

# Innovation For Grand Challenges: The Critical Role Of An Ecosystem Leader

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## Problem of practice

Breakthrough innovation – the kind that impacts the lives of millions – is challenging precisely because of the grand scale of the problem it seeks to solve. ‘Grand’ challenges, such as affordable healthcare and managing climate change, are usually at the intersection of technology, commercial interests and society and are often accompanied by uncertainty and complexity. Innovation leaders who seek to address such ‘wicked’ problems can benefit from leveraging innovation ecosystems, especially when high uncertainty is coupled with severe resource constraints. Especially in emerging economies, which often lack strong institutional support, ecosystem-driven innovation can prove to be the difference between breakthrough and breakdown. How can organisations, both commercial and non-profit, pursuing such breakthrough innovation effectively leverage an ecosystem? The answer draws upon recent [research](#) by Sreevas Sahasranamam, Vivek Soundararajan and Debabrata Chatterjee, who lay out a phased approach to create and orchestrate an ecosystem for cost-effective innovation<sup>1</sup>

<sup>1</sup>The article ‘Co-creating innovation ecosystems in contexts of absolute uncertainty: The case of low-cost heart valves in India’ by Sreevas Sahasranamam, Vivek Soundararajan, Debabrata Chatterjee, featured in Volume 41, Issue 2 of *Journal of Product Innovation Management* talks about how innovation ecosystems emerge in contexts of absolute uncertainty



## The innovation Everest

Startups, often considered the engines of innovation, have a low survival rate: about 90% fail, and 75% of venture-backed startups do not return capital to investors.<sup>2</sup> Corporate-based innovation also struggles – as a survey of CEO's reveals that while 83% of companies see innovation as a top-three priority, only 3% believe they are ready to innovate effectively.<sup>3</sup> The challenge of effectively innovating is even steeper when uncertainty is high and resources are constrained – for instance, when organisations attempt to develop cost-effective renewable energy at scale or renew their urban infrastructure. Organisations that take on such challenges in emerging economies face not only technical, social and regulatory problems but also a lack of institutional support. To enhance the viability of innovation, open innovation – the use of external and internal resources and technologies to advance development processes – has emerged as a solution. A recent survey of companies in Europe showed that 72% of the firms were collaborating using a strategy of open innovation.<sup>4,5</sup> Another report claims that firms that opt

for open innovation see 59% more revenue growth.<sup>6</sup> The research by Sahasranamam and team outlines a roadmap to improve the viability of 'innovation ecosystems', which are networks of organisations that use open innovation.

## Roadmap for viability

Most innovation networks have a blueprint for three distinct phases – ideation, experimentation, and translation (scale) for commercial success. But when it comes to innovation ecosystems, this phased blueprint is not enough to succeed. Take the case of Masdar City, intended as an exemplar for sustainable urban development, a 'zero-carbon emission city'.<sup>7</sup> Despite billions in investment by the United Arab Emirates, twenty years after its commissioning, the city is still primarily powered by oil and has just 11,000 inhabitants. While the project called for collaboration across multiple innovation fronts – efficient cooling, energy and water use, structural elements that reduce the need for cooling and a solar energy plant – the city could not develop and deploy innovation at scale.<sup>8</sup>

In contrast, the research by Sahasranamam et al. highlights a roadmap of an innovation ecosystem that achieved its mission within 20 years, despite being much more resource constrained. The innovation challenge studied focused on developing a low-cost artificial heart valve for consumers in India's emerging market: the ecosystem succeeded in designing and commercialising a valve that cost just USD 265, compared to USD 504 for an imported valve, even in the absence of a biomedical devices industry. So why did one ecosystem innovation succeed while another failed? The researchers

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### The three phases for creating an innovation ecosystem are

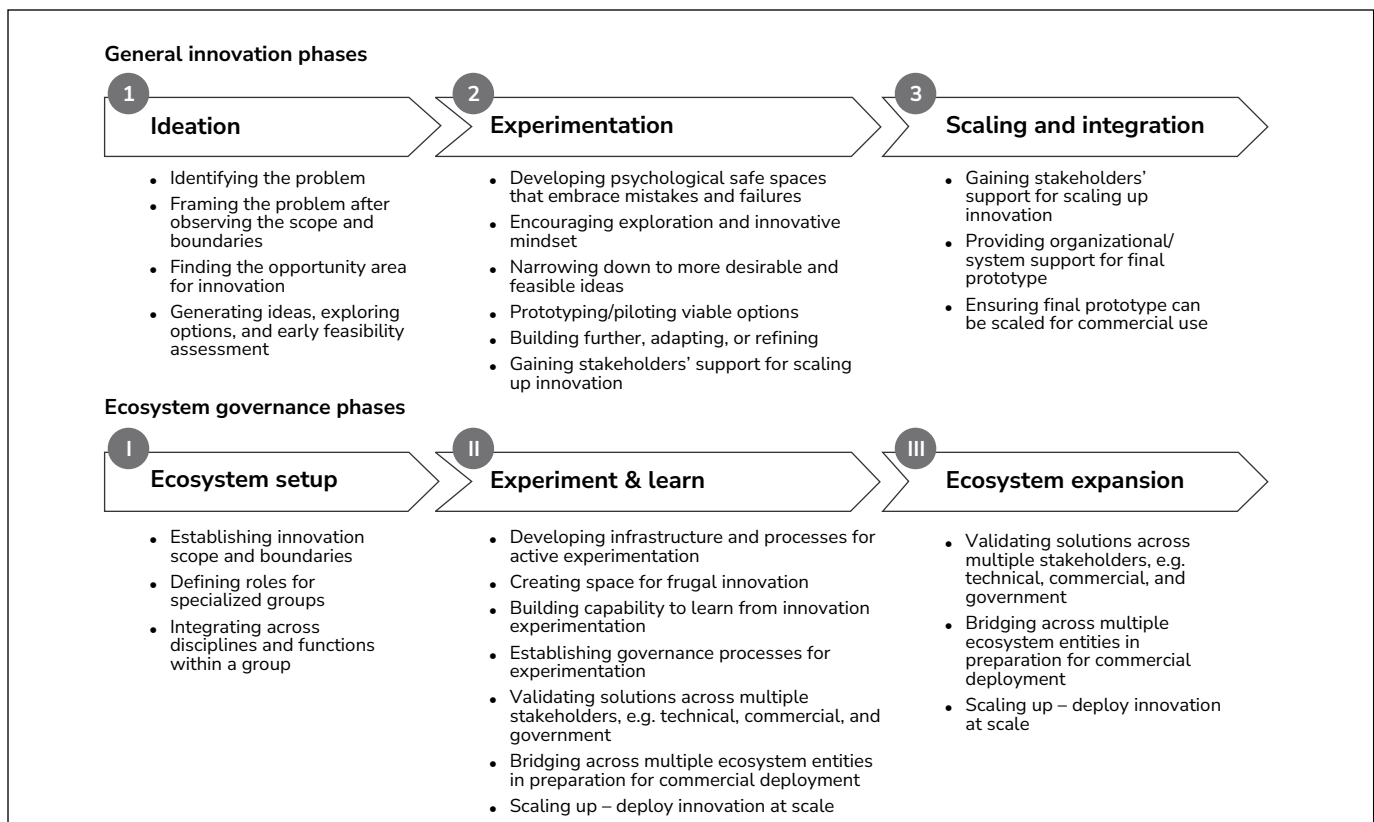
- Establishing ecosystem configuration (ideation)
  - Modeling ecosystem configuration (experimentation)
  - Expanding ecosystem configuration (translation)
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identified that the key to success is properly configuring the ecosystem through ten governance processes across three phases. These governance phases – ecosystem setup, ecosystem modelling, and ecosystem expansion – are meant to synchronize with the innovation phases of ideation, exploration and translating to commercial scale. See *Figure 1* for an overview of this roadmap. The key to the success of the innovation ecosystem is the ecosystem leader, who sets it in motion and enables its smooth functioning, even through uncertainty. The leader also shapes boundaries, invites and aligns stakeholders to ensure value creation. Stakeholders include ecosystem participants with clear, defined roles who contribute with specialised knowledge, capabilities and resources. This role clarity reduces conflicts among stakeholders.

officers need to accomplish the following three key processes.

- i. *Establishing innovation scope and boundaries:* The innovation leadership organisation must bring together other ecosystem partners and jointly define what the big, audacious goals are – what is in and out of scope. *GoHelp*, an initiative that aims to enhance disaster management worldwide, showcases how clear scoping helps.<sup>9</sup> As co-leaders of this initiative, logistics firm DHL and the United Nations (UN) identified two primary aims of the programme: 1) improving disaster preparedness worldwide and 2) deploying disaster response teams whenever and wherever needed.
- ii. *Defining roles for specialised subgroups:* The next step

**Figure 1: Ecosystem roadmap for effective innovation**



Source: Adapted by the authors from Sahasranamam, Sreevas, Vivek Soundararajan, and Debabrata Chatterjee. “Co-Creating Innovation Ecosystems in Contexts of Absolute Uncertainty: The Case of Low-Cost Heart Valves in India.” *Journal of Product Innovation Management* 41, no. 2 (2024): 501–26. <https://doi.org/10.1111/jppim.12715>

**Phase I: Ecosystem setup** is the first stage and the ecosystem leadership must create a shared sense of purpose among identified participants. Participants could include external research organisations, regulators, business partners, and financiers. The ecosystem leadership needs to be creative and flexible, as the exact stakeholder needs and alignment have to be discovered. For a successful setup, chief innovation

is to identify specialised subgroups that would be key to developing and deploying innovative solutions. In the case of *GoHelp*, three such subgroups were identified: First, the DHL Academy of Humanitarian Logistics was formed with the mandate of co-creating (with UN agencies and technical experts) training programs for managing humanitarian crises. Second, a subgroup was formed to reach out to airport

leadership and conduct multiday, onsite training for airport staff globally. Airports were identified, as key participants in the ecosystem, to serve as hubs for receiving and distributing humanitarian aid. Third, a subgroup was established to focus on disaster response by increasing logistics capacity during disasters. Comprised of 1000 specially trained DHL employee volunteers, this group was further organised into three regional hubs. The goal is to deploy volunteer teams across the globe within 72 hours of a crisis.

iii. *Integrating across disciplines and subgroups*: This step involves coordination across stakeholders and subgroups to ensure effective interaction of knowledge, resources and solutioning, even under severe constraints. The step is best illustrated by the heart valve development process in India, which in the 1970s lacked a medical device ecosystem. Hence, ecosystem leadership trained scientists from other domains to work on medical devices and brings in state-of-the-art materials for research from organisations as diverse as the National Aeronautics Laboratory.

One of the critical flaws of the Masdar City project can be traced to a breakdown in the above Phase I processes: the ecosystem leadership was concentrated in a chairperson who was also a leader in the oil industry. This created a conflict of interest, which likely compromised the definition of subgroups and integration across disciplines during the ecosystem phase. Hence, the lack of sufficient solar energy, a reliance on oil, which led to the city's lacklustre socio-economic growth.

**Phase II: Ecosystem modelling** involves active experimentation and prototype development, building on the early ideation from the prior phase. In this stage, the ecosystem leader must create spaces for prototype products, alternative processes and iterative learning. This implies openness to using alternate, available resources; a readiness to embrace and learn from failure and a willingness to institutionalise new protocols for safety and quality. Success in Phase II requires the following four processes to function.

iv. *Developing space for active experimentation and prototyping*: Here, the focus is on developing different source materials, designs, and processes: failing, learning and trying again. In the case of the low-cost heart valve, the ecosystem leader (SCTI) partnered with organisations from industries as diverse as aeronautics and textiles to develop new prototype valves, which frequently failed. But the spirit of discovery-oriented experimentation helped

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## Questions ecosystem leaders need to ask

### Phase I:

- What is the grand challenge we are targeting and who is the target audience?
- What do we need to look into and not assume about available markets or technology?

### Phase II:

- What practices, roles, and collaborations are being redefined or emerging, and how can they be integrated and protected?
- What missing roles or capabilities are being highlighted by frictions or failures?

### Phase III:

- Which roles and responsibilities of the ecosystem can be stabilised or need to remain flexible?
  - What guidelines need to be established for large-scale trust and legitimacy?
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them identify alternate materials and partners until they succeeded.

- v. *Creating opportunities for frugal experimentation*: The lack of resources and an existing institutional base can be a daunting obstacle, but can be overcome by adapting solutions to locally available substitute materials, equipment and processes. For instance, the heart valve's housing ideally required an expensive Computer Numerical Control machine for precise machining. But frugal experimentation resulted in a low-cost substitute — a combination of copper electrodes and a pantograph milling machine that was readily available.
- vi. *Establishing ecosystem learning spaces*: The ecosystem leader also has to train local participants in new knowledge, as SCTI had to train scientists on the importance of a clean and sterile environment for production. Given the breakthrough nature of innovation, it is also essential that ecosystem participants codify the know-how in a process document that can serve as a reference and guide.
- vii. *Establishing governance for experimental spaces*: As this modelling phase calls for new materials, pilot production processes, and new ecosystem actors, it is crucial to experiment using established safety and quality mechanisms. For the new heart valve, SCTI

asked all ecosystem participants to adhere to international standards for ethical guidelines and standards. They also established technical and ethical advisory committees, bringing in scientists from across India to review and advise on experimental protocols.

This phase of experimentation, supported by robust governance, proved crucial to the successful development of a low-cost heart valve. To date, 200,000 such **valves** have been implanted in humans with success rates comparable to the imported devices on the market.<sup>10</sup>

**Phase III: Ecosystem expansion** is about scaling the solution from a prototype stage to commercial production. In this stage, the ecosystem must transcend purely technical considerations and engage with stakeholders such as regulators, distribution channels, large-scale suppliers, and production facilities. This stage is critical for reducing go-to-market uncertainty as the ecosystem matures.

viii. *Legitimising across boundaries*: While the previous phases had to integrate innovation across technical disciplines, this process seeks to gain validation with the non-technical stakeholders, such as regulators, buyers and suppliers. To illustrate this step, we take the case of Israel, which took on the challenge of scaling an **ecosystem** to develop clean water technology.<sup>11</sup> The participants leveraged media and environmental agencies to promote **success stories**

and increase awareness about clean water innovations.<sup>12</sup> To accelerate the uptake of innovative technologies such as desalination, private players like **IDE Technologies** offered incentives for public-sector adoption.<sup>13</sup>

ix. *Bridging boundaries*: This process helps to prove lab-grown innovation at an industrial scale – using varied techniques such as pilot plants and engaging industry players as well as the original innovators. In the Israeli clean water tech example, private **players** in Israel not only helped build the ‘unconventional water supply system’ but also helped to scale the innovation into operational, reliable supply systems.<sup>14</sup> Israel Innovation Authority rolled out long-term funding to make these programs viable for commercial use and attempted to anchor demand by setting up long-term, private-public partnerships for co-developing or procuring clean technologies.

x. *Scaling up across boundaries*: The last step to ensure successful commercialisation of the ecosystem is to expand perspectives and ensure enduring results. The clean water tech ecosystem leaders adopted an export-oriented **approach** to enable more international partnerships to deploy and promote their systems.<sup>15</sup> This process also led to the development of training programs and pilots in areas with water scarcity. These pilots showcased multiple innovations in technologies such as wastewater



reuse and desalination. The country is now able to collect and treat about 94% of all [wastewater](#) and reuse 87%, primarily for agriculture.<sup>16</sup>

## Ecosystem leadership lessons

Innovation leaders who seek to address grand challenges – especially in emerging economies – can benefit from engaging an ecosystem. Drawing upon the spotlighted research by Sahasranamam and team, as well as several examples of grand-scale innovation under deep uncertainty, we highlight a few lessons for ecosystem leaders:

- An innovation ecosystem process will be longer duration, dynamic and iterative and extends beyond

the typical innovation layer to include a governance layer of ecosystem setup, modelling, and expansion.

- Ecosystems require leadership skills such as co-creation, co-leadership, and facilitation: identifying and bringing together multiple external players at different phases over longer durations.
- When resources are severely constrained, part of the leadership challenge is to facilitate cost-efficient, alternative sources for materials, equipment, expertise and technology.
- Ecosystem participants need to recognise that failures are inevitable and should be viewed as iterative learning opportunities that can improve the chances of eventually achieving success.



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