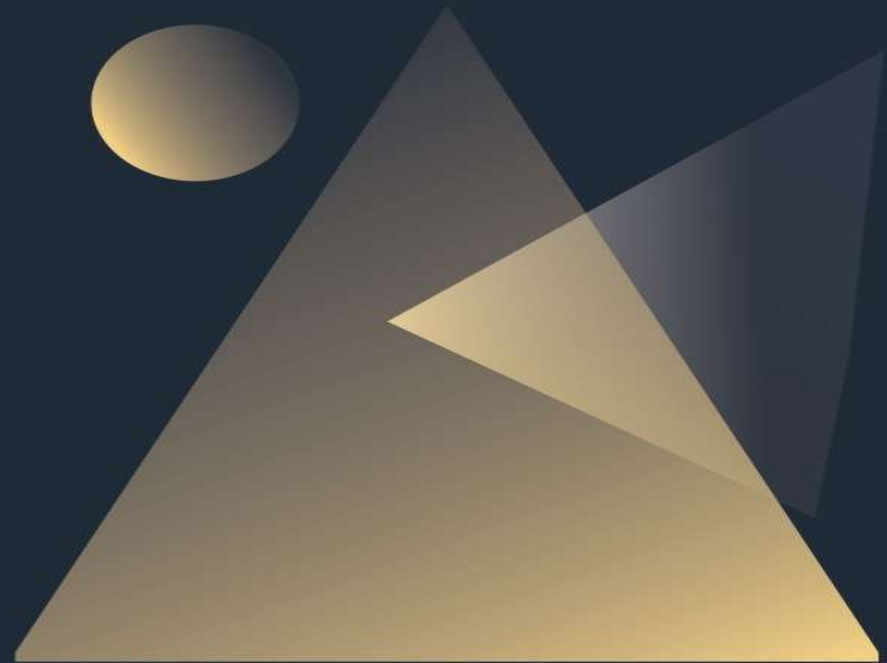
Presenter's webcam image

"From necessity, innovation arises (...) difficult situations are those that make you extreme and make you get as creative as possible"

From a dream and a hope, transform it in a Public Policy

Presenter's webcam image

Thanks



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