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The Urban Lab of Europe !

# The APPLAUSE project Journal N° 3

*Project led by the City of Ljubljana*



**CIRCULAR  
ECONOMY**



# The APPLAUSE project

**ApPLAuSE (Alien PLAnt SpECies) - from harmful to useful with citizens' led activities** will experiment a completely new approach to IAPS (Invasive Alien Plant Species) treatment. IAPS will be considered as a resource and starting point of a new business model. A big effort is dedicated to new green technologies in all aspects of IAPS treatment (e.g. pilot enzymatic processing of IAPS fibres instead of chemical) as well as circular economy principles in development of new products (re-use). Through a large-scale educational and awareness raising campaigns, citizens are encouraged to participate in IAPS harvesting and re-use. ICT technology will be used to address target groups and to produce open data, new knowledge and develop new services like IAPS monitoring. Collected IAPS biomass will feed three main ways of further transformation: at home (e.g. food, dyes), at tutored workshops (e.g. to produce wood or paper articles) and in craftsman laboratories (e.g. to manufacture innovative products with market potential in social enterprises and employing vulnerable groups).

## Partnership

- City of Ljubljana
- SNAGA - waste management public utility
- University of Ljubljana
- Jozef Stefan Institute
- National Institute of Chemistry
- Pulp and Paper Institute
- Company for arboriculture and forestry (TISA)
- GDi GISDATA d.o.o. Ljubljana
- Centre of Excellence for Space Sciences and Technologies (SPACE-SI)
- Association for the development of sustainable design (TRAJNA)
- TipoRenesansa

# Table of Contents

<b>1. EXECUTIVE SUMMARY</b>	<b>4</b>
<b>2. THE TIME IS NOW</b>	<b>6</b>
<b>3. ACCOUNT ON THE PROGRESS MADE BY THE PROJECT SINCE MARCH 2019</b>	<b>7</b>
3.1 Unveiling the circular model for IAPS	7
3.2 Testing a new digital platform that supports plant identification and harvest	12
3.3 The handcraft paper-making workshop is in operation	13
3.4 Assessing the willingness-to-pay for the new circular products	15
<b>4. SUMMARY ON IMPLEMENTATION CHALLENGES</b>	<b>18</b>
<b>5. CONCLUSION</b>	<b>20</b>

# 1. EXECUTIVE SUMMARY

After two years since the start of the project, most processes and planned activities in APPLAUSE are up and running. This means that the City of Ljubljana and its partners are starting to see the full circular model for the management of invasive alien plant species (IAPS) in operation.

Such operation is divided into six main stages: plant identification, biomass harvest, processing & storage, value recovery, final production and market introduction of new IAPS-based circular products and services. Throughout these stages, the value of APPLAUSE is created and captured. But what is the value proposition of APPLAUSE, specifically? The answer is not simply a set of products or services that cover the needs of specific end-users. As in many circular business models, its value is multidimensional, as it encompasses benefits to final end-users, but also to the environment and society. In the case of APPLAUSE, the value lies in its capacity to bridge ecology (effectively removing IAPS), community (though the involvement of citizens), culture (reviving old craft traditions) and economy (locally producing new circular products out of waste) in an innovative and collaborative way.

To make the operation of this circular business model more optimal, in the last 6 months, green area managers of the City of Ljubljana have been testing a new digital platform that supports them in conducting fieldwork and planning harvesting actions. Also, the workshop for handcraft papermaking has been inaugurated, providing services to citizens, in particular educational activities to school children. The consortium has also started to assess the market demand for the new IAPS-based paper and wood products

and to make plans for the future of this circular model once the APPLAUSE project finishes in a year's time.

All in all, the key achievements resulting from the last 6 months of the project are:

- A thorough mapping of all processes that take place in APPLAUSE circular model, identifying main products and by-products as well as new more-environmentally friendly procedures for paper production.
- The completion of a lifelong inventory of IAPS present in Ljubljana's green areas thanks to a new digital platform.
- The inauguration and ramp up of activities at the handcraft paper-making workshop, with 300 citizens participating in more than 15 activities.
- An initial survey to assess the market interest and demand from locals, tourists, schools and families for the new IAPS-based products.

This implementation period has also led to new lessons learned:

- Circular business models tend to be more complex than linear ones and, as a result, they require much closer collaboration between suppliers, partners, and customers. Mutual trust is imperative for its success.
- Such complexity can be eased thanks to digital tools (as for example APPLAUSE's platform for plant tracking and harvesting) that streamline coordination efforts and support better and quicker decision-making.

- Even if APPLAUSE circular model needs to make sense from a business/economic perspective, it is also important not to lose sight of the enormous value it can bring in environmental terms, social impact and preservation of cultural heritage.
- The paper-making workshop is a fantastic new infrastructure for the city that not only serves for purposes of citizens' participation and engagement. It can also become a place that supports artists, craftsmen and designers in creating new, more sustainable products.
- Finally, the process of recovering a resource such as IAPS that was considered waste brings additional costs. For APPLAUSE, this means that the paper and wood products that can be developed will most probably have a higher price than those produced with regular paper and wood. The key is to effectively communicate the originality and added value brought by these products to potential customers who will be willing to pay for such value proposition.

## 2. THE TIME IS NOW

Two years since the start of the APPLAUSE project, the time is now to start demonstrating the practical viability of a circular model for the management of Invasive Alien Plant Species (IAPS).

The project is reaching its peak point where most of the processes for successfully operating the model are in place: from plant identification and harvesting, to processing and storage, development of IAPS-based products, construction of the paper and wood workshops... All with the continuous engagement of citizens.

So, what are the challenges of realistically implementing a circular model for IAPS? What value proposition is brought forward? Will citizens pay for the circular products? How do we plan for long term sustainability?

From March to October 2019, APPLAUSE partners have worked hard to try to address all these issues.

# 3. ACCOUNT ON THE PROGRESS MADE BY THE PROJECT SINCE MARCH 2019

## 3.1 Unveiling the circular model for IAPS

Circular business models represent fundamentally different ways of producing and consuming goods and services (OECD, 2018). Some circular business models such as product-as-a-service or sharing platforms change completely the way we consume goods. Others, such as circular supply chains, tackle the production through fully recyclable, renewable or biodegradable inputs that substitute linear ones.

APPLAUSE circular business model for IAPS falls within the category of resource recovery models where something considered as waste is revived for other uses. In APPLAUSE, the waste source is

a bio-based material (IAPS) that is not only damaging to the environment but it can also be harmful to citizens and the economy. This waste material needs to be located, harvested and processed before its value can be recovered. This value comes in the form of cellulose paper pulp (after the milling and cooking process), wood biomass, flowers and food (tuber, fruits...). Once into the hands of producers, these can be turned into different products for the market such as wood products, paper products, dyes, biopolymers, etc.

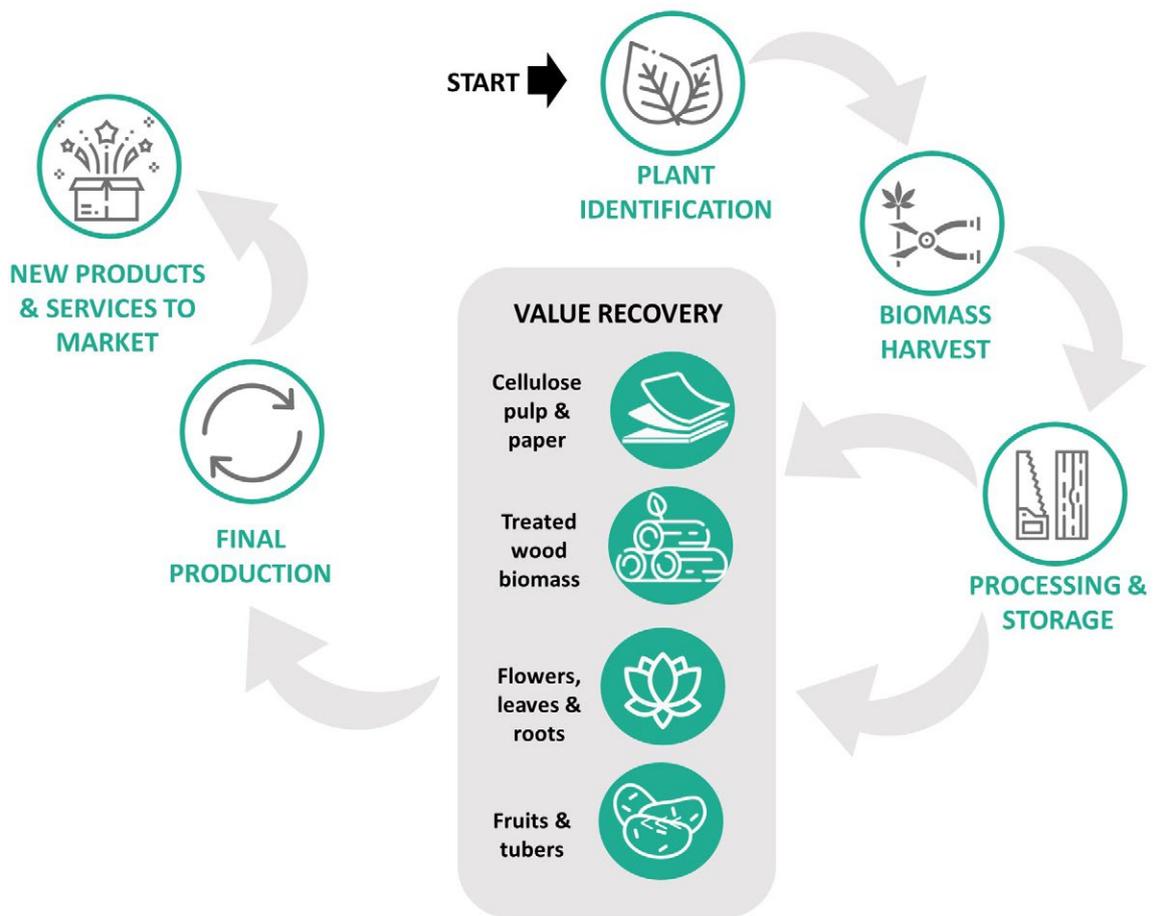


Figure 1: APPLAUSE circular model

JP VOKA SNAGA, Ljubljana’s water and waste management public company, is responsible for the development of APPLAUSE circular business model. During the last 6 months, the partner has been mapping all processes necessary to operate this circular model. These are summarised in the following table:

**Table1: Mapping of all processes taking place in the APPLAUSE circular model**

Plant identification		<ul style="list-style-type: none"> <li>• Visual on-site detection via fieldwork performed by botanists.</li> <li>• Analysis from orthophotos and data from satellites to identify potential locations</li> </ul>
Biomass harvest		<ul style="list-style-type: none"> <li>• Removal of the IAPS according to seasonal patterns and orders made by producers.</li> <li>• Transportation to storage.</li> </ul>
Processing & storage		<ul style="list-style-type: none"> <li>• Cutting of wood materials and storage in dry area.</li> <li>• Storage of herbaceous plants under optimal conditions.</li> </ul>
Value recovery	Cellulose pulp & paper	<ul style="list-style-type: none"> <li>• Selection of wood biomass and green plants, transportation.</li> <li>• Properties' analysis.</li> <li>• Cooking of the biomass (delignification).</li> <li>• <b>RECOVERED RESOURCE: IAPS cellulose paper pulp.</b></li> <li>• <b>BY-PRODUCT: waste from delignification process (black liquor) can also be recovered and treated to extract organic aroma compounds (e.g. vanillin).</b></li> </ul>
	Wood biomass	<ul style="list-style-type: none"> <li>• Selection of wood biomass.</li> <li>• Cutting and properties' analysis.</li> <li>• Drying and thermal treatment.</li> <li>• <b>RECOVERED RESOURCE: Treated IAPS wood.</b></li> <li>• <b>BY-PRODUCTS:</b> <ul style="list-style-type: none"> <li>○ <b>Solid wood residues can be recovered and treated to be used as compost, wood chips, biopolymers (PHA) or aromas.</b></li> <li>○ <b>Liquefied wood residues can be recovered in the form of coatings, adhesives and foams.</b></li> </ul> </li> </ul>
	Flowers, leaves & roots	<ul style="list-style-type: none"> <li>• Manual collection of flowers, leaves and roots from herbaceous plants.</li> <li>• Drying.</li> <li>• Chemical analysis and treatment.</li> <li>• <b>RECOVERED RESOURCE: dried flowers and flower extracts; homemade preparations for pest control; and dyes for textiles.</b></li> </ul>
	Fruits & tubers	<ul style="list-style-type: none"> <li>• Manual collection of fruits and tubers.</li> <li>• Sorting, washing and drying.</li> <li>• <b>RECOVERED RESOURCE: Edible fruits and tubers.</b></li> </ul>
Final production	Cellulose pulp & paper	<ul style="list-style-type: none"> <li>• Production of <b>machine-made paper</b> for commercial use.</li> <li>• Production of <b>craft-made paper products</b>.</li> <li>• Organisation of handcraft paper-making workshops targeted to citizens, school children, seniors...</li> </ul>
	Wood biomass	<ul style="list-style-type: none"> <li>• Production of <b>wood products</b> including wood letters for traditional printing techniques, DIY products, furniture...</li> <li>• Organisation of <b>woodworking workshops</b> targeted to citizens, students...</li> </ul>
	Flowers, leaves & roots	<ul style="list-style-type: none"> <li>• Extracts can be used to produce sustainable <b>dyes</b> for textile printing, paper printing and coatings.</li> <li>• Flowers are also being tested for their use as <b>organic home-made formulations against pests</b> (as a replacement to pesticides).</li> </ul>
	Fruits & tubers	<ul style="list-style-type: none"> <li>• Food products can be used as <b>ingredients</b> for home meals.</li> </ul>

The primary recovered resources are IAPS cellulose paper pulp, treated wood, dried flowers, flower extracts and edible fruits and tubers. However, several by-products can also be recovered. In that way, APPLAUSE circular model closes the entire loop of material flows by testing potential new uses for waste residues from paper pulp and wood production. These tests involve complex biotechnological processes to extract natural polymers that can be used as sustainable substrates for industry applications (coatings, adhesives, foams...).

Also, one of the partners, Jozef Stefan Institute, is obtaining bacteria associated with the IAPS, which are capable of degrading and modifying lignin from the biomass. These bacterial isolates are being further tested in a new way of extracting the lignin and obtaining delignified pulp. This process has at least two effects on the development of a greener pulp production process compare to the conventional delignification process: (i) preparing pulp at room temperature (achieving low energy

consumption), without using toxic chemicals nor producing toxic wastes or (ii) in combination with the conventional pulping procedures it can lower the energy consumption rate according to the lower lignin content of the biomass entering the conventional process. In addition, the residues of the lignin produced in a biotechnological process can be used directly as source of aromatic compounds, which are currently obtained from the oil industry.

A key characteristic of APPLAUSE circular model is that is not meant to achieve high production throughput. The objective is to remain lower-scale while guaranteeing, at the same time, its sustainability from a financial, social and environmental point of view. The following table provides an overview of APPLAUSE business model as it touches on three main elements: What value is provided? (**Value proposition**); how the value is provided? (**Value creation**); and how does it make financial, social and environmental gains? (**Value capture**):

**TABLE 2: Value proposition, creation and capture in APPLAUSE circular business model**

<b>APPLAUSE business model</b>		
<b>Value proposition</b>	<b>Value creation</b>	<b>Value capture</b>
<i>What value is provided?</i>	<i>How value is provided?</i>	<i>How does it make financial, social and environmental gains?</i>
<ul style="list-style-type: none"> <li>• Helps to solve the IAPS problem in Ljubljana by transforming a harmful waste into something useful.</li> <li>• Promotes a green, circular story about paper and wood production.</li> <li>• Educates and empowers citizens in taking care of their local environment.</li> <li>• Revives craft traditions and sustainable design.</li> <li>• Promotes DIY (Do it yourself) culture and responsible consumption.</li> <li>• Provides sustainable materials for industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Paper and wood products with intrinsic circular value which at the same time are attractive, functional and unique.</li> <li>• Products, guidelines and events that encourage citizens' participation (DIY products, catalogues, harvesting days...).</li> <li>• Hands-on workshops for handcraft paper making, wood making and wood letters printing.</li> <li>• New scientific methods for developing sustainable materials for industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Sale/leasing of paper and wood products to locals and tourists.</li> <li>• Supervised activities at the handcraft paper and woodworking workshops.</li> <li>• Support from alliances and sponsorships.</li> <li>• Job creation (workshops).</li> <li>• Active engagement of citizens in green activities.</li> <li>• Contributes to Ljubljana's vision on zero waste.</li> <li>• Preservation of cultural heritage practices.</li> <li>• Valorisation (patents) of new biotechnological processes.</li> </ul>

Another defining factor of APPLAUSE's circular model is that it relies on synergetic cooperation, since not one single partner creates value autonomously. This is a typical characteristic of circular models, which require close collaboration

between suppliers, partners, and customers. APPLAUSE has achieved that by establishing clear agreements and building mutual trust among partners and collaborators.

## TAKE AWAY POINT

### → the value lies in APPLAUSE story

Understanding the value created and getting it right is possibly one of the most difficult parts of a business development process. In APPLAUSE the value lies in APPAUSE's story. A story that bridges ecology (effectively removing IAPS), community (through the involvement of citizens), culture (reviving old craft traditions) and economy (locally producing new circular products out of waste) in an innovative and collaboratively way. Such story needs to be present all along the process, from harvest to the delivery and marketing of products and services to end-users.

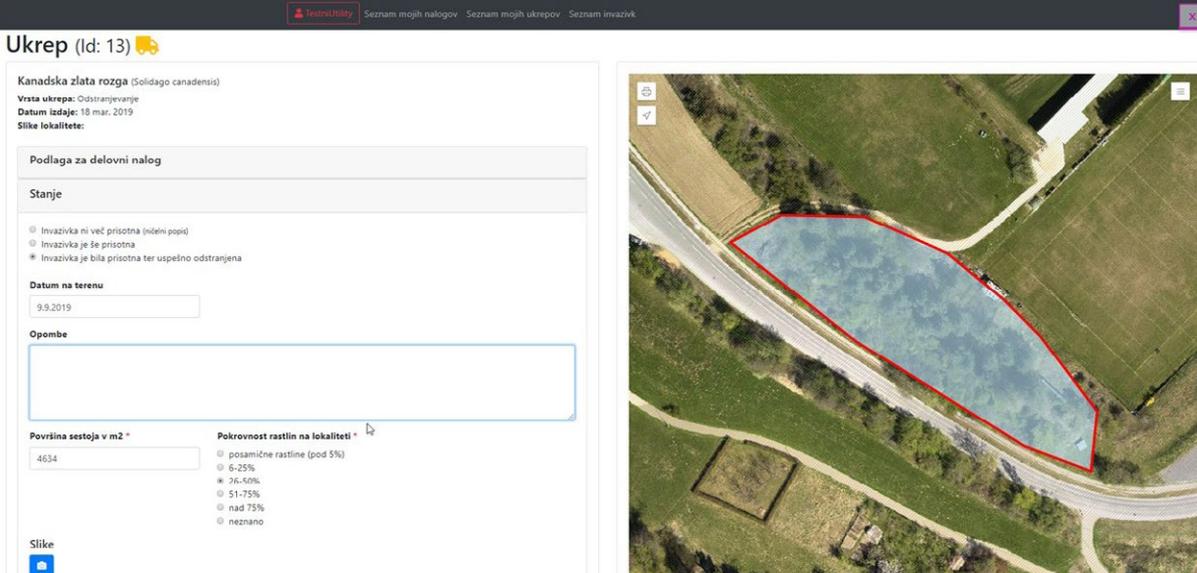
## 3.2 Testing a new digital platform that supports plant identification and harvest

Lately, botanists and green area management employees from the City of Ljubljana have gotten themselves familiarised with new digital tools that support their IAPS tracking efforts. The new platform, developed by the software development company GDi, partner of APPLAUSE, builds on standard asset management procedures supported by geo-localisation systems. Composed of several modules (for fieldworkers, for expert botanists and for coordinators), the platform provides an end-to-end solution for the management of IAPS in the city's green areas.

The team is finishing a lifelong monitoring of IAPS present in the fields thanks to an online survey that field operators and botanists complete each time they are out in the field. Based on this information (IAPS supply) and the quantities of biomass from specific species requested by

partners (IAPS demand), the coordinator and green area managers decide on the most suitable location for specific harvesting actions. The platform also allows them to plan a work order (assign a person responsible, set up a schedule, get a notification when the order has been completed) and get high-level statistics. All in all, this process which previously would have been done on paper and Excel, allows the City of Ljubljana to take better and quicker decision. Making such processes as efficient as possible is crucial for the viability of the circular business model.

GDi is also working on an additional software module consisting of a new App aimed at the general public, that uses Artificial Intelligence to help citizens to identify IAPS by simply using the camera on their mobile phones. The official release of this App is planned for spring 2020.



The screenshot displays a web-based survey form for reporting an IAPS sighting. The form is titled "Ukrep (Id: 13)" and includes the following fields and options:

- Kanadska zlata rozga (Solidago canadensis)**
- Vrsta ukrepa:** Odstranjevanje
- Datum izdaje:** 18. mar. 2019
- Slike lokalitete:** (Image upload area)
- Podlaga za delovni nalog**
- Stanje**
  - Invazivka ni več prisotna (indeni popisi)
  - Invazivka je še prisotna
  - Invazivka je bila prisotna ter uspešno odstranjena
- Datum na terenu**
  - 9.9.2019
- Opombe**
  - (Text input area)
- Površina sestaja v m<sup>2</sup>**
  - 4634
- Pokrovnost rastlin na lokaliteti**
  - posamične rastline (pod 5%)
  - 6-25%
  - 26-50%
  - 51-75%
  - nad 75%
  - neznano
- Slike**
  - (Image upload icon)

On the right side of the form, there is an aerial satellite map showing a red polygon outlining a specific area in a green field, representing the location of the IAPS sighting.

Screenshot of the online survey that field operators and botanists complete when they locate an area with presence of IAPS.  
Credits: GDi

Delovni nalog (Id: 17)

Datum naročila: 10.9.2019

Številka naloga: 2019/1

Opis: Jesensko odstranjevanje invazivk

Dodeljeni uporabniki:

- Applause4 Snaga (Zunanji izvajalec)
- TestniUtility - (Zunanji izvajalec)

Ukrepi na nalogu (5)

Loc	#	Status	Datum	Rast. vrsta	Površina	Vrsta ukrepa	Opombe
38404	78		9 sep. 2019 9 okt. 2019	Vejičati rogovilčaki (Galevsoga cilata)	341m <sup>2</sup>	Odstranjevanje	
12804	79		9 sep. 2019 9 okt. 2019	Kanadska zlata rozga (Solidago canadensis)	3049m <sup>2</sup> 51-75% (1500,87m <sup>2</sup> )	Odstranjevanje izkopavanje celih rastlin in ruvanje kaic	Rastline zbrati za delavnico barvil
26017	80		9 sep. 2019 9 okt. 2019	Kanadska zlata rozga (Solidago canadensis)	16019m <sup>2</sup> 6-25% (2452,945m <sup>2</sup> )	Odstranjevanje izkopavanje celih rastlin in ruvanje kaic	Rastline zbrati za delavnico barvil
12011	81		9 sep. 2019 9 okt. 2019	Čelki dresnik (Filipia x bohemica)	216m <sup>2</sup> nad 75% (159,02m <sup>2</sup> )	Odstranjevanje izkopavanje celih rastlin	
12403	82		9 sep. 2019	Čelki dresnik	9m <sup>2</sup>	Odstranjevanje	



Screenshot of the work orders module that is used to plan and arrange a harvesting action.  
Credits: GDI

### 3.3 The handcraft paper-making workshop is in operation

These past 6 months have also seen the inauguration and ramp up of activities at the handcraft paper-making workshop. This workshop is a place of vital importance for APPLAUSE circular model. Situated within the premises of a household recycling centre in a central location of Ljubljana, the workshop is where one of the primary recovered materials (IAPS cellulose paper pulp) is given a new use, by transforming it into handcrafted paper products. The workshop is primarily used to deliver supervised educational activities to school children as well as citizens willing to learn about IAPS and traditional paper-making. However, it is also a place where product developers can have access to machinery and raw material to design, prototype and produce new IAPS-based circular paper products.

Till October 2019, 15 activities have taken place at the working with the participation of 300 citizens. In May 2019, during the Green Week events, the City of Ljubljana together with JP VOKA SNAGA organised an open day where curious citizens

could come to the workshop, make their own handcraft paper, print on them using dyes made of IAPS, and visit a small exhibition of IAPS-based paper and wood finished products.

One of the main challenges overcome during the construction of the workshop has been sourcing the right equipment. Paper-making is currently done at industrial level, producing large quantities at high speed. However, APPLAUSE workshop produces paper in a much more artisanal way and the required machinery cannot simply be purchased from a regular retailer. Luckily, the right machinery was found in a warehouse of a local paper-making factory. It was not in use since it has been replaced by new equipment years ago. JP VOKA SNAGA acquired the machinery and after reconditioning, it was put into work at the workshop. A former employee from the paper factory, now retired, has helped in the installation of the machinery at the workshop and trained the young staff on how to operate it.



Papermaking demo at APPLAUSE workshop. Credits: Jorgina Cuixart



Moulds and other utensils used to make paper. Credits: Simona Berden

## TAKE AWAY POINT

### → Becoming more circular by extending the lifetime of old, unused machinery while transferring valuable knowledge to new generations

Even if it was not intentionally planned, the sourcing of equipment for the workshop has led to the implementation of yet another circular approach in APPLAUSE. Old, currently disused machinery that eventually would have been dismantled, has been reconditioned and put to work. At the same time, a former employee from the paper factory who used to operate this equipment was able to transfer his knowledge on papermaking to younger generations. Reviving craft traditions is part of the value brought by APPLAUSE. This value is also noticeable during the educational activities for children. Pupils not only learn about IAPS but also about how regular things such as paper are made. They certainly enjoy getting their hands dirty, but these papermaking activities are also a chance for children to learn to appreciate the things that surround us, fostering a more responsible consumption.

## 3.4 Assessing the willingness-to-pay for the new circular products

Earlier this year, partners came up with more than 20 different product ideas that could be developed using the recovered resource, in particular the cellulose paper pulp and wood biomass from IAPS. These products, which were aimed at locals, families, schools and tourists, ranged from paper bags for organic waste collections, to DIY insect huts and birdhouses, educational games or puzzles.

A key aspect to assess during the project implementation phase of APPLAUSE is the

economic viability of the circular business model and whether these new products made of IAPS are attractive to the intended end-users. To do so, in the past few months, a survey has been conducted to verify the market acceptance and also get an indication of the pricing ranges.

Conducted between March and April 2019, the following table shows the level of responses obtained for each target group:

Target group	N. respondents	Method used
Schools	17	Online questionnaire
Residents	333	Online questionnaire
Families	68	Online questionnaire and paper-based questionnaire
Tourists	140	Paper-based questionnaire

Table 3: Results of the willingness-to-pay survey

The main focus of the survey was to investigate the relation of the target audiences towards DIY products, their level of environmental awareness, their purchasing interest and the marketing and sales potential of selected products. Some of the questions asked for a specific product were:

- *Do you find this product (description and symbolic image or photo presented with this question) or service useless /useful, do you need it /do not need it, like/dislike, find it boring/interesting, practical / impractical, ...?*
- *What is the likelihood of purchasing this product or service? rating from 1 (very unlikely) to 5 (highly likely)*
- *Up to how much would you be willing to pay for a selected product or service?*

Some high level findings of this analysis were:

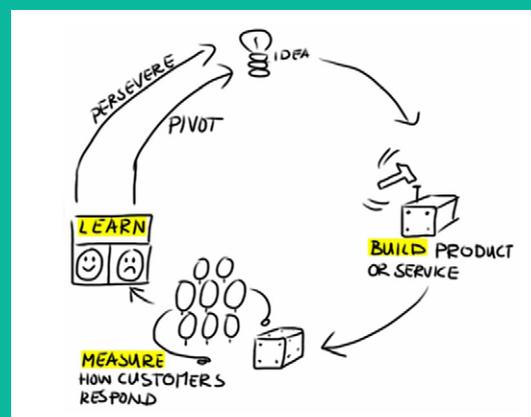
- Schools expressed much interest in the supervised workshop activities.

- Tourists preferred item was the bag holders, families favoured the DIY insect-house, bird-house or hedgehog-house and locals liked the organic paper product basket for bio waste.
- The majority of respondents indicated that the products were needed and useful, although a lower percentage expressed interest in purchasing them.
- There were large differences between the prices quoted by customers as acceptable and their own proposed prices which tended to be lower.
- Overall, organic paper basket for bio waste had the highest market potential. Fruit and herb dryer, home composting set, wooden cutting boards, the board game “Invasive Search in Ljubljana”, and wooden Christmas trees with paper ornaments also had a relatively significant market potential.

## TAKE AWAY POINT

### → Build, measure and learn, the 3 steps for successful new businesses and products

These three steps are the pillars of the lean start-up, a methodology broadly used in business development. It consists in generating a minimum viable product (MVP) that is built from the iteration with the market itself. The APPLAUSE survey has been used to test the MVPs of the different products with potential customers. It has measured their reaction and interest, and based on that, initial ideas are being re-assessed, iterated and some simply discarded. These three steps need to be repeated along the process to ensure APPLAUSE delivers what the market wants.



Lean-start-up methodology. Source: <https://newentrepreneurship.nl>

Finally, when taking into account the costs of recovering IAPS, processing the biomass and transforming it into products, the APPLAUSE consortium has realized that the price of APPLAUSE's finished products will most probably be higher than similar products made of regular paper or wood. This is not uncommon in some circular business models (clothes made of recycled fabrics, modular high quality furniture, etc.). In these cases, companies need to assess

whether all customers or a specific segment will pay premium prices for environmentally superior products or services such as theirs. Also, once the product is out in the market, it is important to inform target customers about the originality and added-value of the products so that they are prepared to pay a higher price. Keeping that in mind is essential for the continuous development of APPLAUSE's circular business model.

## 4. SUMMARY ON IMPLEMENTATION CHALLENGES

The different projects within the Urban Innovative Actions programme face similar implementation challenges. These have been grouped in seven thematic areas. The following table provides an overview of how these challenges are impacting the APPLAUSE project (**red**: high importance,

**yellow**: medium importance and **green**: low importance). Arrows indicate if they have raised in importance (↑), lowered in importance (↓), or remained the same (↔) compared to the previous journal.

Challenge	Level	Observations
Leadership for implementation	<b>High</b> ↔	This continues to be an issue of high importance especially now that the project is heading towards the last year of implementation. Priorities from partners have evolved since the start of the project and the priority of the City of Ljubljana is now to gauge partners' interest in the post-project phase and direct efforts towards a strategy that ensures that the circular model can be continued once the project has finished. Such leadership is sustained by having the Vice Mayor as chair of the project's steering committee.
Public procurement	<b>Low</b> ↓	Most of the procurement foreseen in the project has been done, the most difficult part being the sourcing and conditioning of the old equipment for the papermaking workshop that is now in place.
Integrated cross-departmental working	<b>Low</b> ↔	As mentioned in previous journals, Ljubljana's long tradition in cross-departmental working ensures a smooth collaboration with departments not directly involved in the project. This cooperation is particularly visible with the educational department who has helped in engaging schools and kindergartens, as well as other transversal departments (communications office, the IT department, the legal department, finance department) who provide regular support to the APPLAUSE management team.

Adopting a participative approach	<p><b>High</b></p> <p>↔</p>	<p>The City of Ljubljana is realising that getting citizens involved is challenging, especially in the harvesting campaigns. People already participate in other city-sponsored events (neighbourhood day) and some are worried about doing heavy lifting during harvesting. Because of that, the City is focusing more on high school students and university students from natural science fields who are more motivated for these type of activities. Some corporates have also shown interest in participating in these campaigns for teambuilding purposes.</p>
Monitoring and evaluation	<p><b>Medium</b></p> <p>↔</p>	<p>As demonstrated in section 3.1, implementing a circular model for IAPS is a complex issue. It requires the collaboration of multiple actors in the supply chain, generates varied recovered resources and by-products and activities of different nature (from operational harvesting to prototyping of products, citizens' engagement or scientific research on new biopolymers). Due to very diverse partnership and complexity of the project, the City of Ljubljana, responsible for monitoring and evaluation, has realised it requires support to better address all these complexities within the evaluation framework of the project. An external consultant will help to encompass project indicators and test trust and collaboration within the partnership. The latter is very important because many of the project partners will continue to collaborate after the end of the project and will be part of the core structure of the new business model.</p>
Communicating with the target beneficiaries	<p><b>High</b></p> <p>↔</p>	<p>Communicating with citizens continues to be an issue of high priority. The use of existing communication channels of the City of Ljubljana (Website, YouTube, Facebook, Instagram) works well among the general public. The project communication strategy also foresees working with local NGOs and community groups who then act as channels to further mobilise citizens. In the project APPLAUSE, 60 voluntary actions are foreseen. So far, only 19 have been carried out. The three main challenges are: motivating the citizens to devote their free time to working activities, providing a large enough group of volunteers and planning days with suitable weather. Some senior citizens with physical disabilities have proved to be less motivated to gain knowledge on how to remove invasive plants. Working with these groups requires a more personal approach.</p>
Upscaling	<p><b>High</b></p> <p>↑</p>	<p>As mentioned in the first implementation challenge, the project has only one year left, so the upscaling or, in the case of APPLAUSE the self-sufficiency of the IAPS circular model in the future, is raising on importance. The City of Ljubljana is working on an action plan that includes, among other issues, developing a post-project partners' agreement, identifying the minimum products and services that make the business model viable and developing an internal and external marketing strategy.</p>

## 5. CONCLUSION

The activities that have taken place in the past six months demonstrate that the APPLAUSE project is reaching a maturity state. The focus is still in implementing all the activities that are planned (plant detection and harvesting, citizens' engagement activities, development of final products, the App for citizens...). These are all up and running and continuously being improved thanks to the experience gained. However, the attention is starting to shift towards evaluating the viability of the circular model itself in practical terms.

Compared to a traditional business model, where economic gains are prime, circular business models also deliver environmental and social gains. Another primary difference is that circular models require much closer collaboration and trust with suppliers, partners and customers. As it has been demonstrated in this journal, APPLAUSE circular model already encompasses both aspects which is a great success so far.

In the next few months, APPLAUSE partners will further examine the viability of its circular model in order to plan for its long-term sustainability. In addition, readers of the next journal will expect to learn about:

- The second edition of the IAPS festival
- The next rounds of harvesting campaigns
- The inauguration and operation of the woodworking workshop
- The continuous development and market testing of IAPS-based products
- The release of the DIY handbook, DIY videos on paper and wood products and 3D models for 15 IAPS
- The recovery of culture heritage on the production of wood type for relief printing, supported by a fully equipped workshop (including some rare machines).

Urban Innovative Actions (UIA) is an Initiative of the European Union that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020.

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