



Tailings Session



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General Manager LATAM

7th September 2022



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1. Amira Global

Who we are?



About Us

Independent of research institutions
enables flexibility to engage with best
solution providers globally

Different **collaboration models** to
enable flexibility with Member's needs

Created by global industry
for **global industry**

Act in **Member's Best
interest** always

Global, private sector,
not-for-profit,
Member - based organization

Governed by a **Board Directors** being
majority elected by members







amira 

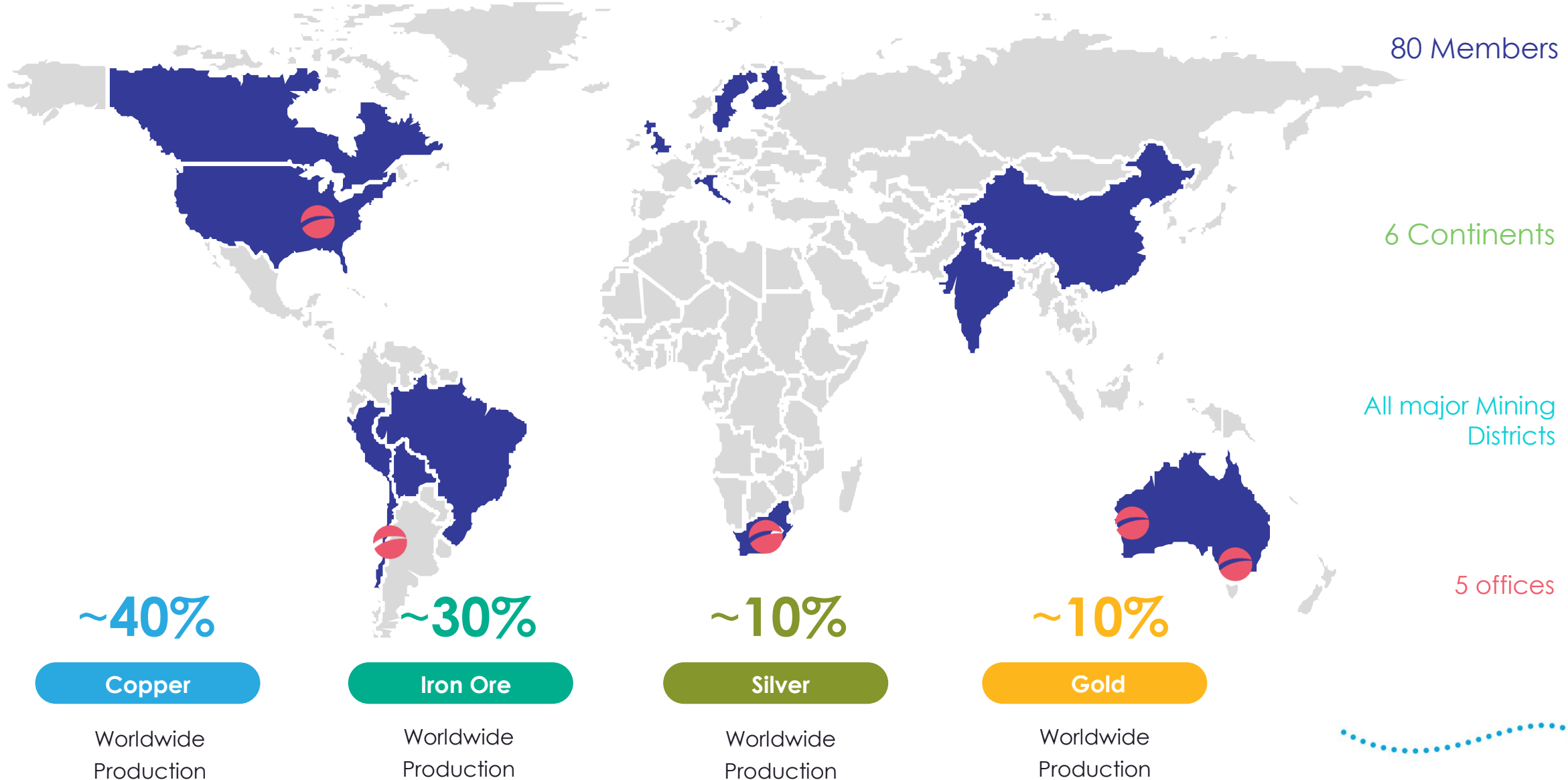
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Our Purpose

Build Collaborations to ...

-  **Enhance** the standing of the resources industry among local and global stakeholders.
 -  **Deliver** new data, knowledge, technologies, products and services to help Members and the Industry.
 -  **Sustainable** development of the resources industries that is acceptable to society.
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Our Members



Some of our Members



Our Numbers

\$1.65B

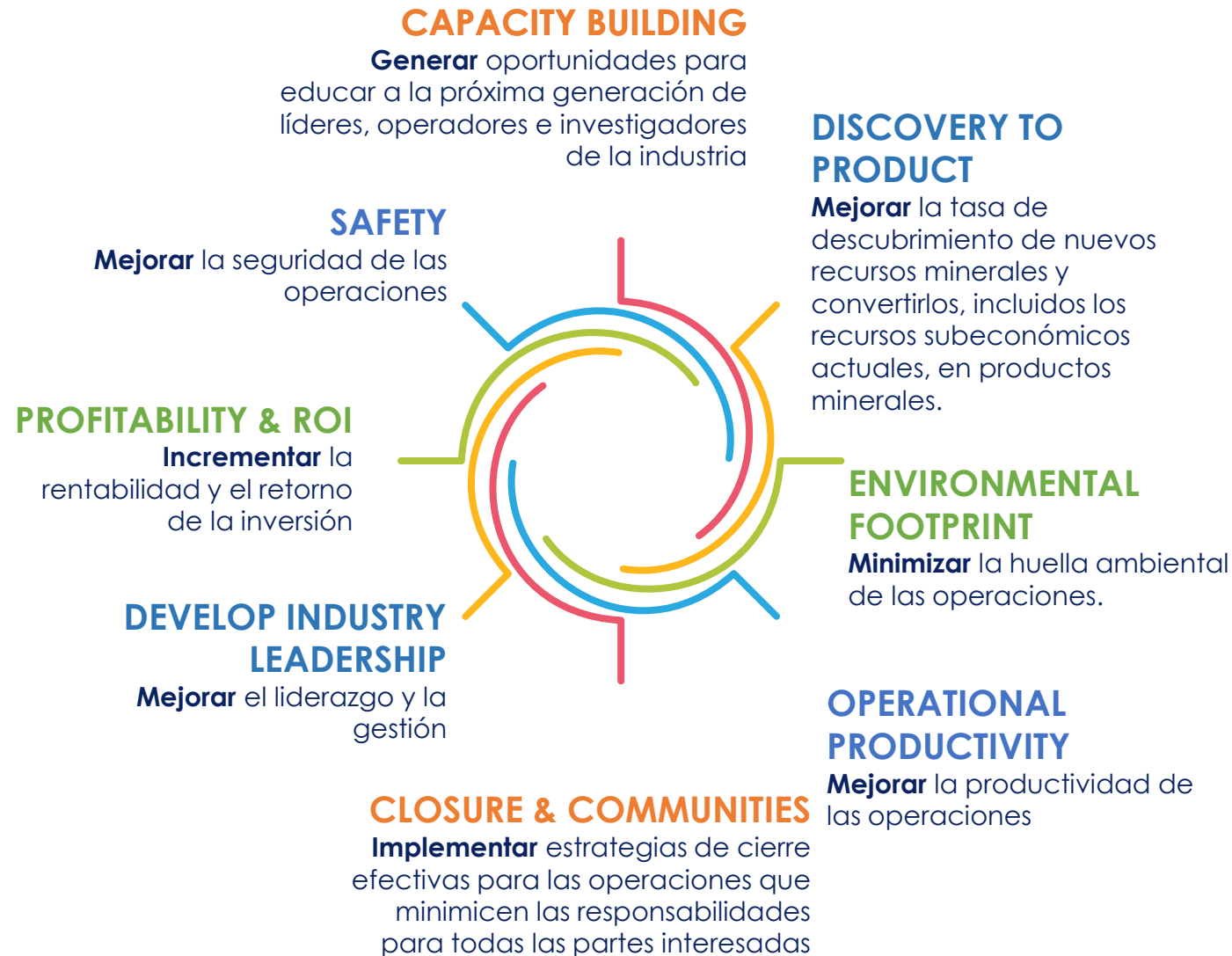
Industry Focused R&D Delivered



Some of our R&D Partners



Our Objectives





Best Interests of our Members

in everything we think, say and
do

Transformative Pre-competitive R&D+I²

deliver knowledge, technology and
capability that has the potential to
transform our Members' businesses and our
industry



Guiding Principles




Global Collaboration for Impact

create global collaborations and
partnerships to solve our industry's
challenges and to build global
capability

Excellent Governance

in all we do internally and externally
and always remaining politically
agnostic and independent

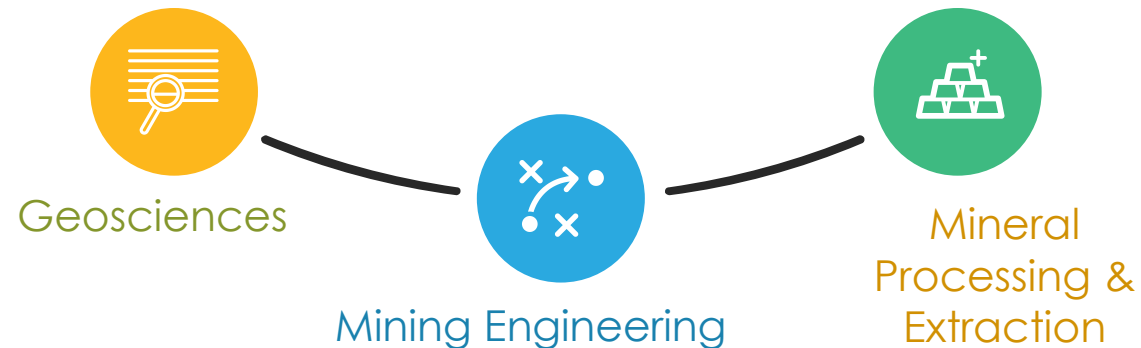


Amira's Enduring Strength ...

- Technical sciences that underpin the mine value chain

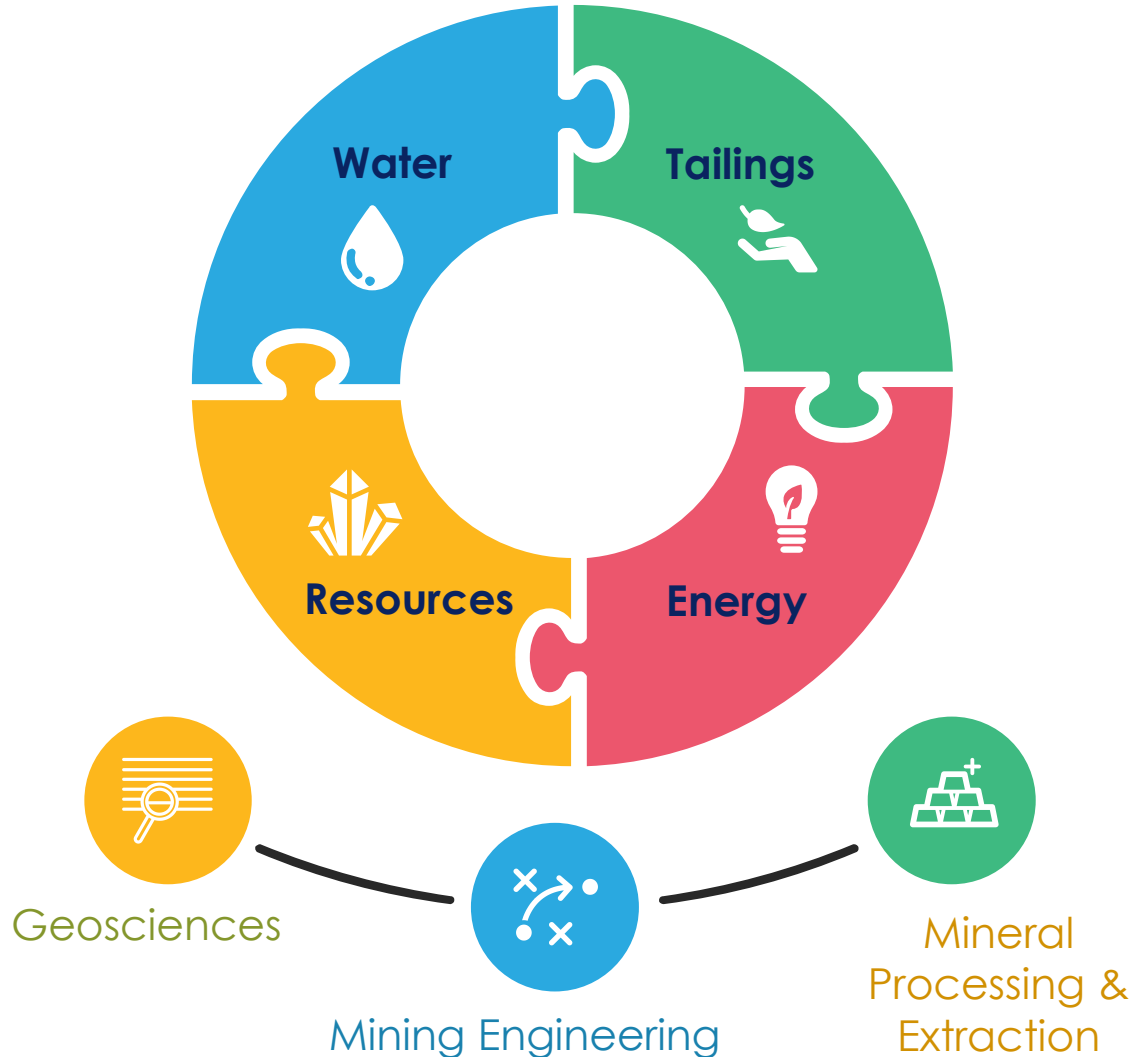
- Creation of new knowledge, data, information
- Development and testing of new technology
- Development of skills, capability, leadership
- Setting of standards and benchmarking
- Roadmaps that envisage future developments and needs

... for over 6 decades



These remain our fundamental enduring focus areas and underpin Amira's drive to solve mega challenges through the ages

Amira's Role ...



There are many components required to solve industry mega challenges

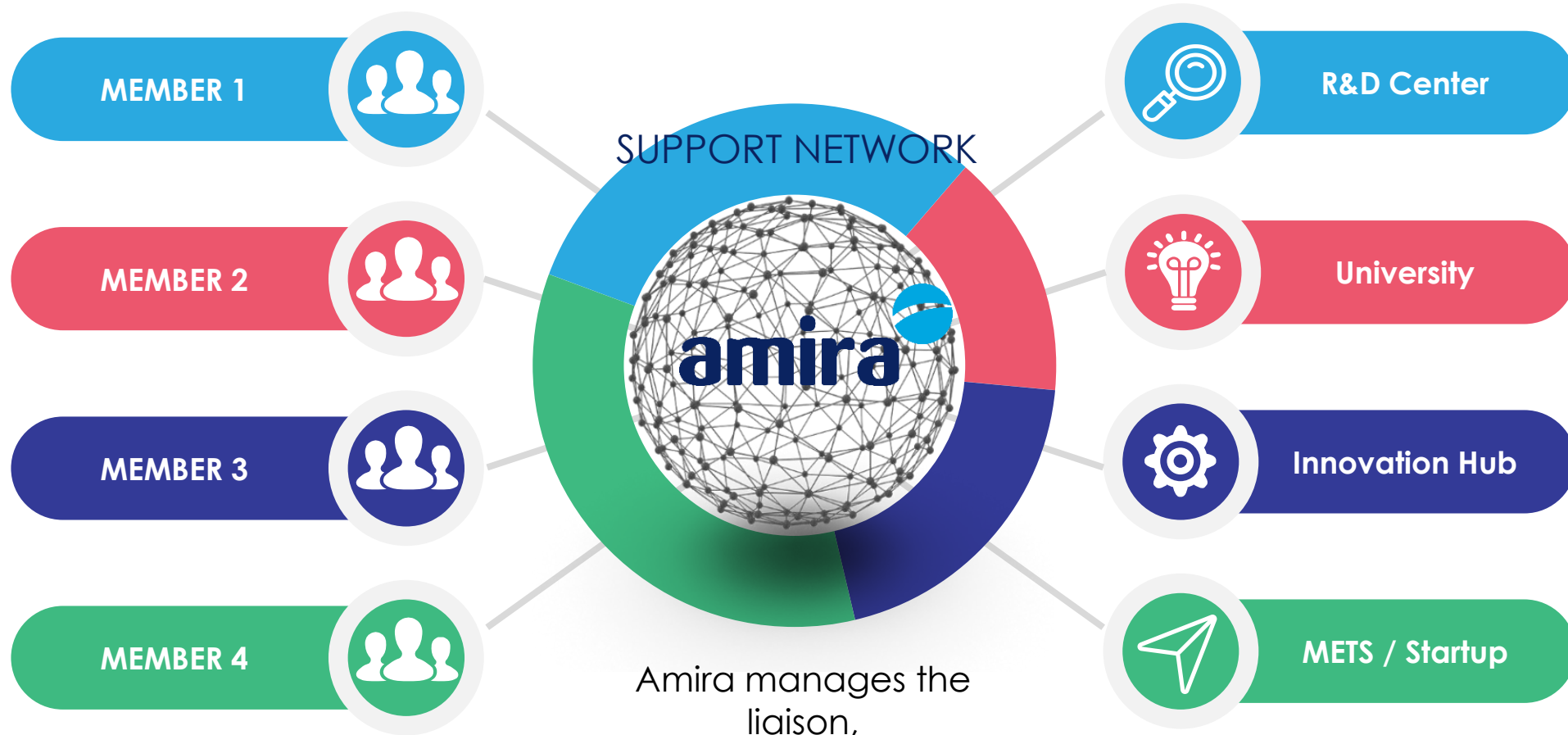
Amira's role is:

to provide our Members with **leveraged opportunities** to support the development of **transformational R&D+I2** and associated spin-offs from our **core scientific discipline** communities that informs, underpins, and contributes to resolution of contemporary mega-challenges in **concert with allied associations**



Amira Projects Model

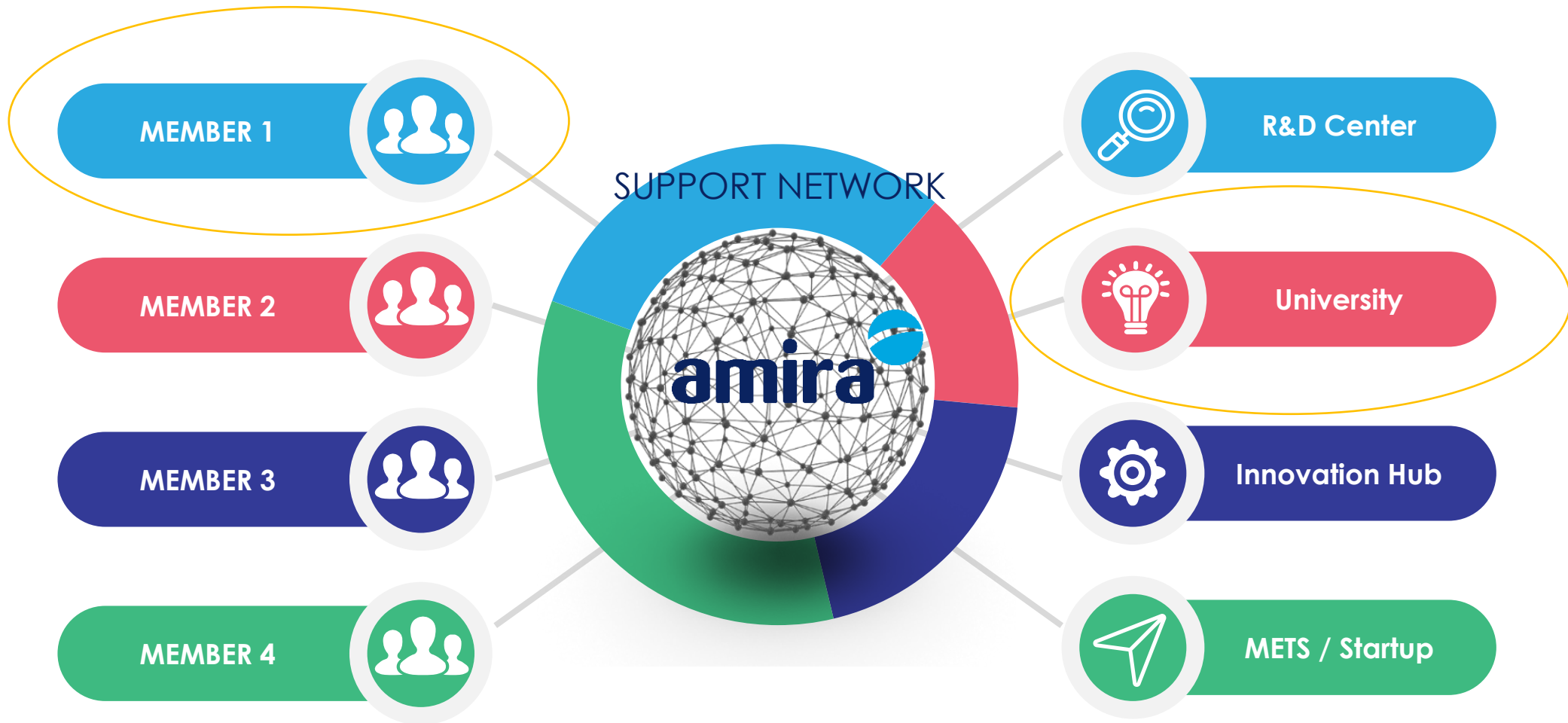
One or more Members sponsor a project
When multiple sponsors,
all sponsors benefit in total from the project outcomes



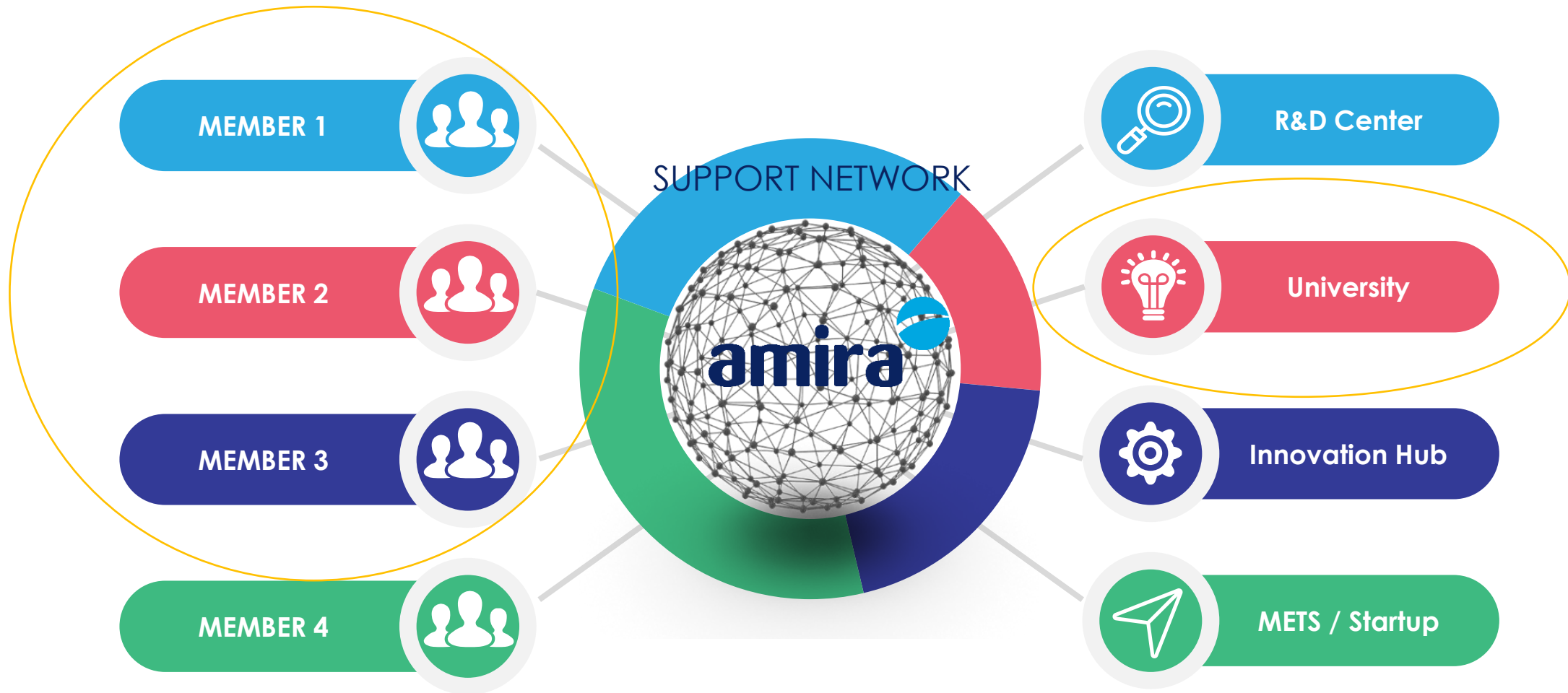
Amira manages the
liaison,
governance, finances,
reporting, meetings, &
timeliness of delivery

One or more Solution Providers or Researchers
collaborate to deliver project
(knowledge, data, technology, and capability)

Amira Projects Model



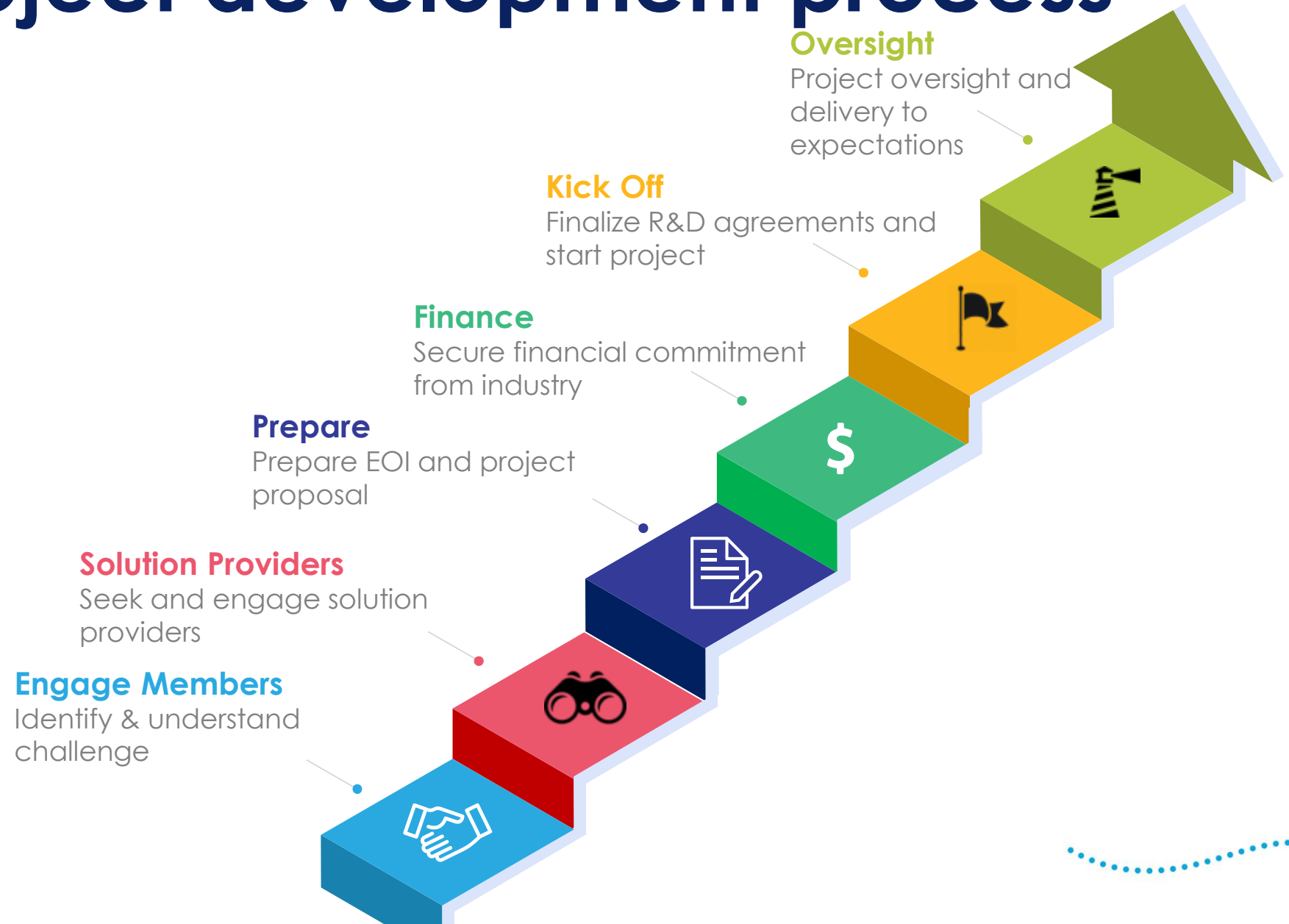
Amira Projects Model



Amira Projects Model



Amira's Project development process



Amira Tailings projects

Program 1:



Zero Harm

Streams:

- a. Monitoring & Pre-empting
- b. Novel design
- c. Tailings Stability – monitoring, enhancing, and responding
- d. De-characterization and rehabilitation

Program 2:



Reduce Water

Streams:

- a. Filtration (mechanical, biomechanical)
- b. Improved Flocculation/thickener
- c. Dry processing & dry stack
- d. Operational water & energy systems optimization

Program 3:



Precision

Streams:

- a. Geoscience and minerals estimation
- b. Precision Mining, sorting & movement
- c. Minerals processing & metallurgical extraction
- d. Disposal & preparation for waste valorising
- e. Characterisation and re-mining
- f. Repurposing

Amira Tailings projects

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Precision



 Project Name	Project Name	Duration	R&D Institutions involved
P1325: Transformational Solution to Mine Tails	The projects aims to transform tailings waste into supplementary cementitious material (SCMs) enabling up to 20% cement replacement. The project will reduce the impact of mine tailings on humans and environment by repurposing tailings waste to drive the next generation of sustainable construction with a lower carbon footprint.	1 years	EnviCore (Canada)
P1301: The Circular Mine Consortium	The project will use tailings waste for construction and topsoil to grow food, trees and rehabilitate mining land contributing to the circular economy and carbon neutrality. Together, the projects aims to create zero mine waste a reality.	4 years	The Circular Mine Pty.
P1271 Geometallurgical 3_D tailing model	P1271 will characterize tailings material mineralogically and geochemically to create a geostatistical 3-D tailings model. The model can be used to predict the quantity of valuable metals, pollutants and residues, enabling the identification of alternative materials uses.	3 years	Helmholtz Institut Freiberg for Resource Technology, Germany

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Zero Harm



amira Project Name	Project Name	Duration	R&D Institutions involved
P1288: Predicting Liquefaction Risk	Preventing tailings dam failures: Predicting liquefaction risk at different ages and states through physical modelling, experimental analysis, field testing and real-time data collection.	5 years	UNSW (Australia) Univ. de Sao Paulo Univ. de Chile
P1287: Real-time tailings monitoring	The project will use the latest fiber optic sensing technology, integrating three types of data - temperature, strain and acoustic/seismic – to monitor in real time the integrity of tailings dams and provide alerts of impending problems.	3 years	Sisprobe S.A.S., (France)
P1290: Characterisation and mapping of Tailings	P1290 will employ advanced technologies (integrated optical and SEM microscopy) along with widely available laboratory techniques and tested exploration methods to obtain quantitative (size and abundance) detail of the different components in the tailings dam, thus recharacterizing the tailings dam as a new economic resource.	3 years	CSIRO (Australia)
P1278: Advanced prediction and optimization of tailings suspension properties as delivered to TSFs	P1278 will develop a transformational approach to the modelling of particle aggregation processes that is ideally suited to tailings of broad composition, thereby maximizing predictive outputs from targeted small-scale testing on real tailings feed suspensions.	3 years	CSIRO Mineral Resources (Australia)
P1277: Advanced tailings dam risk management system based on IoT	P1277 aims to present an evolution in the monitoring and response of tailings dams, presenting a risk management system based on IoT technology. The system will vastly improve the monitoring and alert management process of tailings storage facilities, and detect, as well as respond to, physical threats that mining operators are facing today.	1.5 years	Worldsensing SL

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Project Impact: on Mining Industry, Regions and Communities

- Expanding local research and industry collaborations in regions, e.g.:
 - Chile, Brazil, Peru, Ghana, Australia
- **Building the Future Workforce - Enhance existing, and develop new technical tailings expertise and research capability locally**
 - Networked PhD programs, existing and newly developed
 - Strengthening research and laboratory testing capability locally
 - Train industry professionals on how to apply new knowledge and tools
 - Provide access to international expertise
- New knowledge and data that informs industry on how to reach agreed goals and safety standards
- **Legacy:** a global pipeline of talent to provide next generation industry leaders, technical operators and specialists, and researchers



Reduce Water



 Project Name	Project Name	Duration	R&D Institutions involved
P1310 Tailings dewatering technology	P1310 aims to design, install and operate the first commercial installation of the EKS-DT process within a legacy or active TSF. By rapidly consolidating tailings, and by creating a stable consolidated cap over deep tailings deposits, the EKS-DT process recovers significant water volumes for reuse in the mining process and increases the effective capacity of TSFs.	3.5 years	EKS (Canada)
P1300: Concentrated solar thermal drying	demonstration of our innovative and patented Concentrated Solar Multi Effects Distillation (CSMED) technology. The CSMED is a water purification technology that utilizes solar energy to dewater and produce clean water for beneficial use. CSMED can treat any waste stream ranging from tailings, sludge, sewage and brine.	3 years	JWA Oilfield Supplies & UTS (Australia)





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