Makeademy

Makeademy - Makers Academy:
Developing Future Engineer's Skills

THE EDUCATORS' GUIDE

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ABOUT MAKEADEMY

The **"MAKEADEMY: Developing Future Engineer's Skills"** project wants to innovate existing engineering study programs by developing a flexible modular and widely available program, centred on the CDIO (Conceive, Design, Implement, Operate) approach to provide students with the skills needed to address current professional and global challenges.

According to the National Academy of Engineering, engineers today work in diverse and diffuse teams, often across time zones and national borders. However, soon, engineers will have an even more diverse environment to work in and have more significant issues to solve for humanity than ever before.

The project highlights and addresses three main problems:

1. Sense of innovation, critical thinking, and a holistic view are significant engineering skills. However, activities intended to develop these abilities are missing (or are not fully applied) in HE study programs. Modern engineers need to solve problems from innovative, sustainable and social perspectives.

2. In Europe, there is a lack of engineering study programs based on the CDIO method, which adds a transdisciplinary approach to learning practices. Instead, study programs are usually created based on the traditional and well-known project- and problem-based learning method (PBL).

3. Innovative and modern engineering education programs usually have limited availability (e.g. study programs available to a particular HEI or a specific network, for example, members of Design Factory Global Network or FabLabs).

Therefore, the project addresses the need to supplement HE engineering study programs with an innovative, solution-oriented and widely available program that can act as a platform to recognise and engage with the macro-ethical, adaptive and cross-disciplinary challenges embedded in professional issues The MAKEADEMY project aims to develop the soft and missing skillset of future engineers, who are not just technicians but also sustainable world creators, who take the transdisciplinary perspective into account and who are interested in tackling real-world problems from multiple angles.

makeademy.eu has 4 different resources:

The Framework for a Study Module MAKEADEMY

The framework enables universities to have a practice-oriented study program that better meets the needs of the labour market. It also helps improve the skills of HEIs teachers and engage students in the study process.

Open Educational Resource for Creative Innovators

The OER will improve the ability to foster students' creativity & creative business development. It will also increase the soft skills and entrepreneurial skills of engineering students, as well as increase entrepreneurship opportunities.

Open Educational Resource for Skills Development: Everything about Prototyping

The OER on rapid prototyping will improve students' technical skills, provide better knowledge of what the labour market needs, and foster digital fabrication and digital tools.

Future Engineers' e-Learning Platform

The E-learning platform will ensure free and easy access to all project results. A wider audience of HEIs teachers and students will have access to the created materials.

Project partners

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MAKEADEMY EDUCATORS' GUIDE

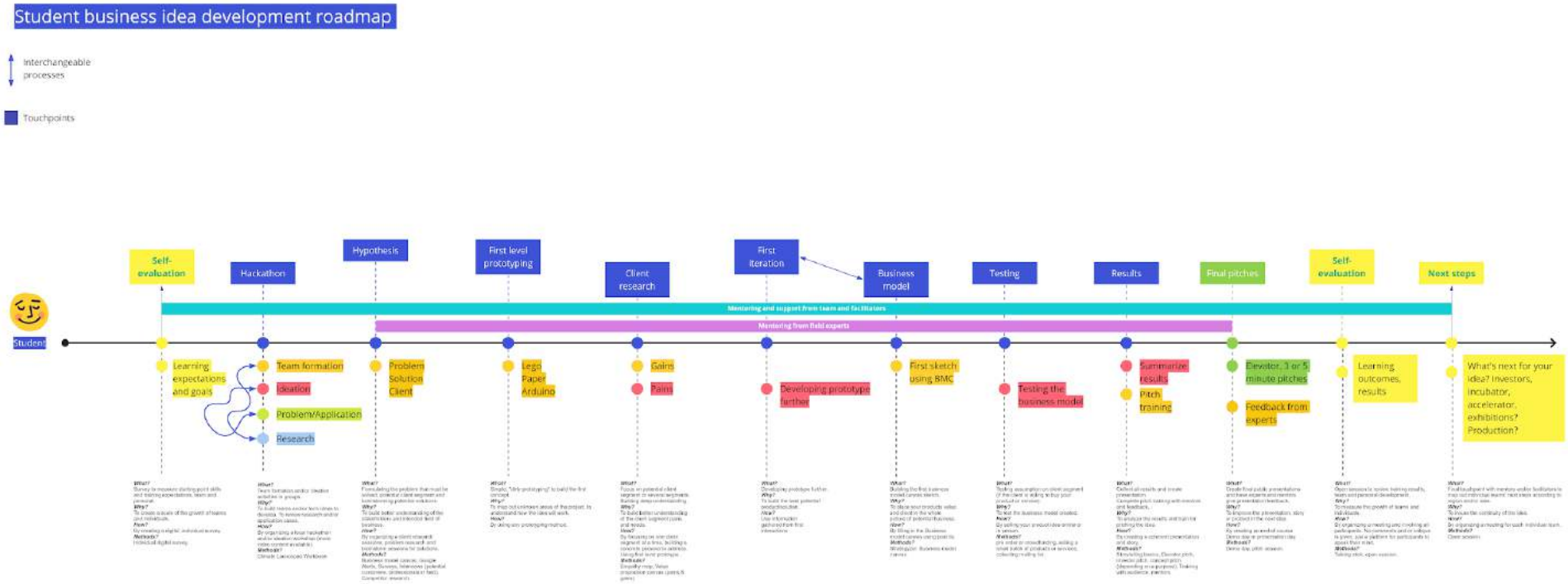
Why?
This guide was created to help educators lead university students and/or teams through the business idea development process using our **"Student business idea development roadmap**".

How?
This guide will help educators facilitate processes of business idea development, creative thinking, teamwork and personal skill development.

What?
This guide comprises the **"Student business idea development roadmap**" and the **"Educators' Guide**". Most of the methodologies mentioned in this guide are available for free online. There are more open resources available on the project website **makeademy.eu.**

We have made this process as flexible as possible so it can be applied to different goals, be it the commercialisation of existing research or application, generating new innovative ideas, or building solid teams.
The roadmap can be used as a supplementary activity during an academic course or as an independent workshop.
Depending on the time educators can dedicate to completing this process, it can be a 48-hour hackathon or academic term. The methods mentioned can be used selectively, and new ones can be added depending on the objective.
Most of the methods are free and available on the web.
Mentoring and support from the educators and facilitators should be established during the process. If needed, mentoring from field experts can be provided in several steps.
This guide has been developed and tested at Riga Technical University as part of the pre-incubation program IdeaLAB.

This guide was created and revised by Kristiāna Kārkliņa and Serena Leka.



ACCESS HQ **Student business idea development roadmap** download HERE: **makeademy.eu**

SELF-EVALUATION

To monitor student expectations before the start of the program, create an open survey with open questions. Use Typeform or Google Forms.

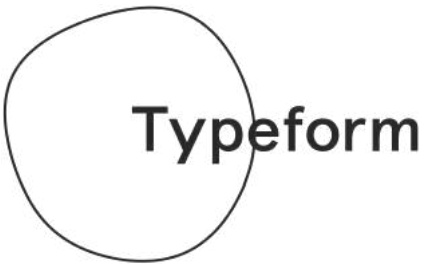
Why?
To create a scale of the growth of teams and individuals during the process.

How?
By creating a digital, individual survey. Use open questions to gather quality data.

What?
Survey to measure the team and personal starting point skills and training expectations.

Methods?
Individual digital survey.

Tools?
Computer, smartphone, tablet, internet access, pen and paper.



TEAM FORMATION, HACKATHON

There are several ways to create student teams.

Problem/Application
Educators present students with an existing problem or allow students to ideate an existing problem or application.

Research
Preexisting research on a subject is done either by students during the program or presented to teams by educators.

Ideation
Form teams around a selected challenge and personal interests. This allows students to generate their own ideas.

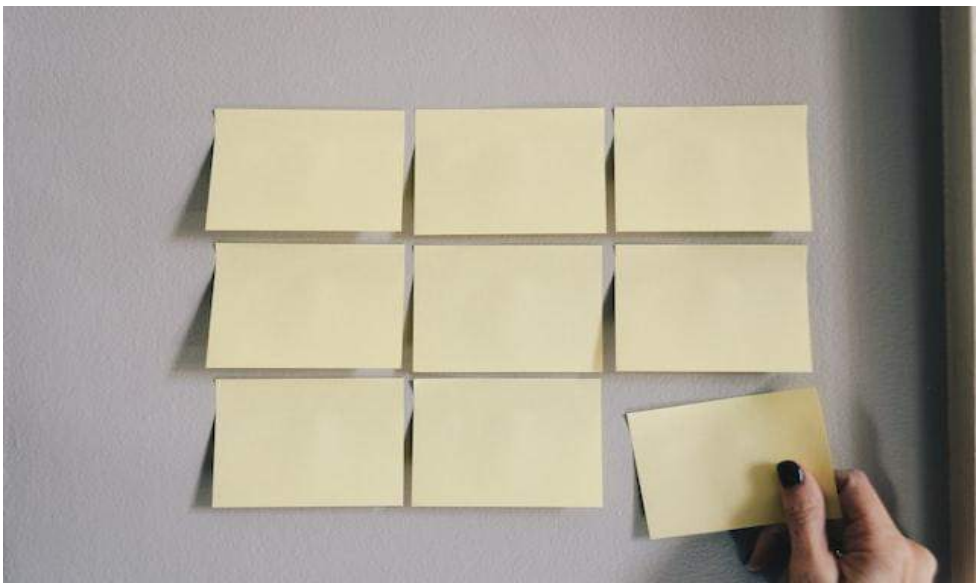
Note
There may be cases where teams are formed based on the skills necessary to develop the project. This can be done carefully by pre-selecting team members and giving the team time to bond.

Why?
To build teams and/or develop ideas. To review pre-existing research and/or application cases.

How?
By organising a local hackathon and/or ideation workshop.

What?
Team formation and/or ideation activities in groups.

Methods?
The worst possible idea, a vision board, Climate Launchpad Playbook.



Tools?
Post-it notes, a wall or table surface, pen.

Notes?
Make sure to use one Post-it note per idea.

HYPOTHESIS

After ideation and/or a hackathon, teams have established hypotheses (problem, solution, client) for further research.

Why?
To build a better understanding of the stakeholders and intended field of business.

How?
By organising client research sessions, problem research, and brainstorming sessions for solutions.

What?
Formulating the problem that must be solved, potential client segment, and brainstorming potential solutions.

Methods?
Competitor research, field research. Google Alerts, Surveys, Interviews (potential customers, professionals in the field).

Tools?
Internet access, library, and any other related data.

FIRST LEVEL PROTOTYPING

Why?
To map unknown areas of the project and/or idea; to understand how the solution will work.

How?
By using any simple prototyping method.

What?
Simple, "dirty prototyping" to build the first concept/solution.

Tools?
Lego, paper, Arduino, drawings, office supplies.

CLIENT RESEARCH

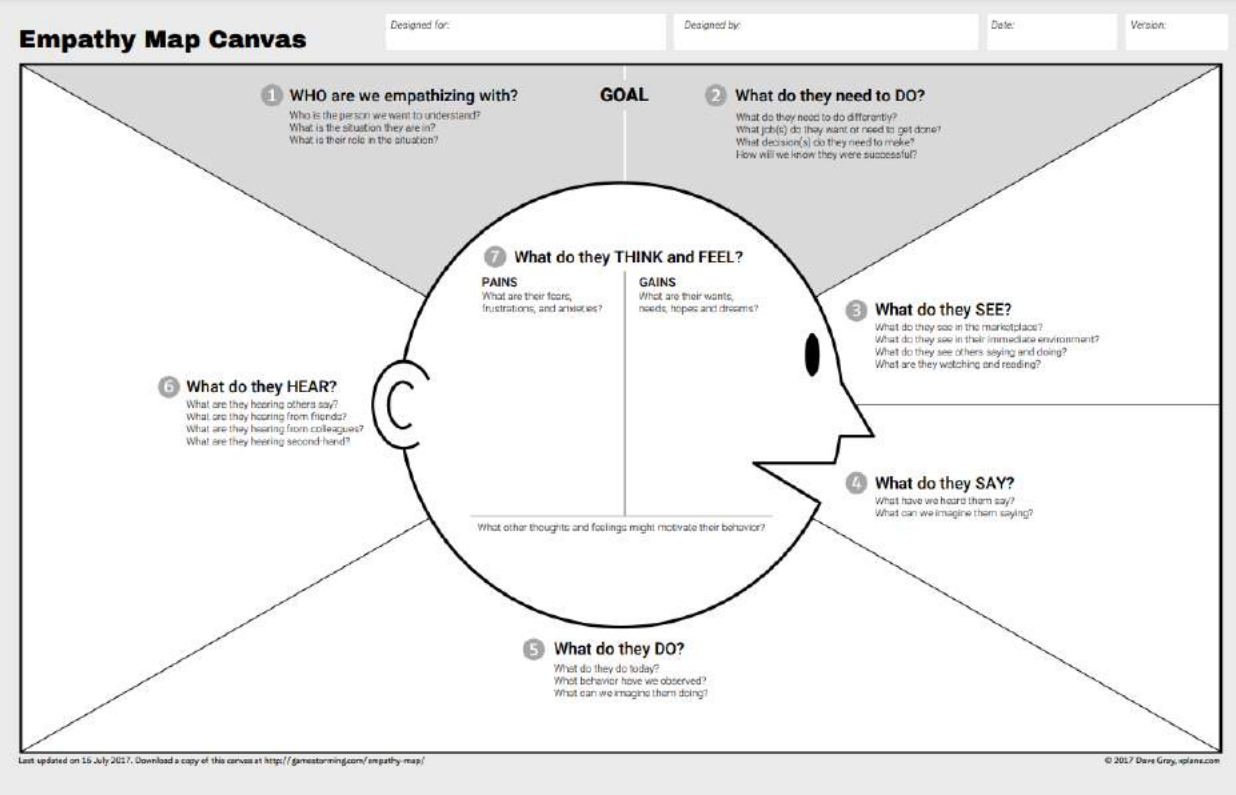
Why?
To better understand the client's pains, gains, and needs.

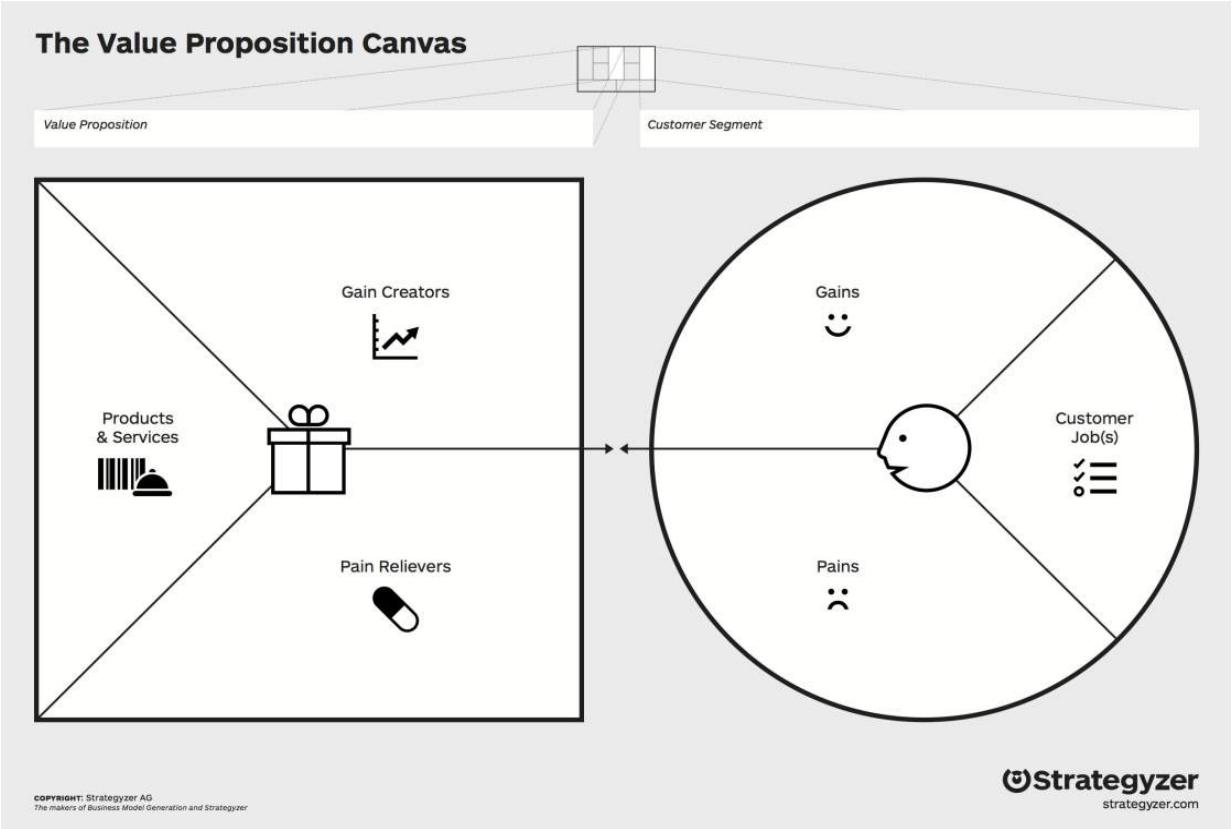
How?
By focusing on one client segment at a time, building a concrete user persona to address. Using a first-level prototype to gather data.

What?
Focus on potential client segments. Build a deep understanding.

Methods?
Interviews, prototype tests. Empathy map, Value proposition canvas (pains & gains).

Tools?
Research data, pen, paper.





FIRST PROTOTYPE ITERATION

Why?
To build the best potential product/solution.

How?
Use information gathered from testing and interactions with potential clients and experts.

What?
Develop the prototype further.

BUSINESS MODEL

Why?

To position the product's value and the client in the business model.

How?

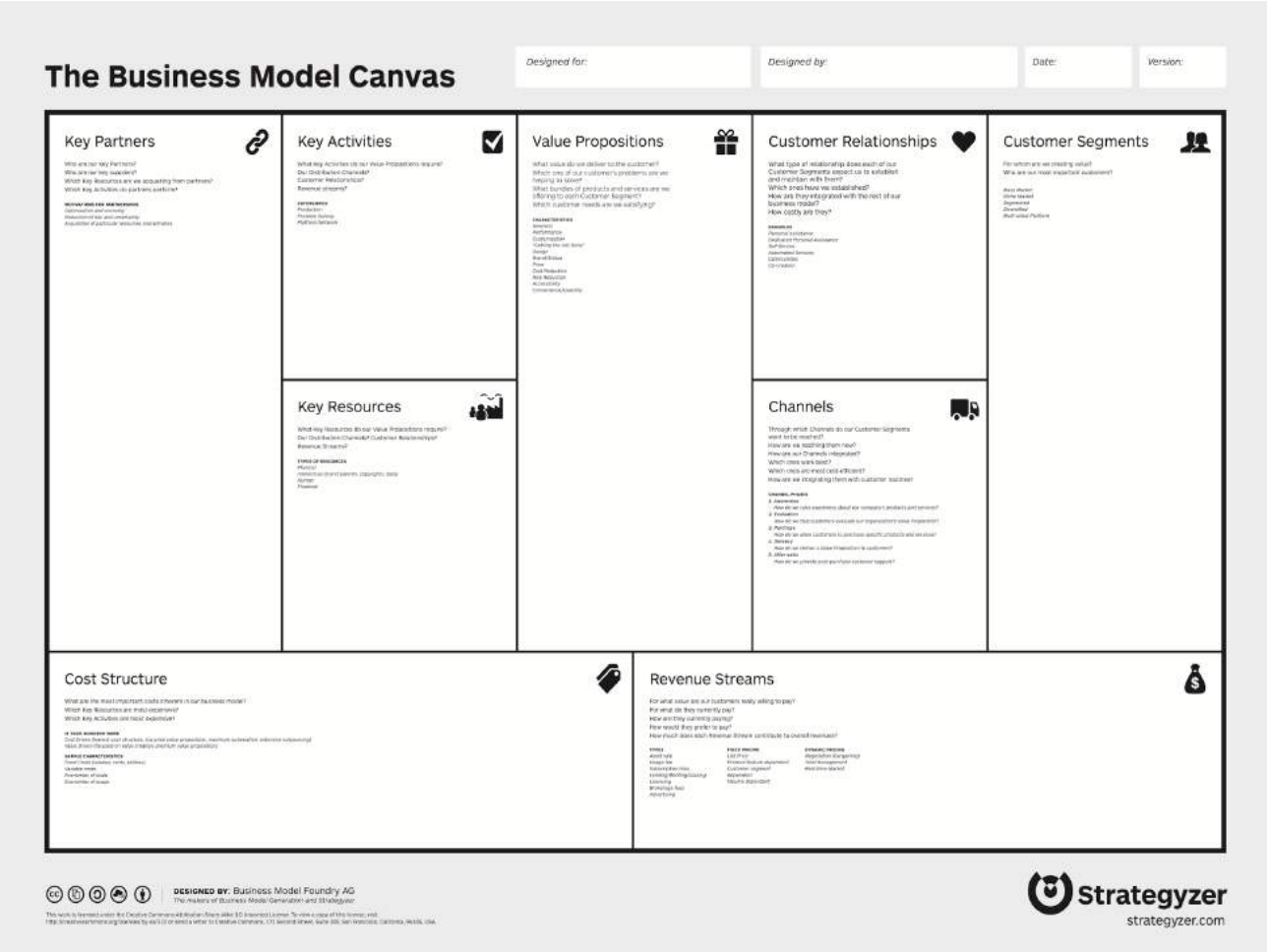
By filling in the Business Model Canvas.

What?

Creating the first draft of the business model canvas

Methods?

[Business model canvas.]



TESTING THE BUSINESS MODEL

Why?
To test the business model created.

How?
By selling your product idea online or in person.

What?
Testing the hypothesis on the client segment (if the client is willing to buy your product or service).

Methods?
Pre-order or crowdfunding platforms, selling a small batch of products or services, collecting mailing lists with committed clients.

NOTE
Testing the business model might take several iterations to be completely successful and get confirmation from the client. Use as many adjustments as your timeframe allows.

RESULTS

Summarize the results of the work and complete pitch training.

Why?
To analyse the results and practice pitching the idea.

How?
By creating a coherent 2-5 minute presentation and story.

What?
Collect all results and create a presentation. Complete pitch training with feedback from mentors and peers.

Methods?
Storytelling basics, Elevator pitch, investor pitch, concept pitch (depending on the purpose). Training with an audience and mentors.

Tools?
Allow free format - video, PowerPoint, Prezi, and drawings to get creative results.

FINAL PITCHES

Why?
To improve presentation skills, story, or product/solution in the future.

How?
By creating an end-of-course demonstration day or presentation day. Feedback from experts from relevant fields.

What?
Prepare the final public presentations and have experts and mentors give feedback on progress.

Methods?

Demo day, pitch session. These sessions can also be held remotely.

Tools?

Computer, office supplies, a venue - on-site or via video conference.

SELF-EVALUATION, LEARNING OUTCOMES, RESULTS

Why?
To measure the progress of teams and individuals. To receive feedback on mentor and facilitator work.

How?
By organising a meeting and involving all participants. No comments or critiques are given, just a platform for participants to speak their minds and share experiences.

What?
Open session to review training results, and the development of the team and individual.

Methods?
Talking stick, open session, sharing circle. No extra tools are needed.

NEXT STEPS

What's next for the business ideas the students developed? Investors, incubators, accelerators, exhibitions? Production?

Why?
To ensure the idea continues after the course.

How?
By organising a meeting with each individual team.

What?
Final touch point with mentors and/or facilitators to map out the next steps for individual teams about their ideas

Methods?
Open session, stand-up. No extra tools are needed.

CONCLUSION

We have created this process to be as flexible as possible and applicable to different goals, whether commercialising existing research or applications, generating new innovative ideas, or building solid teams.
Depending on the time educators can dedicate to completing this process, it can be a 48-hour hackathon or academic term. Methods can be used selectively, and new ones can be added depending on subject and timeline.

GOOD LUCK, MAKERS!

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