Building a Green Hydrogen Centre of Excellence: Advancing Kenya's GH2 Entrepreneurial Ecosystem

Documentation of full ii2030 process in Kenya

September 2023

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ii2030

INCLUSIVE INNOVATION 2030

an endeva initiative

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Make-IT in Africa

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Introduction to ii2030 Methodology

ii2030 GH2 in Africa Edition

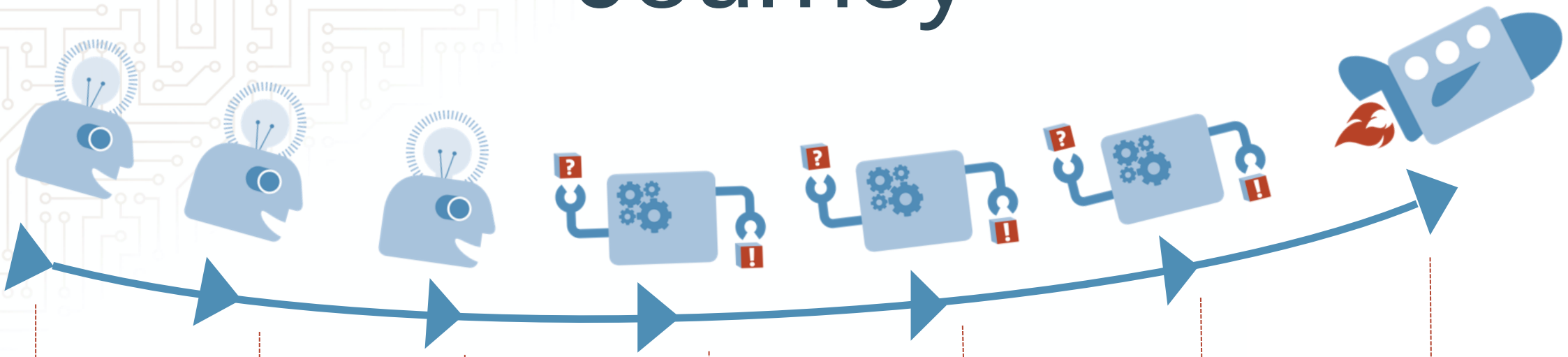
Green hydrogen can be transformative for Africa. The sector will create **green jobs** and **new opportunities for local startups and innovators**.

Now is the time to create the fertile ground for entrepreneurs, who often lack access to adequate finance, skills, or even awareness of opportunities in the GH2 sector.

ii2030 is a **catalytic process** that begins with a problem and an opportunity and ends with a prototype of a systemic solution that can be implemented to **strengthen the GH2 support ecosystem for local startups and innovators at the national and pan-African levels.**

Photo: Co-Creation in Nairobi in June 2023 (Endeva)

ii2030 GH2 in Kenya Journey



BILATERAL INTERVIEWS

December 2022 – February 2023

60 min interviews

Identify inhibitors and enablers in the system

SYSTEM CHALLENGE WEBINAR

7 March 2023

120 minute webinar

Understand system dynamics

SYSTEM OPPORTUNITY WEBINAR

21 March 2023

120 minute webinar

Identify levers for change

PAN-AFRICAN WEBINAR

20 April 2023

120 minute webinar

Continent-wide peer exchange

CO-CREATION EVENT

27 and 29 June 2023

1.5 day workshop

Co-create solution to positively disrupt the system

CELEBRATION WEBINAR

14. September 2023

60 minute online event

Pitch solutions and seal commitment for implementation

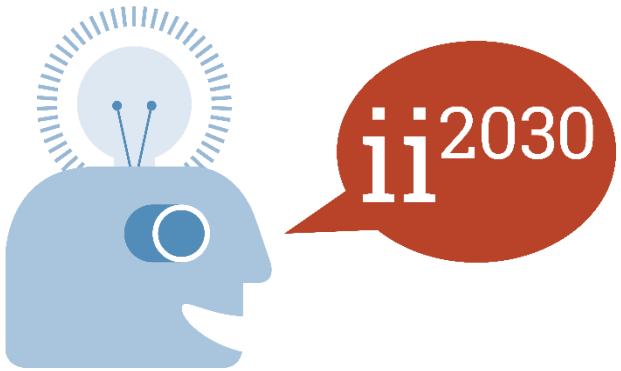
IMPLEMENTATION PREPARATION

Ongoing support

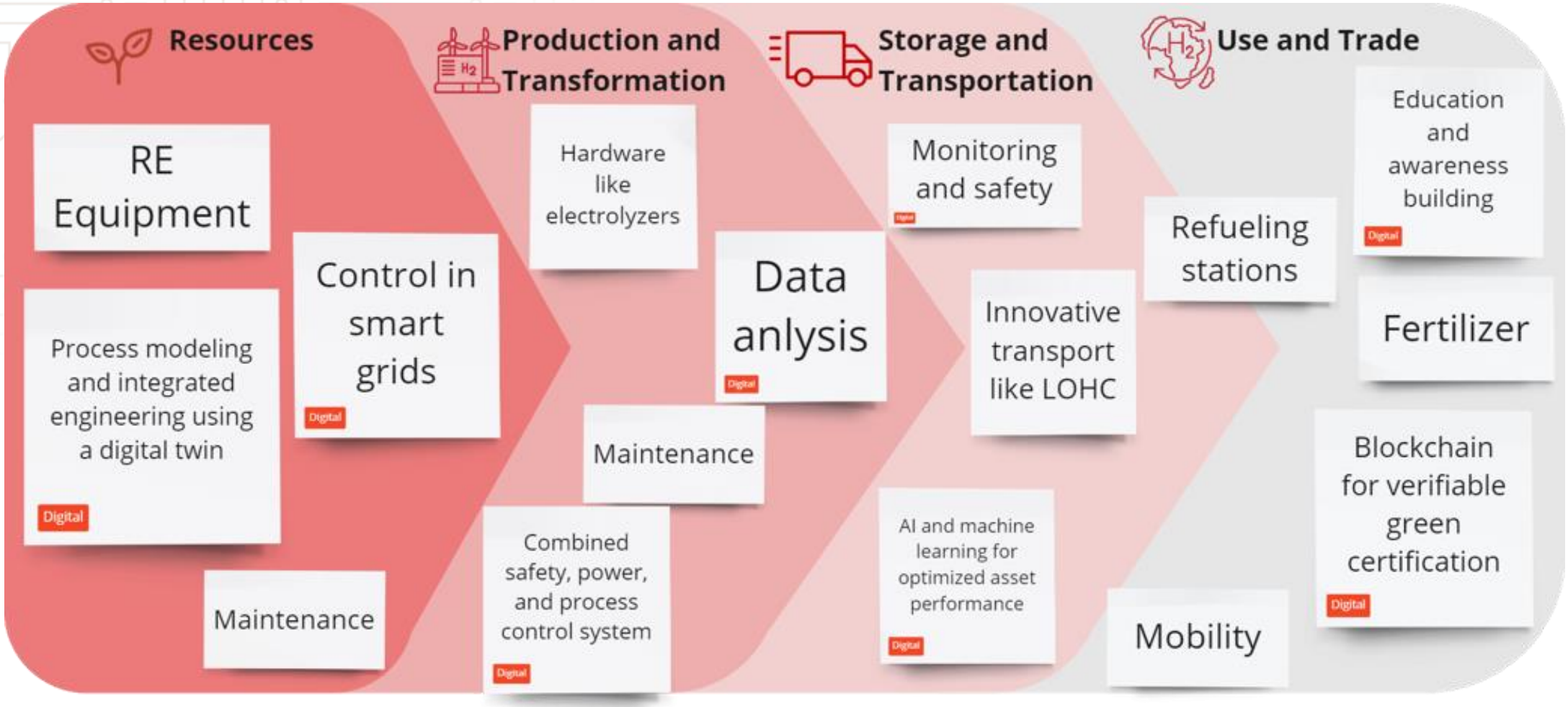
Develop project documents with main stakeholders

Guiding Question for the ii2030 Green Hydrogen Edition

How might we ensure that **(digital) startups** and **local innovators benefit** from the potential in the **green hydrogen** sector?



Scope: Opportunities for (Digital) Startups and Innovators



Background for GH2 in Kenya

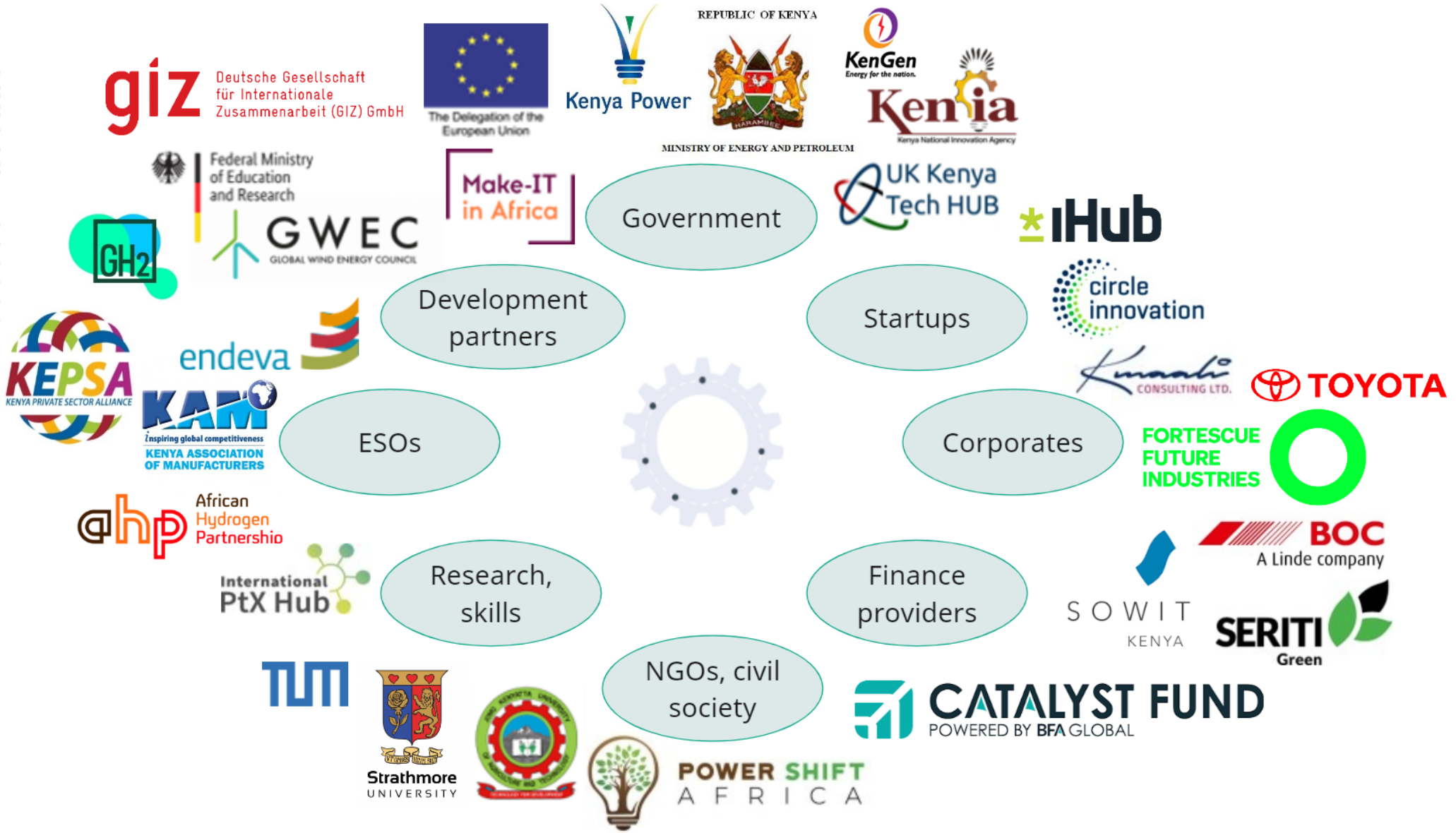
Milestones of the Sector

- Kenya produces **more than 90%** of its electricity from hydropower, geothermal energy, solar and wind energy as well as biomass.

- Kenya's hydrogen development strategy and roadmap is under progress and is scheduled to be launched in **early September 2023**, when Nairobi is hosting Africa Climate Week.

- Kenya is identifying industrial pathways to further pursue uses of **GH2 as energy carrier** for selected transport (mobility) options and **regional export of green ammonia/fertiliser** into the East Africa Community (EAC) and under AfCFTA.

Key Actors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The Delegation of the European Union
Kenya Power
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MINISTRY OF ENERGY AND PETROLEUM
KenGen
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Kenia
Kenya National Innovation Agency
Federal Ministry of Education and Research
Make-IT in Africa
UK Kenya Tech HUB
iHub
GH2
GWEC
GLOBAL WIND ENERGY COUNCIL
Government
Development partners
Startups
circle innovation
endeva
KEPSA
KENYA PRIVATE SECTOR ALLIANCE
Kwaati CONSULTING LTD.
TOYOTA
KAM
Inspiring global competitiveness
KENYA ASSOCIATION OF MANUFACTURERS
ESOs
Corporates
FORTESCUE FUTURE INDUSTRIES
ahp
African Hydrogen Partnership
BOC
A Linde company
International PtX Hub
Research, skills
Finance providers
SOWIT
KENYA
SERITI
Green
NGOs, civil society
CATALYST FUND
POWERED BY BFA GLOBAL
Strathmore UNIVERSITY
POWER SHIFT AFRICA

Enablers of GH2 Development

Strong entrepreneurial spirit and ecosystem, incl. incubators, accelerators and access to finance

Off-peak renewable electricity capacity will be used for GH2 production (esp. geothermal at night)

Standardization of GH2 projects allows for certification and local capacity building, e.g. for project developers, access to carbon credits

Good coordination of stakeholders, e.g. in working groups in MoE and KEPSA, and interest from DPs, foreign governments and commitment from the Kenyan government

Investments for big market segments, e.g. green ammonia/fertiliser

Inhibitors of GH2 Development

Limited awareness, understanding and skills among current stakeholders

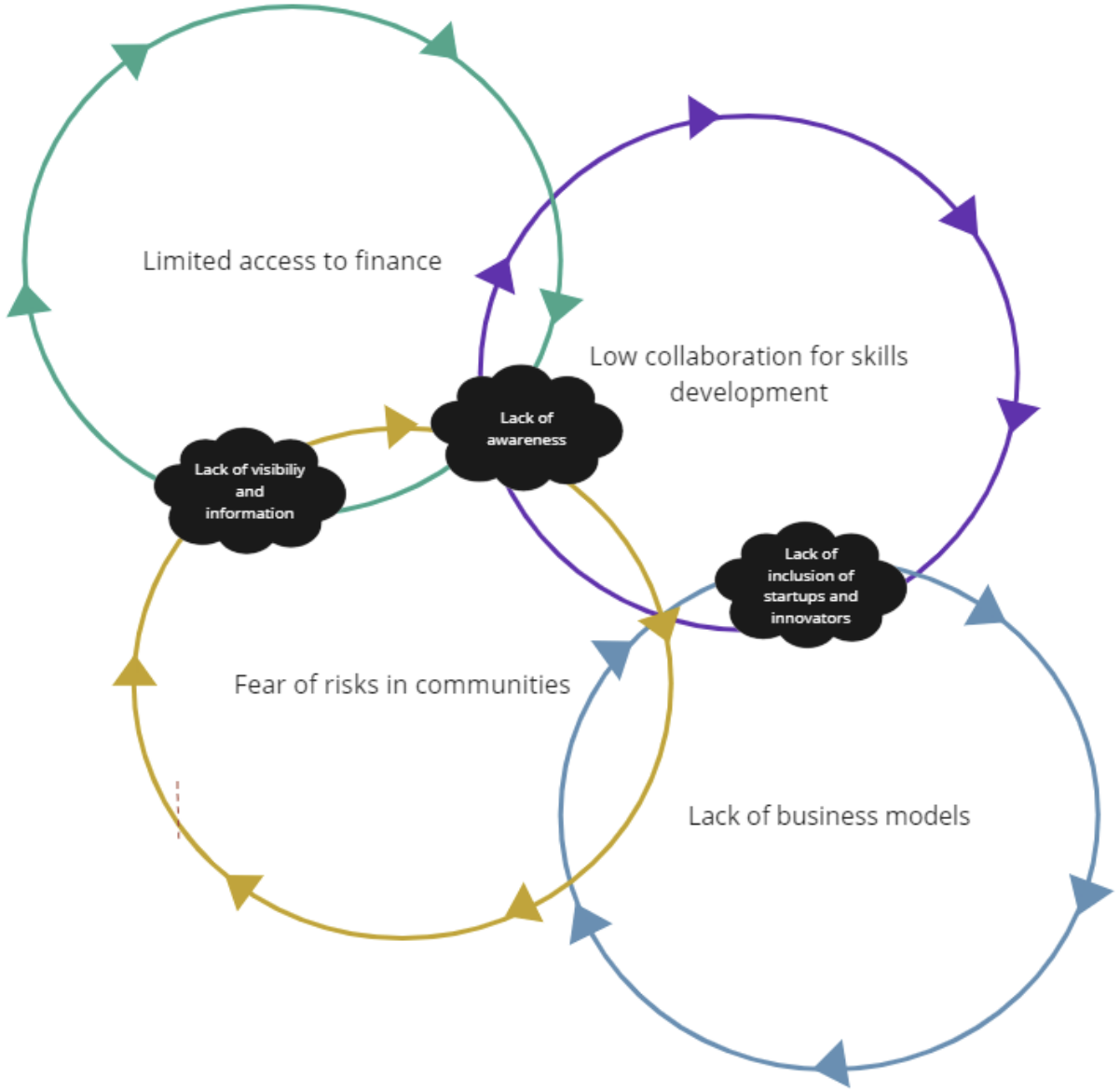
Communities are wary of H2 and the perceived risks, incl. environmental impact of new infrastructure (wind, solar, pipelines, storage and access to water etc.)

Lack of policy, regulations and financial incentives from the Kenyan government, though a strategy & roadmap is in development (Q3/2023)

Lack of access to finance for innovators and potential startups

GH2 is currently approx. 3 times more expensive than grey H2, with therefore limited demand for local use cases, switching and export

Core Story of the System

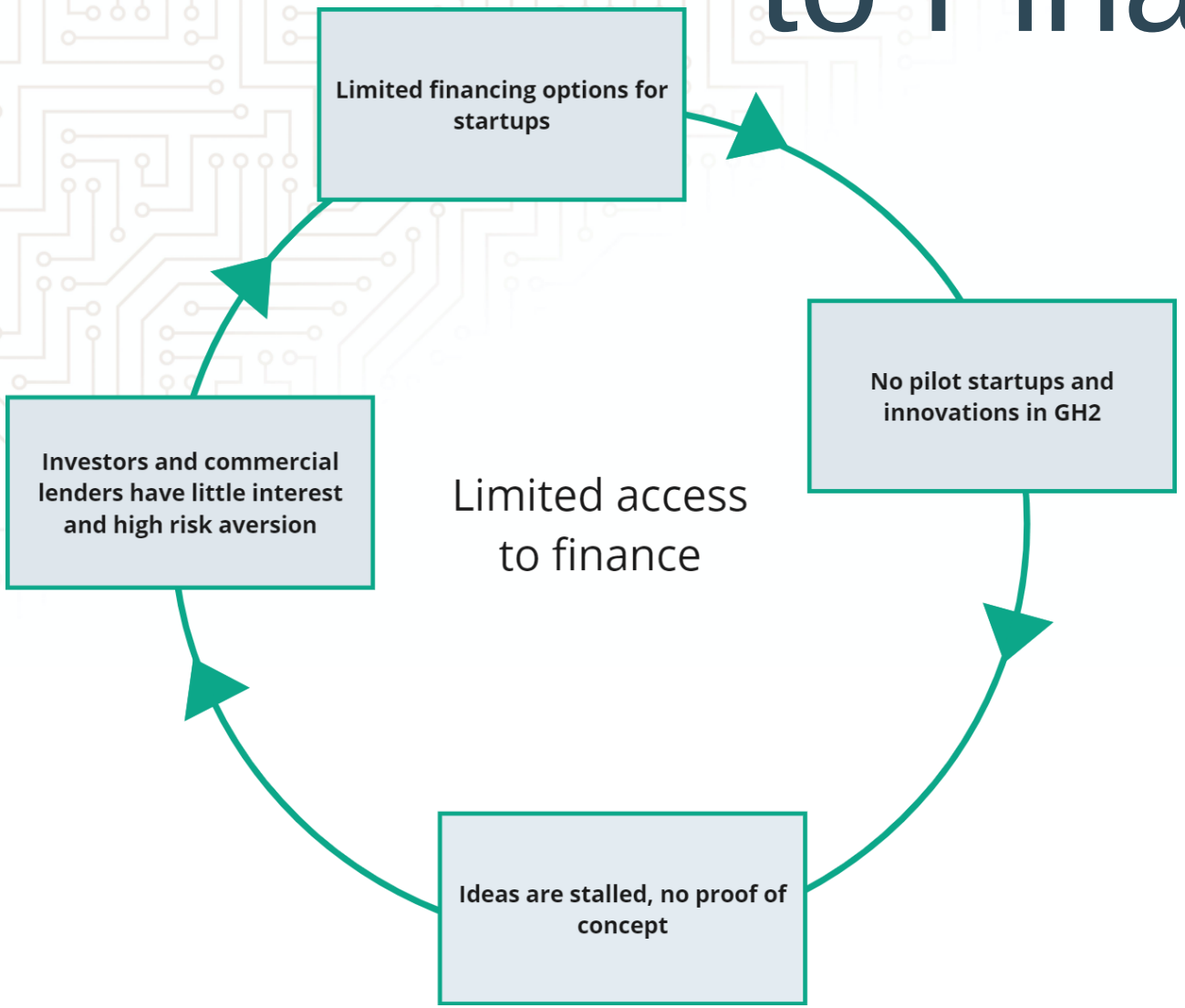


Overall, we see that the hype for green hydrogen in Kenya is driven by a committed government to complete the green transition to 100% renewable electricity generation as well as an equally supportive collaboration with development partners and (international) financial institutions.

However, there is a lack of inclusivity as communities and entrepreneurs experience limited awareness, visibility, information, finance options and opportunities to participate. A more holistic approach might be needed for full understanding, support and enthusiasm from all sectors.

Another key bottleneck is the cost of electricity. Therefore, the price to produce GH2 is still a challenge.

Loop 1: Limited Access to Finance



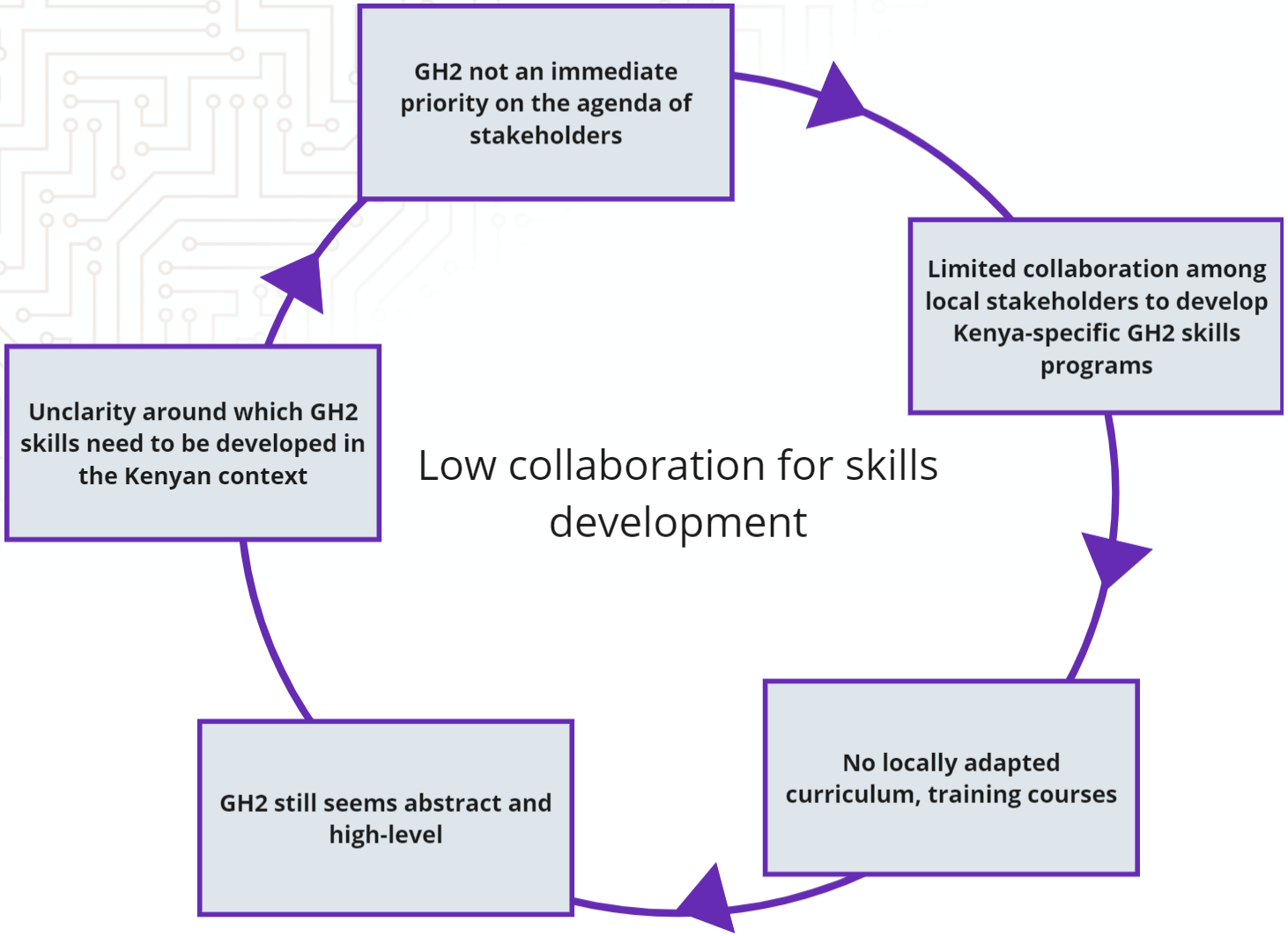
One of the typical challenges or inhibitors in a startup ecosystem is limited access to finance.

Limited financing options for startups lead to a lack of pilots and innovations in GH2 in Kenya, which in turn leads to ideas being stalled and no proofs of concept being developed.

Therefore, the demand for loan and investment products/services is limited, and investors and commercial lenders have little incentives to offer them. High-risk aversion prevails for such a new sector.

This closes the loop by resulting in limited financing options for start-ups, leading the vicious cycle to continue.

Loop 2: Low Collaboration for Skills Development



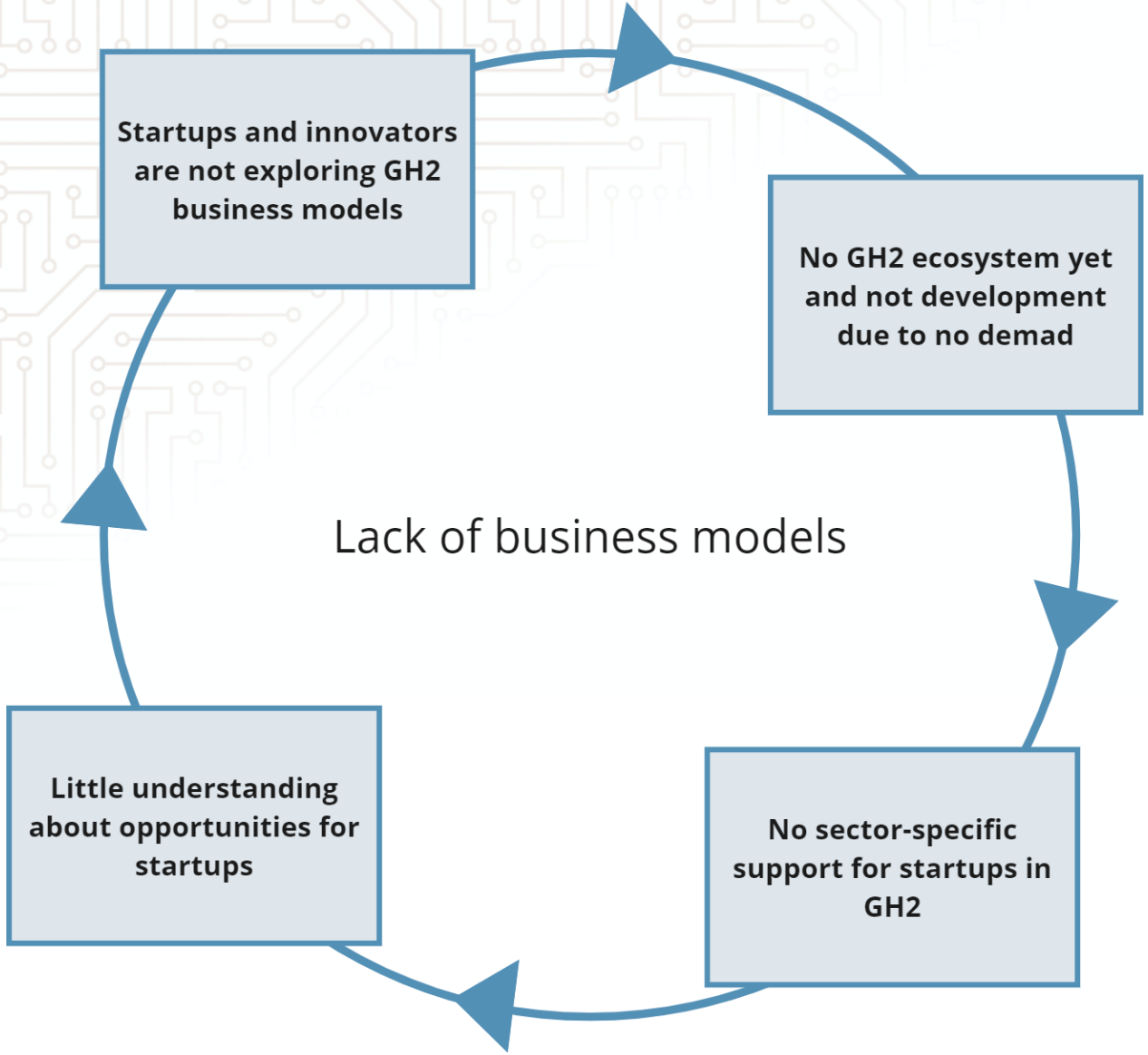
The focus of this loop centers around limited collaboration to develop Kenya-specific GH2 skills programs.

Because of this deficiency, we see that there are few locally-adapted curricula and training programs.

This gap in local training and skills programs leads to ambiguity around which GH2 skills should be developed in the Kenyan context, which in turn means developing these ambiguous skills isn't a high priority for stakeholders.

This closes the loop by explaining the limited stakeholder collaboration we see for skills development locally.

Loop 3: Lack of Business Models



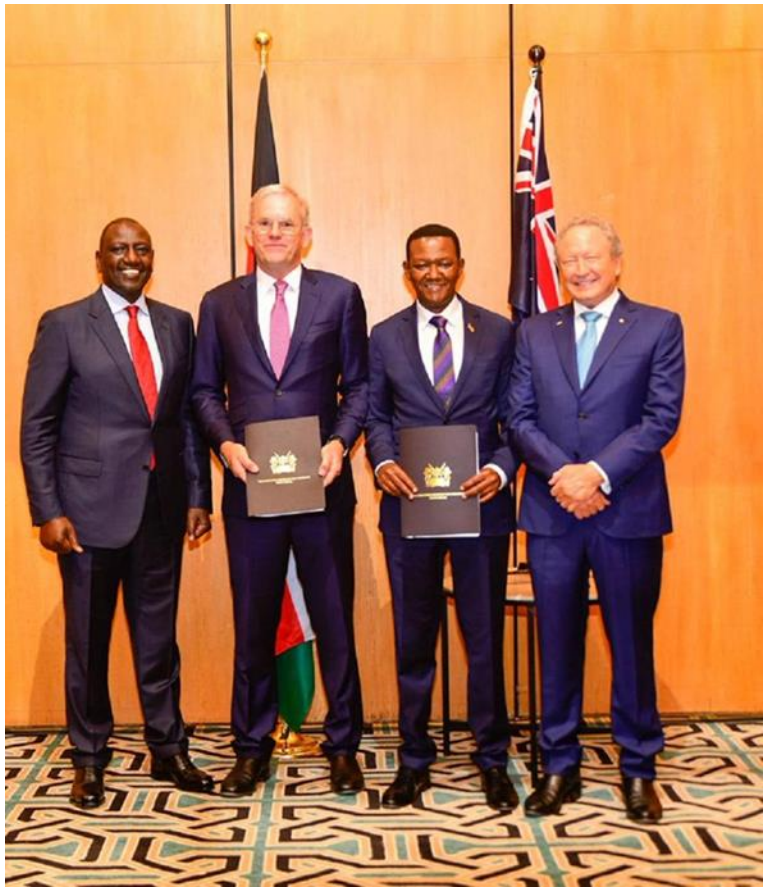
There is a lack of business models in the green hydrogen sector for startups and innovators; so far, only very large companies are active in the sector, and there seems to be no space for smaller companies to participate in the sector.

This notion is cemented by the following loop:

- As there is no specific innovation and startup ecosystem for GH2 - and as there is no obvious need for it - it does not develop.
- The lack of a GH2 innovation ecosystem leads to the fact that there is no sector-specific support for startups and innovators.
- This lack of support contributes to the fact that there is little understanding of the opportunities in the sector for existing (digital) startups or innovators at universities, etc.
- This finally leads to startups and innovators not working on business models in the GH2 space, as it seems to be an unattractive sector for them.

Example Projects I

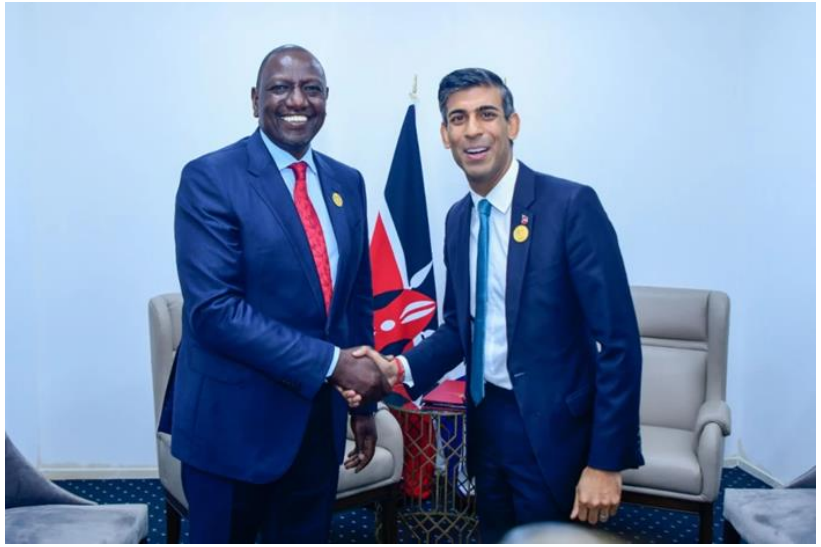
- Green Ammonia and Fertiliser.
  - Fortescue Future Industries (FFI), the green energy arm of Australian mining giant Fortescue Metals, struck a deal with the Kenyan government on November 8, 2022, during COP27. FFI wants to turn this deal to produce green ammonia for fertilisers and create a green fertiliser supply chain into a blueprint for other countries to follow.
  - Under the agreement, both parties will work together to build a 300 megawatt-capacity generation green ammonia and green fertiliser facility, scheduled for completion by 2030 using existing geothermal power to produce H2 via electrolysis.



Example Projects II

- The German BMZ Prospect
  - Germany has pledged at least 112 million euros to support Kenya in implementing its goal of switching entirely to renewable energy sources by 2030
  - The Climate and Development Partnership will focus on expanding renewable energies, the electricity grid and H2 production, as well as job creation.
- The UK Government Prospect
  - Kenya's president said the country aims to produce 30GW of GH2 after signing a KES500 billion deal with the UK to fast-track green investments.
  - The UK-Kenya Strategic Partnership is an ambitious five-year agreement that aims to unlock benefits for both countries.

Federal Ministry
for Economic Cooperation
and Development



Levers and Solutions for Change

Stars mark the solutions which resonated most with the consultations‘ participants

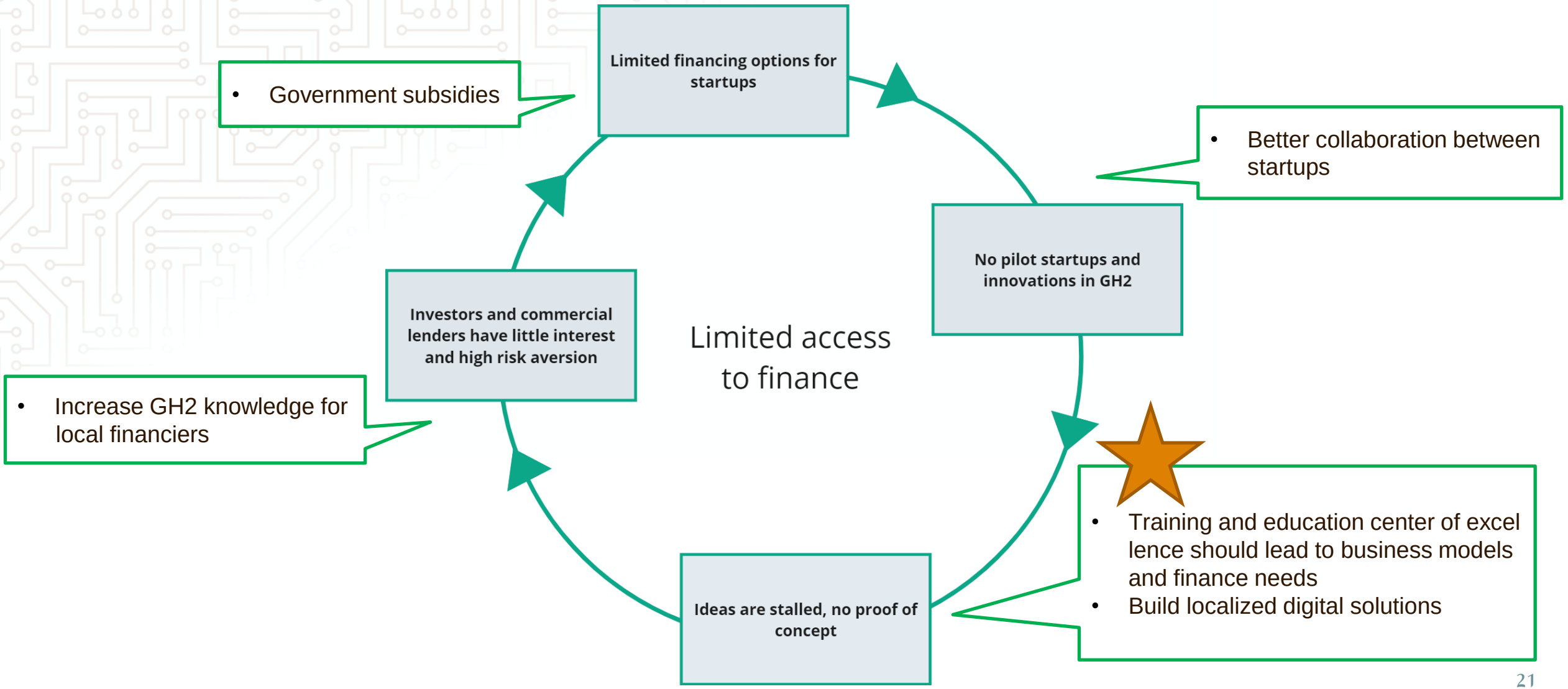
Overview of the Levers for Change

- The need for **targeted finance products** (concessional loans, (matching) grants, impact investments, carbon-credit schemes and results-based-financing) for start-ups and small, growing innovators can be a starting point for change. This could be complemented by government subsidies, tax breaks and other non-fiscal incentives (e.g. procurement quotas).

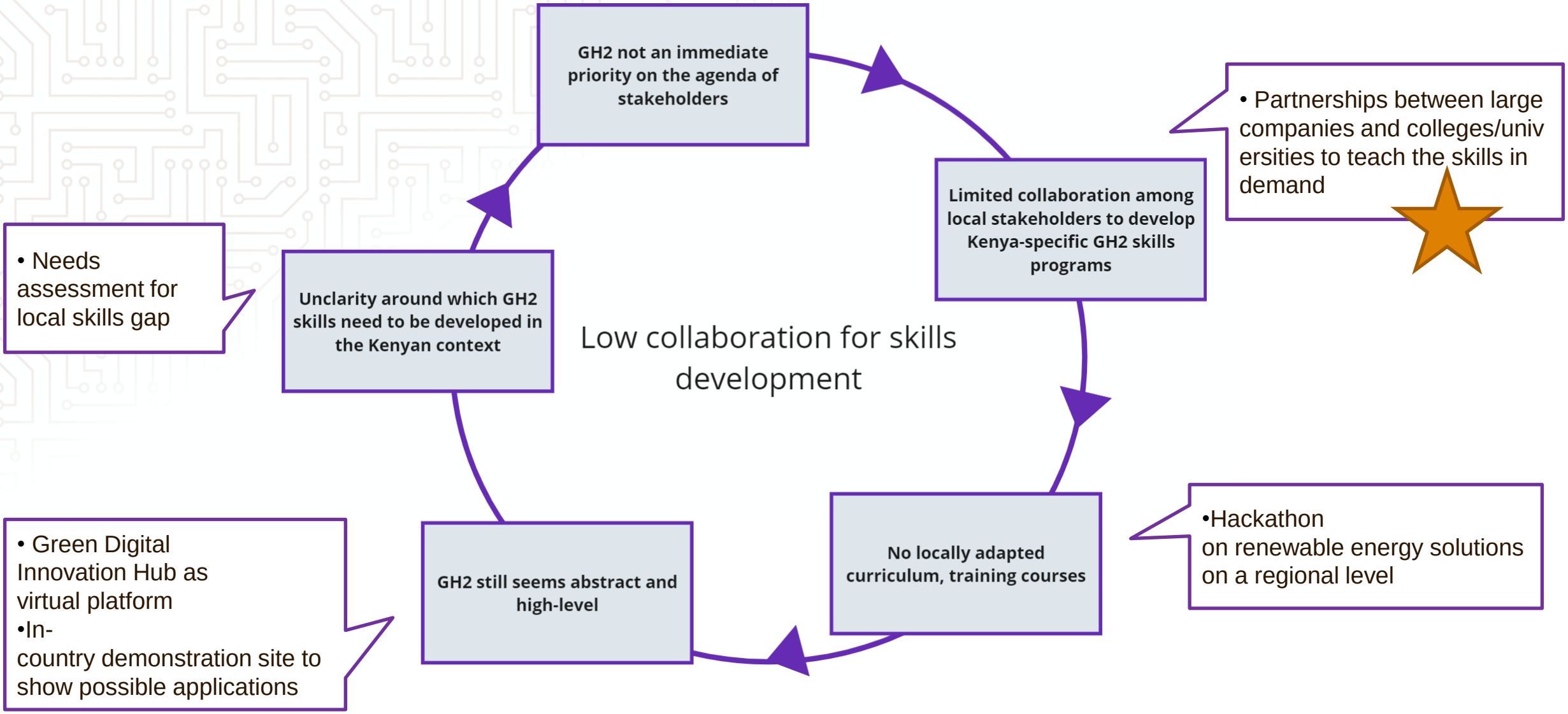
- The priority of a **local skills needs assessment** and subsequent contextualized curriculum for technical and commercial skills in green hydrogen would also change the system. This would help de-mystify the sector and show clear opportunities in **technical jobs and entrepreneurship,** e.g. for maintenance and digital solutions.

- Overcoming the lack of business models and thought that the **full value chain** needs to be understood and analyzed for opportunities for local innovators to build successful and relevant business models. Stakeholders should combine resources and knowledge for a **holistic GH2 Hub** (incl. Digital innovations) that combines technical knowledge and commercial skills and helps to create start-ups.

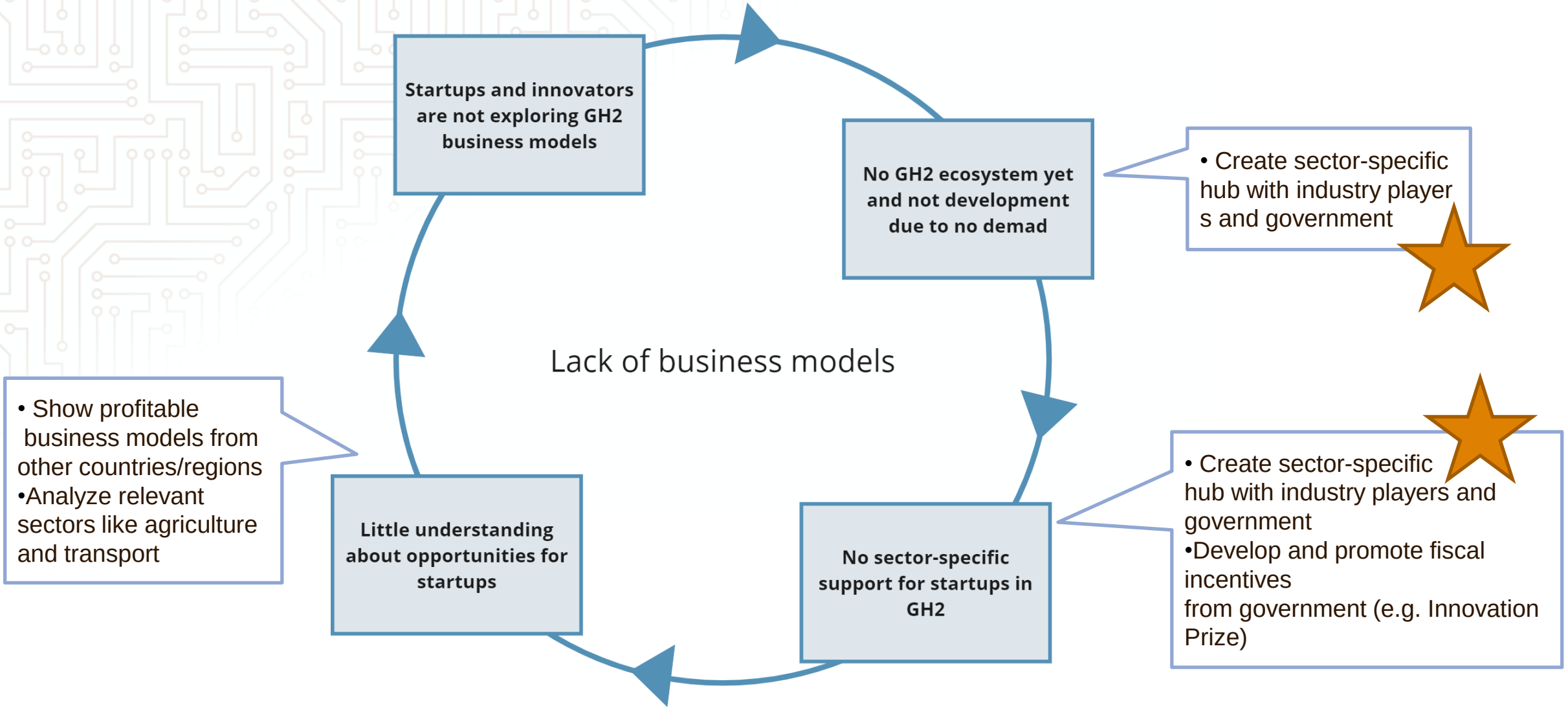
Solutions for Access to Finance



Solutions for Collaboration for Skills Development



Solutions for Lack of Business Models

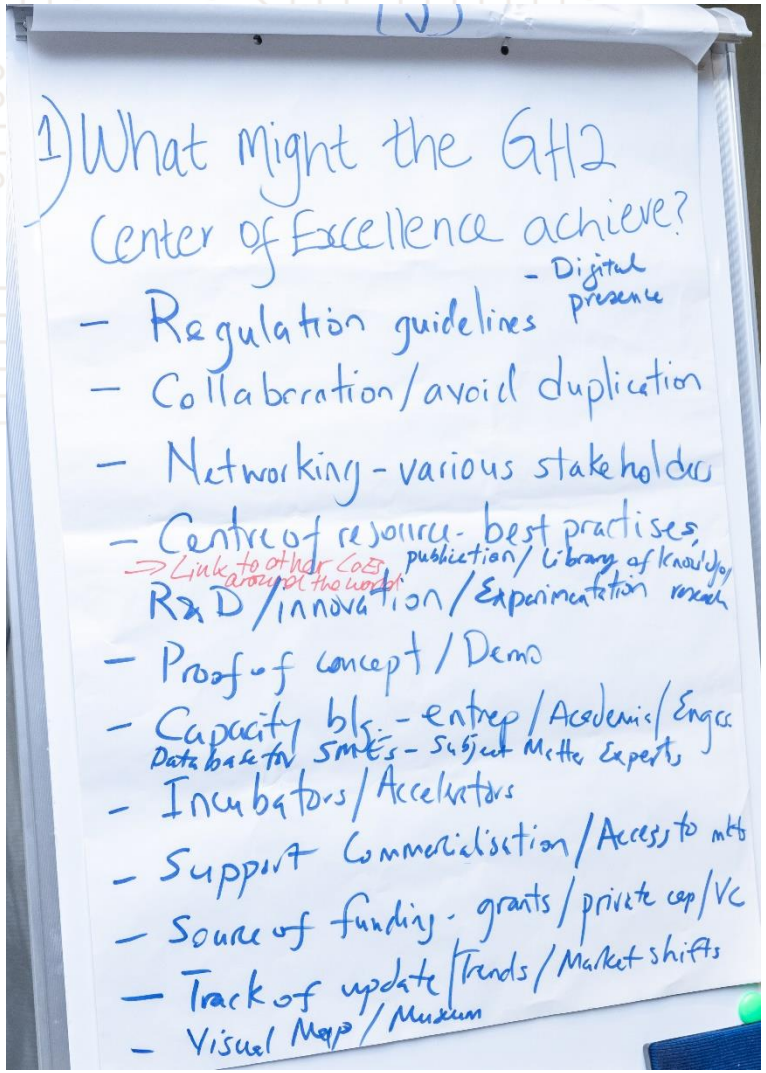


Results of Co-Creation: GH2 Centre of Excellence

Starting Point

How can we create a Centre of Excellence to support the development of the green hydrogen ecosystem in Kenya
through technical and commercial expertise and know-how for entrepreneurs, technicians and investors?

Fast Networking, Q1



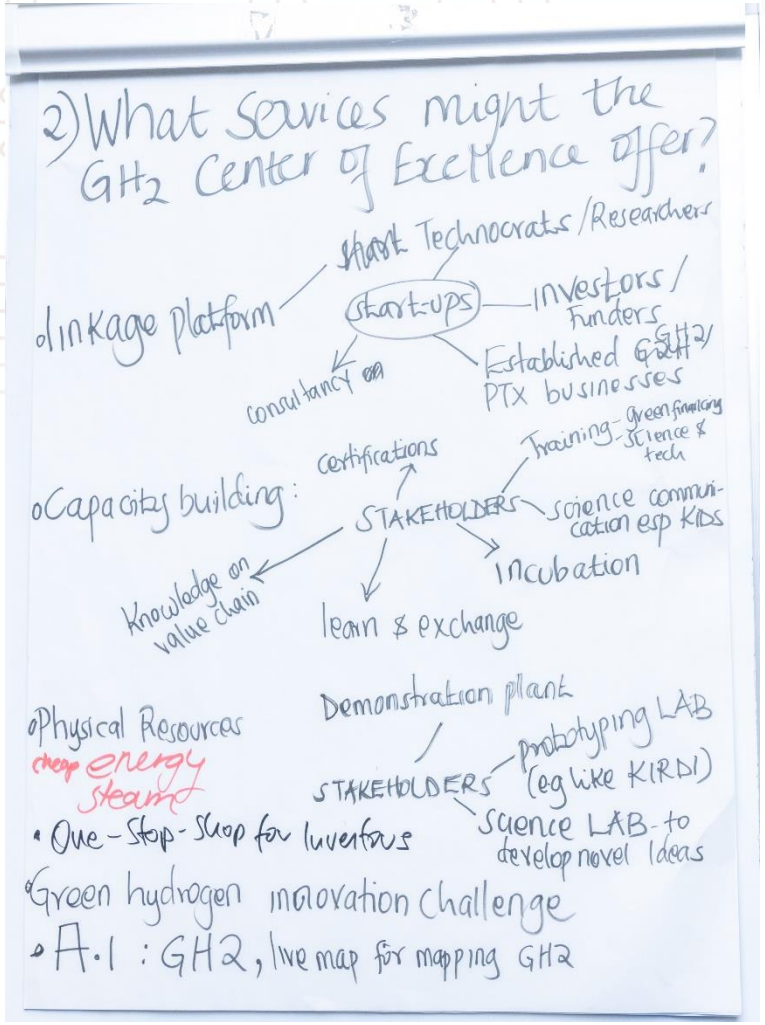
The group's vision to what a Centre of Excellence might achieve, focused on

- **Collaboration** – networking and exchange among national stakeholders, regional partners and similar global Centers of hydrogen Excellence

- **Innovation** – a hub to ideate and co-design new models and solutions. A learning/incubation/acceleration centre for start-ups and SMEs to refine new products, services and markets

- **Match-making** – a meeting place for investors & startups, researchers & businesses and policy makers/regulators & users

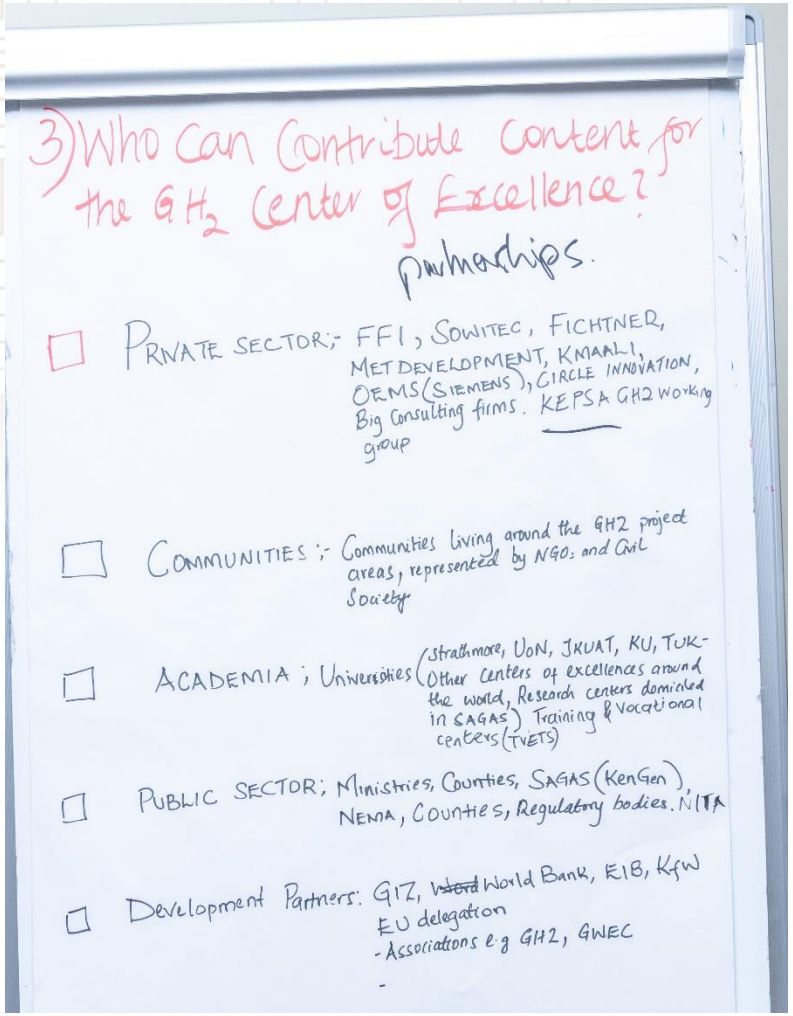
Fast Networking, Q2



The envisioned services centered around the necessary ecosystem for a training and commercial hub

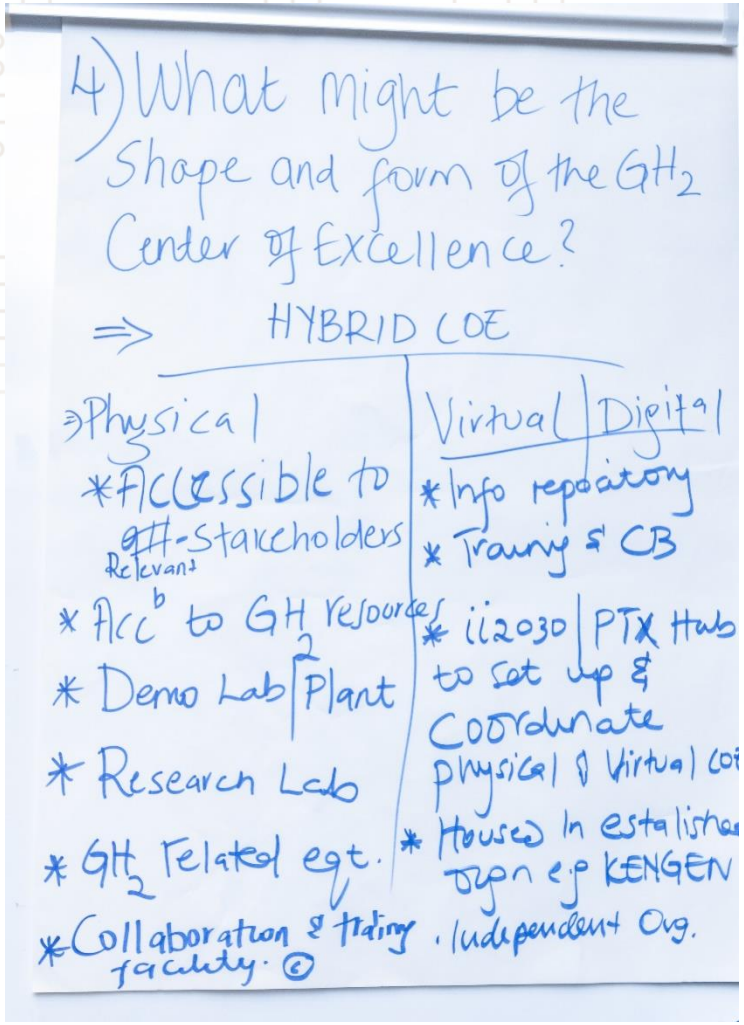
- **Repository of GH2 knowledge**
- **Linkage platform for stakeholders** incl. consultancies, access to finance and markets, support for certifications
- **Training center and maker space** incl. science lab, exchange programs and demo plant

Fast Networking, Q3



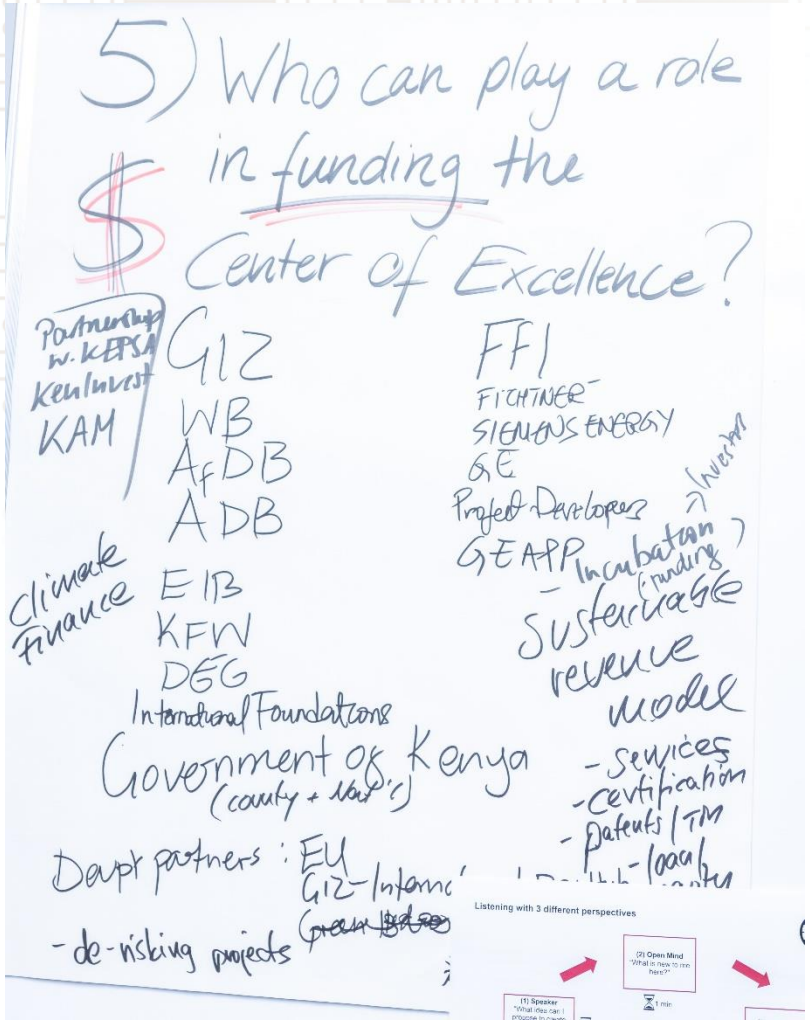
The group designed a list of contributors, potential partnerships and concrete stakeholders for an inclusive Centre of Excellence

Fast Networking, Q4



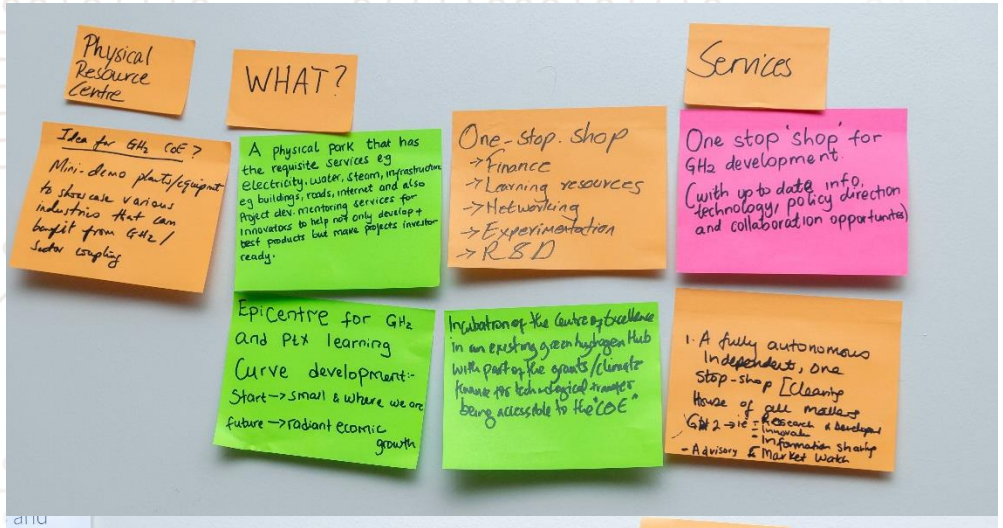
There was consensus that the CoE should offer both a **virtual/digital platform** (training programs/webinars, information database, calendar of events, links to further resources) and a **physical center** (demo plant, lab, TVET/practical courses, meeting/conf center)

Fast Networking, Q5



The group identified a number of bilateral **development partners, finance institutions and partners** that could help to secure set-up funding and help leading to a sustainable revenue/user model.

Clustering of ideas



Participants each shared their ideas for a solution that brings technical and commercial stakeholders together in the GH2 sector.

These ideas were clustered under three main support themes:

1) Format for physical Resource Centre

2) Envisioned Services

3) Finance Solutions

These themes defined the co-creation groups for the prototyping session in the afternoon, and each group emerged with a concrete prototype addressing the main support theme and highlights from each individual idea contributed to the respective theme.

Prototypes for Centre of Excellence in the GH2 Sector

1: GH2 Accelerator Centre (GAC)

Prototype 1 - GAC

Prototype 1 – GAC

Developers/Group participants: Pauline, Christoph, Lucy, Lemayan, Hillary

An inclusive centre of hydrogen that focuses on the technical knowledge and showcasing of the entire value chain from renewable energy production (wind, solar) to use cases.

Featuring:

1) Demonstration plots for solar, wind and electrolyzers
2) Research lab
3) Market place

2: Services

Prototype 2 - Services

Prototype 1 – Services

Developers/Group participants: Catherine, Jackie, Grace, Joy and Mary

Designing the services, the group envisioned an open, welcoming space to experiment and network among engineers, scientists and R&D companies to fully understand and utilize the technical aspects and commercial opportunities of green hydrogen in Kenya.

Featuring:

1) Demonstration plots
2) Prototyping Lab
3) Networking Hub

3: GH2 Fund

GH2 Fund

Prototype 1 – GH2 Fund

Developers/Group participants: Karina, Joyce, Kevin and Paul

Focussing on short- and long-term finance solutions, the group envisioned several funding opportunities for GH2 activities, start-ups and mature businesses, where in-depth knowledge and investor appetite would de-risk new ventures.

Featuring:

1) Soft loans and equity from Impact Investors
2) Revolving Fund for SMEs
3) Grant mechanisms and innovation challenge funds from development partners

Commitment

At the end of Day 1, the participants channeled the creative and constructive energy into firm **personal and institutional commitments** to bring the Kenya GH2 Centre of Excellence to fruition.
The ideas and commitments centered around design, support and implementation of the CoE and a core group was formed to evolve the Day 1 outcomes into a detailed **project model canvas, roadmap/workplan** (Day 2) and a first draft concept note.

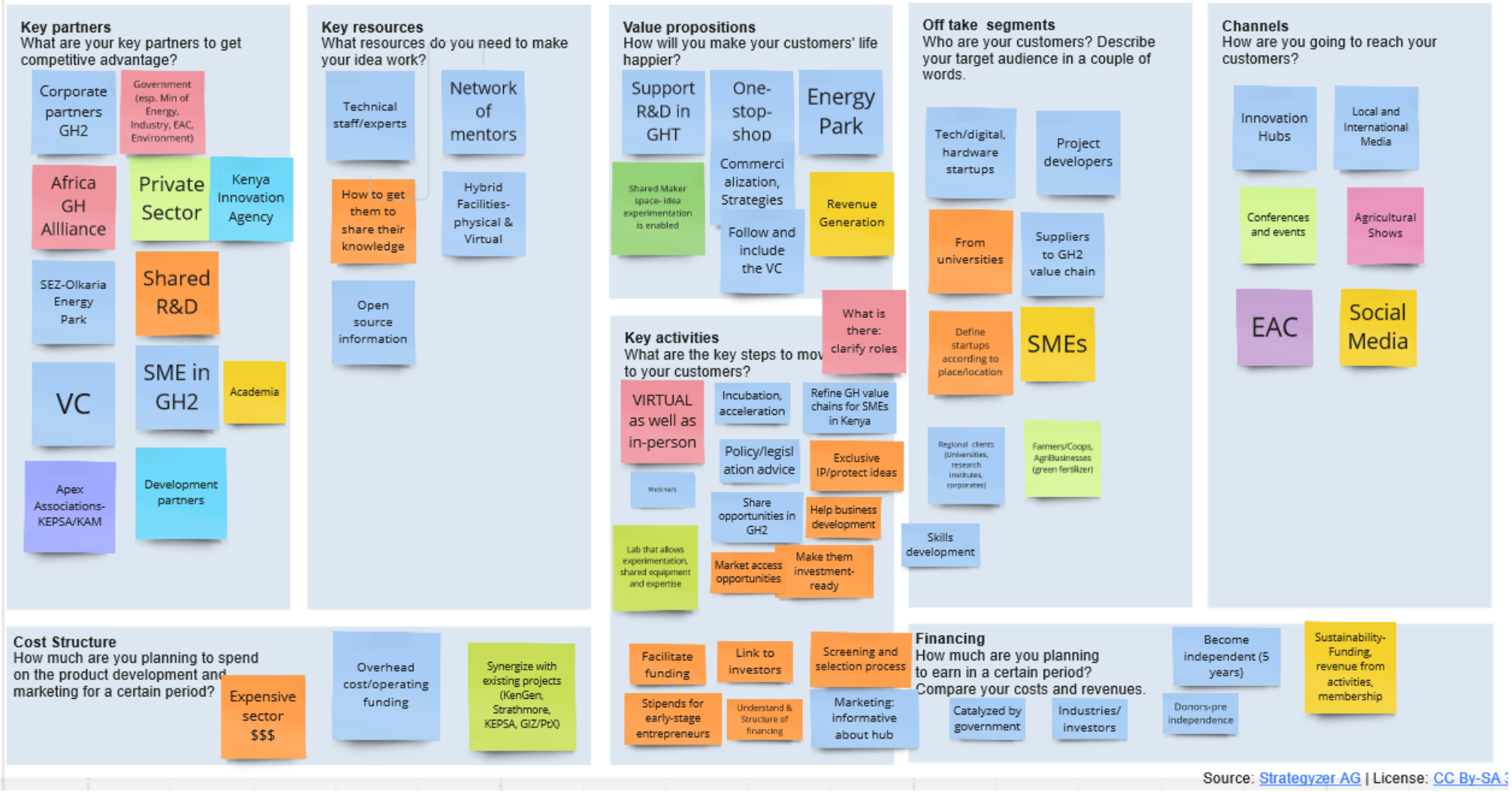
Members of the core group:

- KenGen (lead)
- GH2/AGHA
- Circle Innovation
- Kmaali Group
- Endeva Africa

Concept of a Centre of Excellence in the GH2 Sector

On the second day, core stakeholders started detailing the idea of a Centre of Excellence

Project Model Canvas



Roadmap to Concept Development