Technical interoperability and integration final

Decentralised Citizens ENgagement Technologies

Specific Targeted Research Project Collective Awareness Platforms

d-cent

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D-CENT
Decentralised Citizens
ENgagement Technologies

Lead beneficiary: ThoughtWorks

D5.7 Technical interoperability and integration final

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D-CENT

Decentralised Citizens ENgagement Technologies

Specific Targeted Research Project

Collective Awareness Platforms

D5.7 Technical interoperability and integration final

Version Number: V1
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Dissemination level:		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Approved by: Francesca Bria

Date: 31 May 2016

This report is currently awaiting approval from the EC and cannot be not considered to be a final version.

Contents

1. Executive Summary

When assessing what work to undergo at ThoughtWorks in the final stages of our project, we considered our user feedback, integration goals and the future sustainability of the tools.

We ran a usability testing session for Objective8, Mooncake and Stonecutter with technical and non-technical people working at ThoughtWorks and received useful feedback that helped guide our work. This included discovering any missing translations, unclear text, or confusing journeys. This drove out further work to improve our registration journey.

After feedback from potential pilots we discovered useful features that better accommodate the needs of a wider range of projects. We added customisation to Objective8, so that pilots could brand the tool themselves. We added a feature in Objective8 to have promoted objectives so administrators could highlight popular objectives and any they wanted to promote themselves. Another configuration option is to allow Objective8 to only accept trusted users from Stonecutter and to keep the information in Objective8 private to only those with access. This is useful for when an organisation wants to provide internal openness and transparency but might be dealing with sensitive information that should only be shared with approved users.

The sustainability of the tools beyond the end of the project has been an important consideration when planning our work. To improve the speed and simplicity of deployment we have used Docker [1], a tool that allows you to package an application with all of its dependencies into a standardized unit for deployment. We have also improved our documentation for running the app on a workstation to enable easier development and therefore encourage open source contributions.

We have helped out our pilots with deploying their applications, and this in turn provided us with very useful feedback on the difficulties people were facing with the deployment process and documentation. We have spent time improving our documentation and process accordingly.

We have investigated the accessibility of our apps and improved the journey for Stonecutter and Objective8 ahead of the launch of our pilots. We used the Web Content Accessibility Guidelines [2] for this.

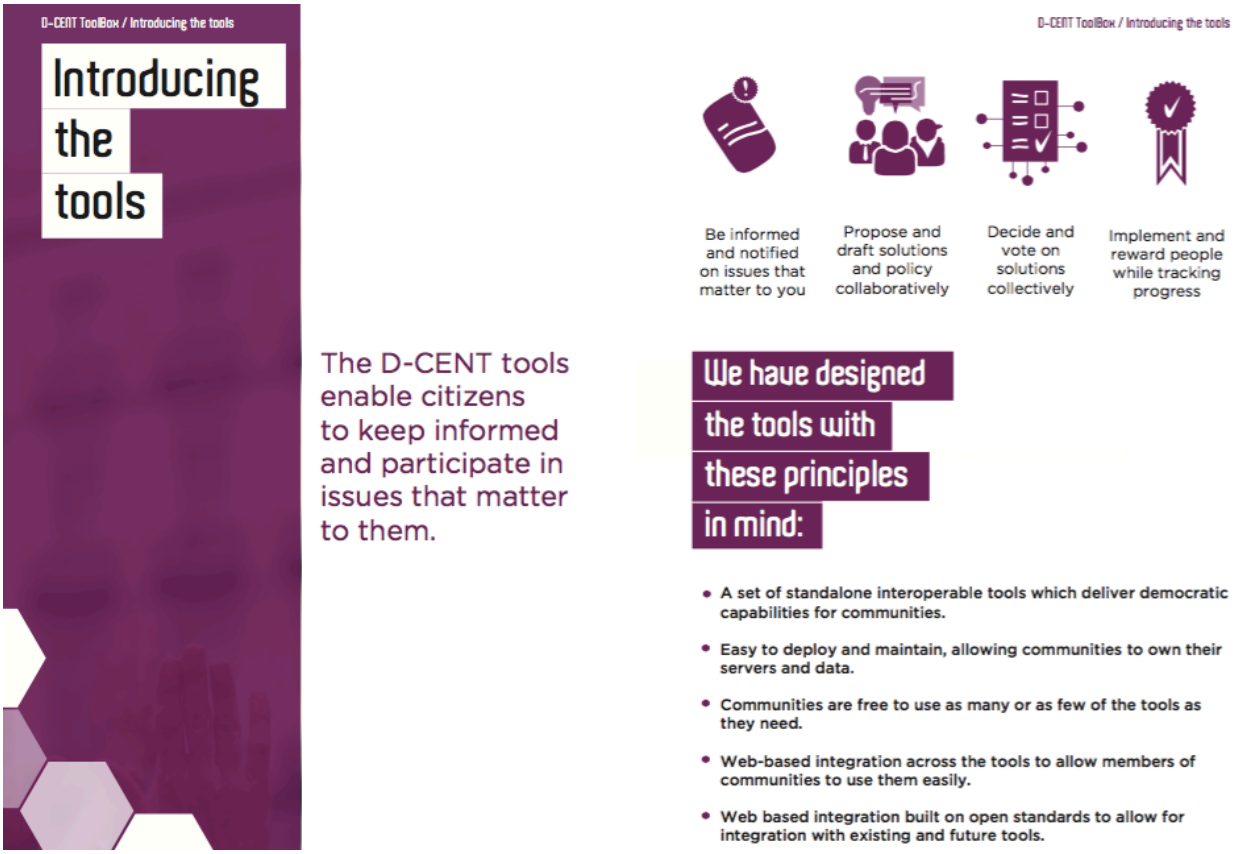
Mooncake, Objective8 and Stonecutter had all been built using open standards in a modular fashion for ease of interoperability. By adding these open standards to Freecoin for D5.7 we have enabled integration with Mooncake and Stonecutter and added Freecoin to the suite of modular tools.

Consul is the software in which the participatory platforms of Madrid (decide.madrid.es) and Barcelona (decidim.barcelona) are based. It is free software and licensed under a Affero GPL3 license. The platforms host several participatory processes and mechanisms as citizen proposals and debates, participatory budget or urbanism processes (Madrid) or strategic planification and collaborative legislation (Barcelona).

Your Priorities is a citizen participation social network application developed by the Citizens Foundation in Iceland. It has been in development since 2008 and with support from D-CENT since 2014. It has been used by over 650.000 people and is currently being used by pilot projects in Iceland, Scotland, Hungary, Croatia and Slovenia. Its main function is to help citizens organize around ideas and have their voice heard with government.

1.1 Tools

All the software developed under the D-CENT umbrella is open-source. The code is developed under version-control using Git[3], and hosted on the GitHub[4] site. Details of each code repository are listed below.



Fig, I DCENT ToolBox

Objective8 is a policy drafting tool that allows organisations to work with their members to produce crowd sourced policy/manifestos. It was developed as part of T5.1 and documented in deliverable D5.3.
Live Demo: https://objective8.dcentproject.eu/
Open Source Code: https://github.com/d-cent/objective8

Stonecutter is a privacy aware single sign on tool that also provides federated user management for organisations. It was developed as part of T5.1 and documented in deliverable D5.4.
Live Demo: https://sso.dcentproject.eu/
Open Source Code: https://github.com/d-cent/stonecutter

Mooncake is a notifications tool that securely notifies your members of events/activity in your D-CENT ecosystem. It was developed as part of T5.1 and documented in deliverable D5.6.
Live Demo: https://mooncake.dcentproject.eu/
Open Source Code: https://github.com/d-cent/mooncake

Coracle is a notifications server which stores activities. It presents the activity stream at an endpoint for other applications to access.
Open Source Code: https://github.com/d-cent/coracle

Freecoin is a toolkit to let people run reward, remuneration and incentive schemes that are contextually transparent and can be inscribed in different blockchain backends. Freecoin is made for participatory and democratic organisations who want to incentivise transparency and management agility.
Open Source Code: https://github.com/d-cent/freecoin

Helsinki Decisions is a notification service that lets citizens sign up to receive information on municipal decisions of interest to them.
Website: https://github.com/okffi/decisions
Open Source Code: https://github.com/d-cent/decisionsproto

Consul is an e-government and e-participation digital platform that allows citizens to be an active part of the city government by offering them different kinds of participatory mechanisms for direct democracy, deliberation and other collaborative political practices.
Website (Decidim.Barcelona): https://decidim.barcelona/
Website (Decide Madrid): https://decide.madrid.es/
Open Source Code: https://github.com/consul/consul

Your Priorities is an open source citizen participation social network application.
Website: https://www.yrpri.org/
Open Source Code: https://github.com/rbjarnason/your-priorities-app

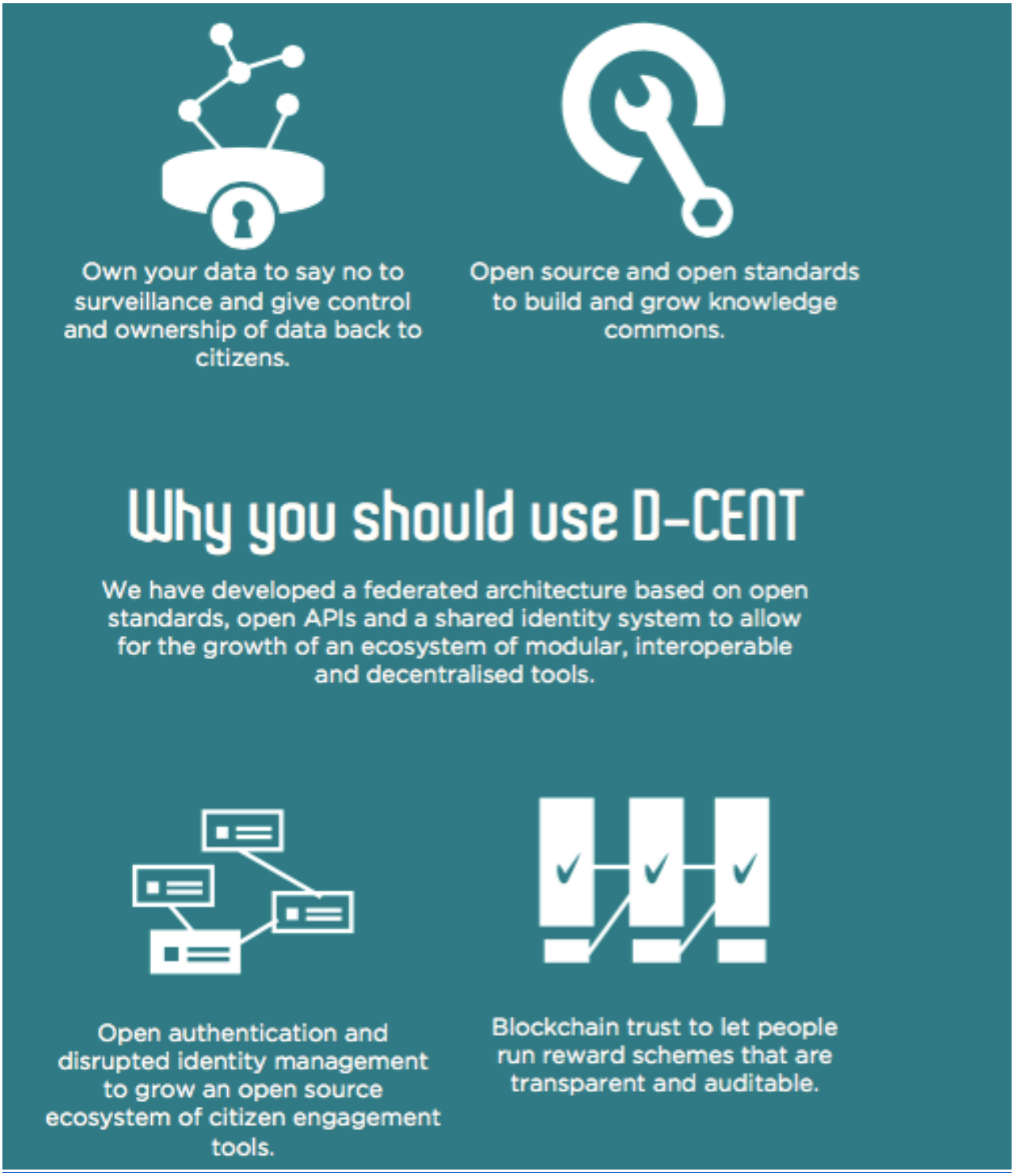


Fig.2 D-CENT ToolBox

2. The Tools in Depth

2.1 Objective8, Stonecutter & Mooncake

Objective8 is a software application that aims to encourage collaboration between members of a community in writing policy documents (policies, manifesto pages, election promises, etc.) in an open, collaborative and transparent way. Traditionally policy documents have been written by a single person or small team, and only distributed once complete. Objective8 has been designed to help organisations and political parties create policy in a more open, transparent and collaborative way. It allows a wider community to shape and inform the policy drafts. In order to reach a large number of users the tool has been designed to be compatible with existing social media (e.g. Twitter, Facebook, Reddit).

The tool allows members of a community to review, comment and annotate drafts of a policy. The feedback provided by the community is then made accessible to the policy writers so that it can be assessed and included in the next version of the draft. Members are also able to become policy writers themselves if they choose to.

Through the tool, users can gather community opinion, generate ideas, share, discuss, vote and collaborate with experts to draft the new policy. This could include specific policies, manifesto pages, election promises, etc. The policy writers are able to view an aggregation of their feedback for all their objectives on a dashboard.

Stonecutter is a secure single sign-on (SSO) tool, which aims to keep users' security and privacy as its guiding principle. It was designed to be easily deployed by democratic organisations, to provide a secure SSO service for their users. This SSO service can be easily integrated with other tools hosted by these organisations by the use of the Open Standard OpenID Connect.

The use of a consistent protocol implementation (OAuth2) allows organisations to share their userbases with other organisations if they register as a client application to the OAuth2 instance belonging to that organisation.

Mooncake is a notifications tool that can be added to an existing ecosystem so that users can stay up to date with multiple other applications through a single interface. These activities could include actions such as transactions, in the case of Freecoin, or newly created obejctives, in the case of Objective8.

We have been working with W3C to develop the open standard Activity Streams 2.0 (AS2) so Mooncake can be configured to consume data in this format. The Mooncake feed updates as new data is published so that users are aware of any activity in their network. This network can consist of multiple apps, including both those within the D-CENT ecosystem and additional custom tools, provided they publish data in the same format. Objective8 and Freecoin publish AS2 streams that can be consumed by Mooncake.

2.2 Freecoin

Freecoin is a software codebase to operate Trust Management Systems among individuals and organizations. When systems users are humans, Trust Management is an area of information technology that aims to improve the operation of open, distributed systems by predicting or influencing the behavior of their users. When applied to human users, Trust Management methods attempt to leverage the human capacity for trust or dis-trust (Wierzibiki 2010). With the expansion of the digital domain and its security issues, to manage trust in a transparent fashion is a social, economic and political need that nowadays is becoming more important to address for a correct and appropriate functioning of communities and organizations. With Freecoin, communities can run decentralized incentive and reward structures to self-manage their trust relationships across time and space in a shared environment in terms of tolerance to risk. Indeed, Freecoin allows to put RESTful APIs in communication with distributed ledgers. Based on Bitcoin Core, Freecoin allows to approach the distributed ledger technology in a malleable and flexible way, as it bridges UI with distributed ledgers in ways that can be tailor made for members needs.

By building on the innovative notion of Social Proof of Work, i.e. the proof that a member in a community or organization is endowed with coins as a reward to an action in the real world while abiding to community rules and enhancing collective values. With Freecoin, the Social Proof of Work will be tailor- made and agreed upon by the community of users of the crypto-currency. For instance, in Spain POW will be in the form of a Proof-of-Business as concrete economic transactions in a B2B context. In Iceland, the POW will be a Proof-of-Political-Participation as online engagement to reward users on the Your Priorities platform, while in Finland it will be the proof that somebody performed cooperative work and had honestly remunerated themselves for that, i.e. a Proof-of-Contribution.

All Social Proofs of Work can be a variation of a similar, or at least compatible, Smart Contract, i.e. a piece of software that can encode actions to perform in order to execute a transaction and broadcast it on a distributed ledger. In this case, a transaction can be a virtual currency transfer (crypto-coin broadcasting), the exchange of tokens for voting purposes, or more in general the transparent and accessible storage of decisions made in a datum context be it social, political or economic/financial.

The outcome of this shift in design is twofold: (1) communities and organizations can engage in transactions that have real world desirable impact that they produce and collectively construct, in that Freecoin allows to store the dynamics of human friendly incentive structures on a shared locus, i.e. the distributed ledger indeed; (2) it is possible to go towards self-managed decentralized trust management systems with desirable consequences for credit risk management practices. In this way, new participants can enjoy an egalitarian economic environment by avoiding the undesirable condition of structural advantage by early adopters of a transaction system, be it for currency or for value exchange of digital assets more in general. At the same time this allows to have complete democratic oversight on transaction history and collective deliberation on social currency systems', i.e. the rules of engagement and reward as a function of reputation management. By expanding the possibilities that the novel notion of Social Proof of Work opens, Freecoin is framed in such a way that it therefore bridges community or organization's dynamics with the distributed ledger architecture. The software Freecoin aims to be an open-source, non-proprietary, customizable, translatable, appropriable layer for the human interaction

with value transactions. The complete transparency on a community scale, as a private ledger, can validate certain transactions also on global distributed ledgers backends, or peer to peer networks running smart contracts. The FXC protocol is proposed also to enhance the privacy, security and maintainability for users using secret sharing techniques.

With a simple secret sharing based on number series resembling phone numbers, Freecoin enables extreme flexibility in the individual and collective management and broadcasting of value exchange: 'value' in this case can be economic (broadcasting transactions), social (as a vehicle that allows to manage decisions inside a community and store them on a shared database) or still political (for example, voting and polls). In D-CENT, quite diverse needs have been expressed in three different designs and implementations scenarios derived from participatory and emphatic co-design with communities in Iceland, Spain and Finland. From rewarding political participation, to the creation of mutual credit circuits, to the simpler, but not less important, remuneration for work performed inside a (local) economic circuit, Freecoin's design has been conceived as an MVP informed by narratives aiming at harmonizing human relations in political, economic and social contexts.

For instance, Freecoin is a qualitatively different approach compared to the global rhetoric of security industry to fighting corruption. Freecoin is conceived as a very simple toolkit, a wifi pod, a website on a gadget that can serve a transparent and horizontal network of value exchanges. Such exchanges are documented and totally transparent for all participants. A sum of all operations can then be communicated to global ledgers, still keeping the anonymity of the participants. Globally distributed ledgers may then be accessible for openness and transparency to other interested parties, shareholders, stakeholders and the public.

2.3 Helsinki Decisions

The internationally unique data opened by the City of Helsinki is an interesting testing ground for new citizen engagement tools. Although the data is public, to date there are no user-oriented and citizen-managed services that allow people to make use (be informed/notified and to react to) the decision data.

This allows us to build and test prototypes and services that close the loop; the city creates and provides data => the citizens consume and react to the data => the city reacts to the citizens' feedback.

The prototyping has been well-timed as the Six City Strategy (http://6aika.fi/in-english/) is gearing up to expand the lessons learned to the other big cities in Finland. The Six City Strategy is an Open and Smart Services strategy for sustainable urban development carried out by the six largest cities in Finland: Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu. The strategy will be carried out between 2014 and 2020 and is funded by the EU with up to 80 million euros.

The decisions data API is one of the five API's that will be synchronized across the six cities. The D-CENT Decisions prototype and the user research carried out during the project will help make sure that the tools will benefit citizens in all the cities.

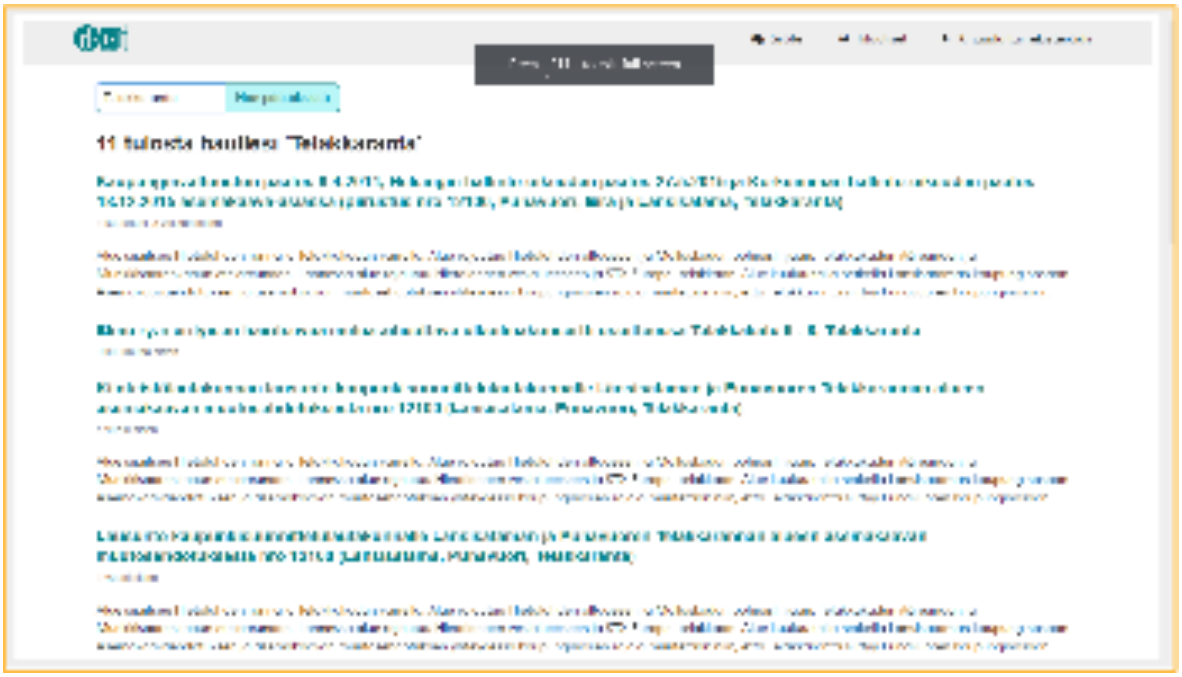


Fig.3 Helsinki Decicion screenshot

2.4 Decidim.Barcelona

Decidim.Barcelona is the participatory platform launched by the City Council of Barcelona on February 1st, 2016. In its first deployment, Decidim.Barcelona has served as a tool for elaborating the strategic plan of the city of Barcelona for the next three years. The platform allows for the registering of institutional and citizen proposals, debates, and physical meetings; orienting users' activity to make, discuss and evaluate proposals. The City Council defined a taxonomy of categories in order to classify proposals, and the platform is designed to track the different stages of the participatory process. The main principles on which the platform is based are:

- open participation
- transparency
- the combination of online and offline participation
- citizen empowerment

However, the current process is just the first one on Decidim.Barcelona. Upcoming democratic processes, such as participatory budgets or citizen legislative initiatives, are planned to be run on the platform. Some of the initial designs of Decidim.Barcelona are inspired by the D-CENT pilots and the platform code is a fork of Consul, the participatory platform developed by the City Council of Madrid.

A key value of Decidim has been to integrate several functionalities into the same digital participatory process. For example, it allows for the upload and debate of proposals that emerged from physical debates. Users can navigate across proposals and check the associated content: the support, the arguments in favor or against the proposal, the physical meetings where the proposal was discussed, the organizations who support the proposal, etc. At the same time, thanks to its integrated interface, Decidim.Barcelona helps to manage the complexity of the strategic planification, which is often a challenging task for the Council. Finally, the platform brings the institution closer to the citizenry by opening direct participatory channels for policy-making.

Here are some screenshots of the different aspect of the system:

Fig.4 Home page of decidim.barcelona

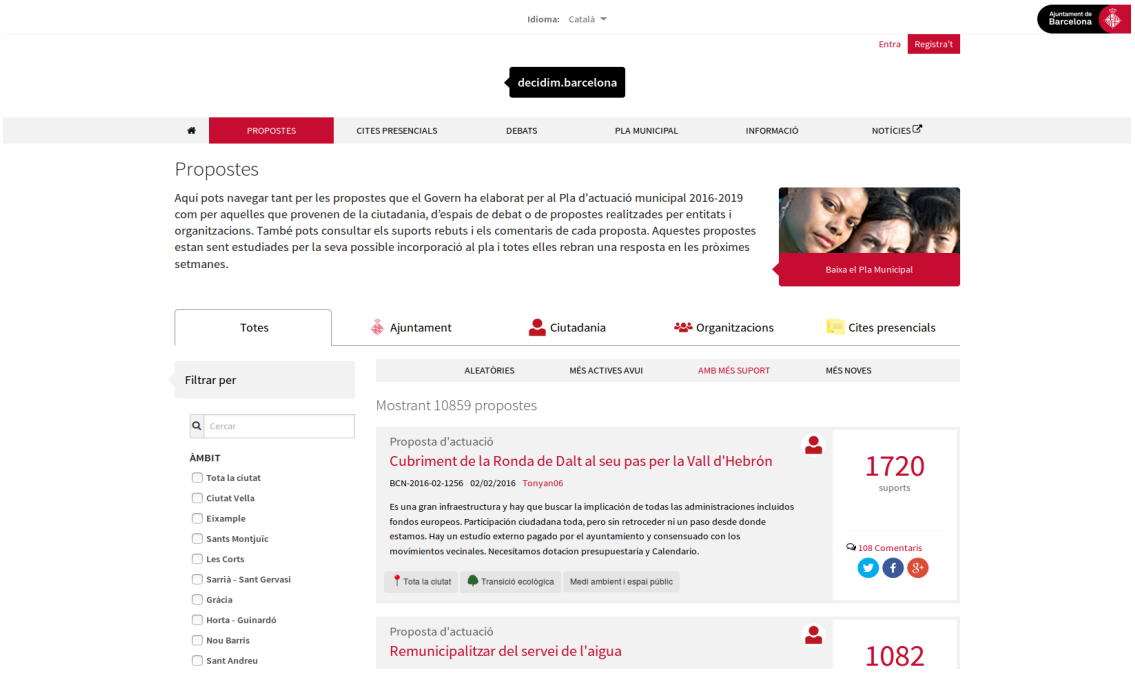


Fig.5 Proposals page of decidim.barcelona

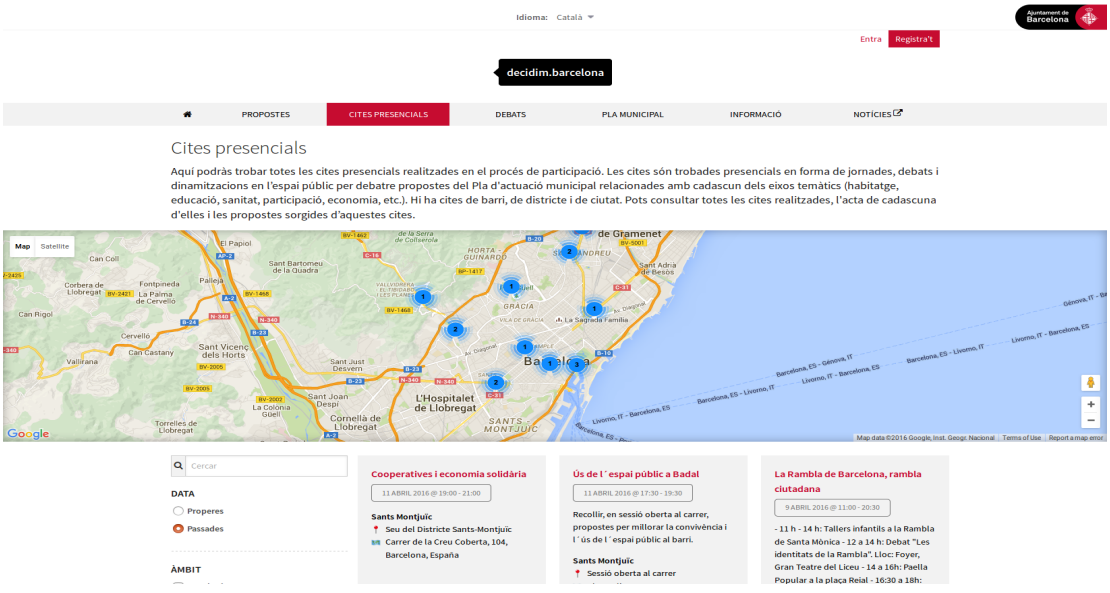


Fig. 6 Physical meetings page of decidim.barcelona

2.5 Your Priorities

A citizen participation social network application that helps citizens connect with government through ideas and debate. The application has a sophisticated debate system to help groups come closer to consensus on ideas.

The application has recently been rebuilt from scratch after development since 2008. It is now built in HTML and Javascript with a new industry standard called Web Components that enables an app like experience on desktops, mobiles and tablets on the web.

People can add ideas, vote ideas up or down, debate ideas and communicate through a Facebook-like news feed by sharing links and comments. People can follow and unfollow each other. Communities and groups can be created to organize different idea generation processes.

Here are some screenshots of the different aspect of the system:

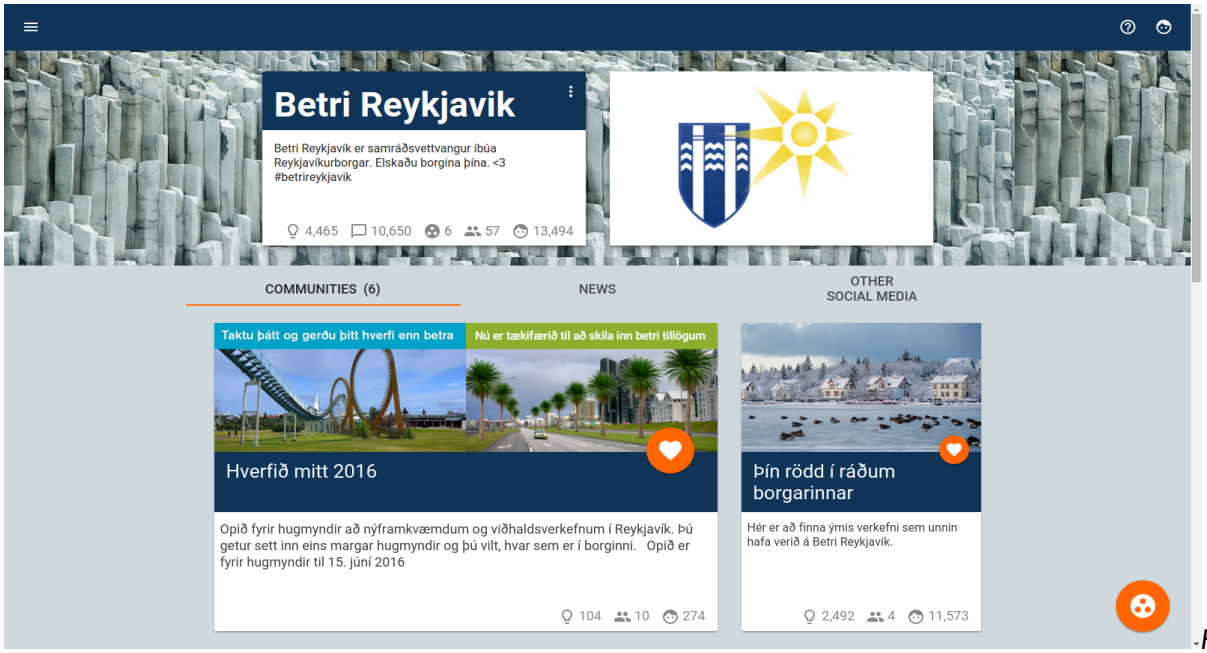


Fig. 7 Front page of Better Reykjavik

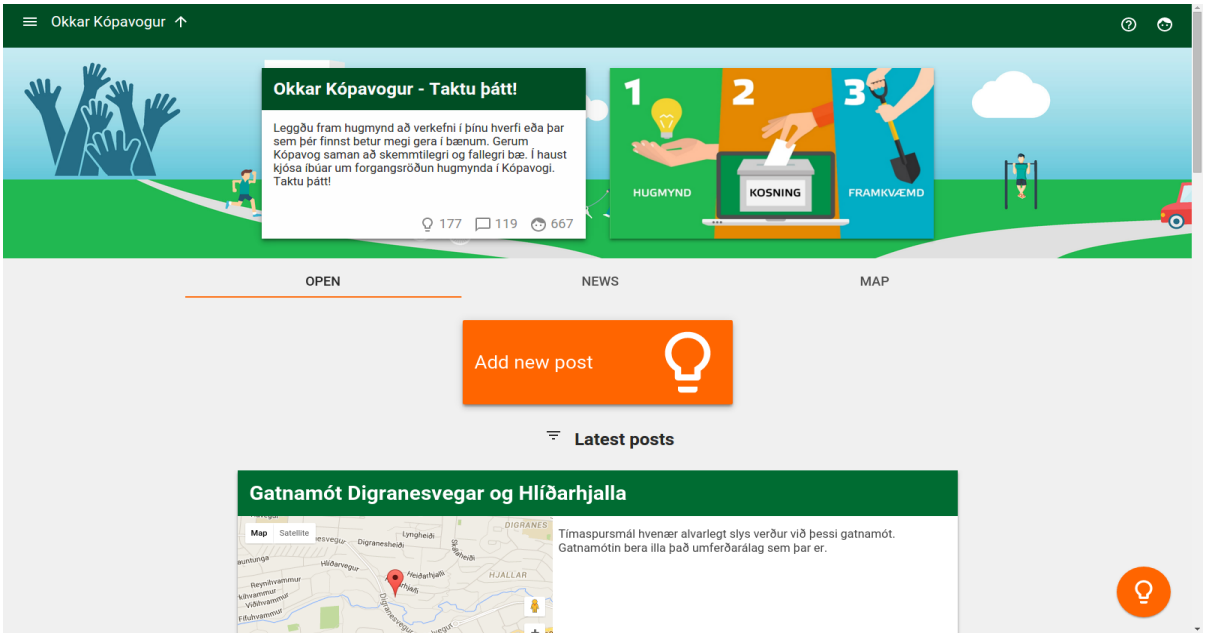


Fig.8 Front page of Our Kopavogur in Iceland

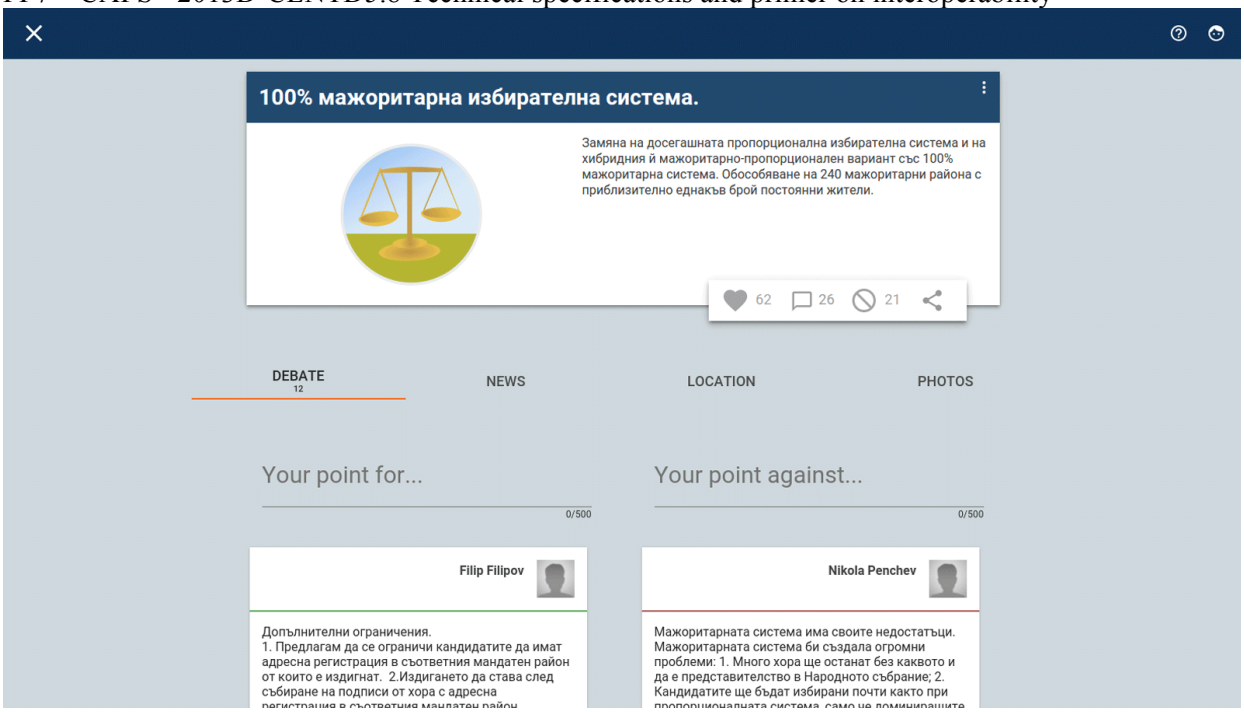


Fig.9 Example idea from Bulgaria

3. Pilot Projects

3.1 Objective8, Stonecutter and Mooncake

3.1.1 New Garden Cities Alliance

This project aims to define what a Garden City is by refining a set of social, planning and architectural criteria through Objective8. This would allow the New Garden Cities Alliance to develop an accreditation process for new cities in the UK. They are also using Stonecutter.

3.1.2 West Midlands People's Plan

This project's purpose is to test D-CENT in the UK, deploying the platform to help the public and party members in the West Midlands Metro Area to collaboratively write their manifesto for the new Metro Mayor. They are using Objective8 and Stonecutter.

3.1.3 ThoughtWorks

The LGBT+ group in ThoughtWorks are using Objective8 and Stonecutter to update their internal policies based on the results of the Stonewall index.

3.1.4 Other Interested Parties

We have discussed the use of the tools and gathered feedback from a range of other organisations including the Web Foundation, Podemos, The Scottish Green Party, and Something New.

3.2 Freecoin

Although the design of the social digital currency (D4.4) proposed three tailor made models apt to address the different needs of the pilot communities in Iceland, Spain and Finland, only in the latter context communities have been able to usher in a concrete pilot. This is due to the fact that the Finnish solution and contexts (self-remuneration and a few dozens of people within the former hospital complex in Lapilathi, Helsinki) are the most simple to implement, if compared to the relatively more challenging solutions proposed for Iceland (rewarding political participation among the 12 thousand members of Your Priorities platform) and Spain (a micro-endorsement and mutual credit system for the SME sector in Catalunya). The inability to run full pilots in Iceland and Spain finds justification in reasons that are both endogenous and exogenous to the D-CENT Consortium.

At the endogenous level, the currency research tier has always been considered the most experimental pillar of D-CENT, hence also allocated less resources compared to the direct democracy tier (and main pillar) of the D-CENT platform.

Pilots have been conducted as interdisciplinary research: through the informed analysis of economists, providing knowledge for the design of a software implementation as minimum viable product (MVP). The pilots turned to be very advanced: in Iceland in the Participatory Budgeting social credits were already present, using the Your Priorities reputation management system, an open source technology thriving in various deployments.

By experiencing the pilot in Iceland we realise that further research could be invested in advanced experiments with the partners:

1- Instantiating a crypto-currency denominated in Social Kronas and valued in Icelandic Kronas;

2- Integrating the Freecoin codebase connected as backend with the smartphone app of the local transport company. These opportunities for rare experimentation in Europe are offered by open minded people around the Municipality of Reykjavik: they intend to redeem Social Kronas to reward citizen political participation for the common good of the city.

At the exogenous level, in Iceland it has not been possible, within the scope of the D-CENT project timeframe, and for reasons of greater order, to integrate the escrow account from the Municipality of Reykjavik and the backend of the smartphone app of the local transport company with the Freecoin code base, thus enabling citizens to be part of a fully-fledged pilot. Indeed, political ferment and banking scandals favored an eclipse of D-CENT social digital currency for Iceland, i.e. Social Kronas, as the perturbations coming from the conventional banking system together with political instability made pretty incontrovertible by phenomena such as the Panama Papers, which were enough to keep

understandably busy to address more urgent situations both pilot partners and communities of this Northern country.

Regarding the Spanish pilot, a different set of considerations has to be made. Although a pilot with end users had not been realized, during the scope of D-CENT, it has been conducted a precious work of design, software implementation and business environment creation that will remain after the end of the D-CENT project itself. Indeed, at the endogenous level, and although Freecoin multi-signature features had been correctly realized in order to manage the micro-endorsement system of Eurocat, i.e. the trust management tier of the three-layered Catalan regional currency Spain, Spanish pilot communities had not been able to implement Drupal based Integral CES to run Eurocrat relation with Freecoin. In other words, and due to the eminently voluntary nature of the involvement of local communities and Eurocrat management and promoters, the centralized software of choice by the local community, indeed Integral CES, to run the mutual credit tier of the system had not been integrated with the Freecoin codebase apt to power the micro-endorsement tier. In brief, Freecoin had been designed and the codebase had been implemented in order to be integrated with Integral CES, whereby Freecoin trust management deployed on a distributed ledger had to instruct and condition the money supply of the complementary currency 'eurocat', i.e. the mutual credit system of Eurocat. Integral CES would then have to communicate with the third tier or layer of Eurocat that is to say the conventional banking system where Euros circulate. The complexity to integrate their different backends, of which one is decentralized and open source (Freecoin), one is centralized and open source, and the third is centralized and proprietary revealed to be a challenge that needs to be tackled with the necessary timing and resources going beyond the scope of D-CENT.

At the exogenous level, the Spanish pilot suffered (like Iceland) from political instability. Indeed, the victory of Barcelona em Comu' apparently signalled the possibility to experiment with Eurocat with the bene placito of public authorities as the electoral campaign of this novel political force included the proposal for a social currency for the city of Barcelona. However, the difficult situation that the new administration found itself in, meant that the distraction and reallocation of human resources from the office for the Moeda Social to more pressing duties connected to the management of the municipality in times of austerity. A positive note manifested during a D-CENT sponsored workshop run on the 2nd and 3rd of March 2016 at Eurocat headquarters in Barcelona, where representatives of the SME sector, the regional association of Catalan municipalities, the crypto-currency local developers communities gathered to present the state of the Eurocrat project and network to find interested communities to pilot the project. Although it revealed itself as a success, including positive coverage by local media, both local and national political emergencies (Spain has been without a functional government since the elections in Dec. 2016) - as it happened in Iceland - did not allow to create an appropriate business environment able to create the right conditions for such an innovative pilot to take place with the timeframe of the D-CENT project.

However, Icelandic partners and Dyne.org Foundation are willing to continue Freecoin experimentation beyond the life cycle of D-CENT within the CAPS constellation. With the upcoming elections, the Icelandic Pirate Party could be the determinant to pilot Social Kronas at the next Participatory Budgeting event. The same applies with Eurocat and the crescent situation in Barcelona. In short, both Icelandic

and Spanish pilot will probably see practical manifestation - albeit outside D-CENT timeframe - as the extremely experimental nature of the Social Digital Currency tier of the D-CENT platform, coupled with what has been defined above as the exogenous level of analysis, justifies the state of affairs.

3.2.1 MULTAAPAKKU: Finland – current DCENT pilot add pad elements

What started off as the less ambitious one, in terms of systemic complexity and users basin, the Finnish pilot was revealed as the most malleable and easy to put into practice. Both the economic stability characterising today's Finland and a generally favourable business environment for social currency experimentation have been the determinant of a successful practical application of the self-remuneration system designed and detailed in D4.4. For instance, Finland recently passed a new law on basic income, whereby every citizen in need of welfare benefits has been endowed with an 800 Euro basic income per month. Examples such as this, together with a cultural predisposition to innovation and social equality, paved the way for a concrete experimentation with Freecoin. The pilot experimentation of this MVP will be in May 2016.

What began as a Community Supported Agriculture project, promoted by Helsinki Urban-Cooperative Farm, turned out to become an expanded version of the pilot described in D4.4. and further detailed in D5.5. Indeed, Helsinki Urban-Cooperative Farm found its headquarters in a former hospital in the heart of Helsinki city centre, Lapilathi. The former hospital has recently be refurbished in order to host a variety of co-working spaces rented by the City Council to startups and NGOs in tandem with health services to the person. A cafe', a restaurant and different sectorial companies give to this structure a variety and richness of reciprocity possibilities that made the very community ask for the deployment of the Freecoin prototype based on the Social Proof-of-Work designed for Finland, the Proof-of-Contribution to enhance community values. In particular, the digital social currency, i.e. multapaakku (English translation 'pieces of mud') will be pre-mined and assigned to a Community Wallet backed up in every user account. As for the design in D4.4 and the user journey developed in D5.5, participants to the scheme will be able to self-remunerate themselves after they performed what can be loosely defined as community work. The latter can range from agricultural production, the maintenance of common spaces at Lapilathi, or as the result of services performed by community members to other community members (unloading a van, taking care of facilities, and the like).

The strategy for the deployment will be conservative: as agreed with lead users and D-CENT Finnish pilot partners, the Freecoin implementation for the mutaapakku will be initially rolled out in a micro-context, which is the office space that D-CENT partners and lead users already share. At such premises, facilities and appliances will present a QR code embedding the address of the Community Wallet whose keys will be anyway kept safe by a D-CENT Finnish partner. As people will clean, prepare coffees, wash dishes, in brief as they will perform commonly useful tasks, they will self-remunerate themselves as all those actions will represent variations of the same Proof-of-Contribution. For instance, if one person prepares the coffee for the whole office, s/he will find a QR code on the coffee machine and, after preparation, s/he will request a reward (whose value will be determined by the office members themselves in an assembly deliberation), scan the code and receive the payment. At that point, all others will see the correspondent value decrease in the balance of the Community Wallet backed up on each user's account. In this way, Freecoin will be tested as a distributed trust management system in which a

complementary crypto-currency will flow, the multapaakku, while it will managed as a common good (distributed Community Wallet backup).

3.2.2 Macao / Commoncoin from D-CENT use case to pilot in PIE News

A second area of future continuation of Freecoin experimentation and prototyping is within the CAPS landscape. Indeed, Dyne.org Foundation is going to take part of a new Consortium led by the University of Trento, which won one the first rounds of funding for Horizon2020. The Consortium formed around organizations from Italy, the Netherlands, Scotland and Croatia, giving substance to a network forming the basis for developing a collective awareness platform apt to give a space to welfare innovations helping to tackle the issues of poverty, unemployment and low income. Poverty Income and Employment News, or PIE News, is a project that will run from 2016 to 2019 and will develop a platform for storytelling, where pilot communities formed by various persons experiencing 'PIE conditions' (calculated by the EU around 120 million, i.e. the part of the EU population 'at risk of poverty') will narrate their stories. From how one got into poverty either won over it or is still struggling and why.

In Croatia, for example, the pilot will be with the unemployed youth, while in the Netherlands single mothers and immigrants will have a say on how they deal with their problems and how policymakers in Brussels could adjust their policy drafting in way that would include the information provided by the very recipients of welfare policies. Moreover, in Milan the project will pilot with the precarious workers of the art and theatre sector. Macao, an occupied building in Milan, has been already studies within D-CENT as a use case in which it would have been possible to expand the experimentation started with the Finnish pilot. As the latter is the one that is ready to be deployed, it is encouraging to start a new CAPS project with a stable Minimum Viable Product on top of which one can further evolve with the design of distributed ledgers for the enhancement of the common good and community value. Free coin is indeed the candidate for a new form of trust management and system ownership and scalability for payments networks that harness distributed computing and horizontal collaboration and exchange.

3.2.3 DYNER: Freecoin for agile organizations

Another area of innovation in which it is possible to experiment with Freecoin is what can be defined as agile organization management. Indeed, Freecoin modularises and increases the features of the distributed ledger technology and, in this case, it can be applied as a timesheet, accounting and payroll system that renders easier to track personnel contributions to projects tasks while automating as much as possible payroll procedures within organizations. The concept for this implementation of Freecoin is currently named DYNER and we are adopting at Dyne.org to "eat our own dog food" and create an incentive for its future sustainability and maintenance.

Below a presentation of the dual currency timesheet, accounting and payroll system.

A dual currency timesheet / accounting and payroll system for Dyne.org / Dyne- solutions using Freecoin
Community Served: organizations members, i.e. employees, employers and accounting divisions
Name of currency / Standard of Value:

The system is called DYNER and it is made by two interlocking tiers representing autonomous but intercommunicating parts of a crypto-currency run on a dedicated distributed ledger. Each tier corresponds to a section of the distributed ledger, one to broadcast 'crypto-euros' (crypto-coins denominated in Euros, or any national currency); the other, to broadcast 'timers' (coins denominated in man hour, where a man hour is the time corresponding to an hour of work performed in a project by an employee):

1 CRYPTO-EURO = 1 EURO2) 1 TIMER = 1 MAN/HOUR (e.g. a definite amount of conventional currency)

Management: an organization's accounting division (SME, NGO, Big companies, Universities, Public Offices) maintaining the backend which, nevertheless, runs in a highly autonomous way thanks to the trust-less features of distributed ledgers

Cost recovery: in general, the only cost is initializing and maintaining the system. Overall, DYNER adoption can correspond to savings for the organization.

Main Purpose: When dealing with projects administration, organizations need to take care of:

1) Employees Contribution Time-Tracking >>> Timesheet
2) Internal Accounting >>> double entry bookkeeping
3) Payroll >>> Manual payment to employees

As the Finnish pilot clearly shows, especially small organizations (SMEs and NGOs) face the burden to take care of this with problems concerning time management and lack of human resources. In the case of big companies, centralized accounting practices present high costs related to the need of human supervision for processing time-tracking (e.g. excel sheets), accounting (e.g. double entry bookkeeping) and, once timesheet and hours worked match at a certain moment in time, proceed to pay employees' salaries.

DYNER is the concept for a Freecoin implementation that can automate time-tracking, accounting and payroll in the same solution in view of allowing organizations to both save time and money while taking care of internal accounting processes.

3.2.4 DYNER – FXC

Benefits:
1) Integration of time-tracking, accounting and payroll components within an organization, and in total transparency to the employees and employers.
2) Disintermediation of time-tracking, accounting and payroll components within an organization thanks to distributed ledger implementations.
3) Desirable for small organizations in that it can make time-tracking, accounting and payroll less of a burden in terms of time-management and lack of human resources; desirable for public bodies and big companies in order to make these processes more efficient, transparent and less prone to error.

However, from an ethical point of view this raises the question around the relation between technological innovation as automation and rising unemployment as a result. Core mechanisms.

Within a project organized in, for example, Working Packages and with each working package subdivided into Tasks, crypto-euros are an escrow wallet attached to a task and filled with the amount corresponding to the budget allocation in national currency given to that specific task within the project (e.g. 100k EUR = 100k CRYPTO-EUROS); while timer-coins are the total amount of man/hours allocated to each employee busy in his/her task(s) (e.g. if one man month is 150 hours and is paid 7500 EUR, then the employee will receive in her timer wallet the amount of 50 timer-coins). In other words, there are 2 wallets: one with crypto-euros representing conventional Euros and the other containing the amount of man/hours that each member has been allocated to work on in the projects' tasks, represented by timer- coins. It is important to stress that the underlying crypto-currency is the same, there are not two blockchains or distributed ledgers to represent their payment histories because they are denominated in the same currency, i.e. the Euro.

How it Works

The game starts with:

Crypto-euros allocated to tasks from the budget are sent the Task-crypto-euros-Wallet. Further, for each project's task a Task-timer-wallet is created and left empty. All employees with a role in a certain task will be notified about the address of the Task-timer-wallet to which they will send - after completing a working session on the task - the correspondent amount of timer-coins they had been assigned at the beginning of the project in relation to the man/hour worked is sent to the Task-timer-wallet.

Also employees have two wallets: the employee-timer-wallet in which the hours of the tasks are represented by timer-coins sent to the Task-timer-Wallet as work proceeds; and an initially empty Employee-crypto-euros-Wallet: when the Task-timer-Wallet receives coins from an Employee-timer-Wallet, the Task-crypto-euros-Wallet will release crypto-euros that will reach the correspondent Employee-crypto-euros-Wallet.

Once an employee accomplishes a task, her/his Employee-timer-Wallet will be emptied of timer-coins while her/his Employee-crypto-euros-Wallet will receive the amount of crypto-coins corresponding to the total man hours that such member worked to complete the task, from the Task-crypto-euros-Wallet. A piece of software is needed to take care of the quadruple flow: double flow from Employee-timer-Wallet to Task-timer-Wallet; and double flow from Task-crypto-euros-Wallet to Employee-crypto-euros-Wallet.

As the Employee-crypto-euros-Wallet is 'full' (i.e. the task had been accomplished), either manually the person in charge of payroll or a special purpose DYNER backend communicating with a conventional bank account where the budget is parked in the form of national currency, will release the corresponding amount of national currency (Euros) to the employee's conventional bank account.

In brief, crypto-euros relate to accounting national currency dedicated to a task in a project, in principle either for- or not-for-profit purposes (decentralized internal accounting expressed in national currency); timer-coins relate to time-tracking (they are conceived as a decentralized timesheet) and DYNER is the Freecoin implementation of the distributed ledger technology that coordinates the relation between the former two.

3.3 Helsinki Decisions

The Democracy pilot tool is http://decisions.okf.fi/. It is currently in alpha phase for a limited number of people and is scheduled to be launched in the public beta on 25th of May.

Helsinki is - to our knowledge - the first city to open up all of its decision making data in structured format. This means tens of thousands of municipal decisions annually as the data covers not only the Mayor's decisions and the decisions of the City Board and City Council, but also the decisions of all the committees and boards of the city and the individual civil servants who make decision. This data set was made possible by the fact that the City moved into a fully electronic document management system. The API - called Open Ahjo - provides the data in structured format with geo-location and keyword tags included.

Although a currency pilot in Helsinki was not originally planned for, it seems likely that first actual test cases will also be launched before the end of the project i.e. during May 2016.

3.3.1 Past Pilots

An earlier prototype (alpha) of the decisions prototype was developed in 2015: https://decisions.dcentproject.eu/.

3.3.2 Current and Future Pilots

The social virtual currency pilots will continue with the support of Dyne event after the project ends. The Lapinlahti cooperative will introduce the social currency for sharing commons and the community supported agriculture initiative, Kaupunkilaisten oma pelto (http://ruokaosuuskunta.fi/) and expanded to other user groups.

The Six City Strategy project will provide a platform for future pilots in Finland over the coming years.

The collaboration with the national parliament which started during and as a part of the D-CENT project will continue in 2016 and 2017 as the technical provider of the upcoming open data API's for the parliament can leverage use cases from D-CENT project when designing and implementing the new API. The national decisions data schema will hopefully be compatible with the decisions data API now expanding to the six biggest cities. International cooperation for standardising decision data is also potentially starting as a spin off from the work done in D-CENT.

Helsinki City is already leveraging the work done in D-CENT in its internal development projects and roadmap. For example, the open source Open City App - a native mobile app for Helsinki and any other

interested City - has adopted the philosophies and technical solutions delivered in the D-CENT project. The Activity Streams concept will allow people to be notified via the mobile app when there are decisions, events, reservations, news and other activities related to the city and their active citizenship.

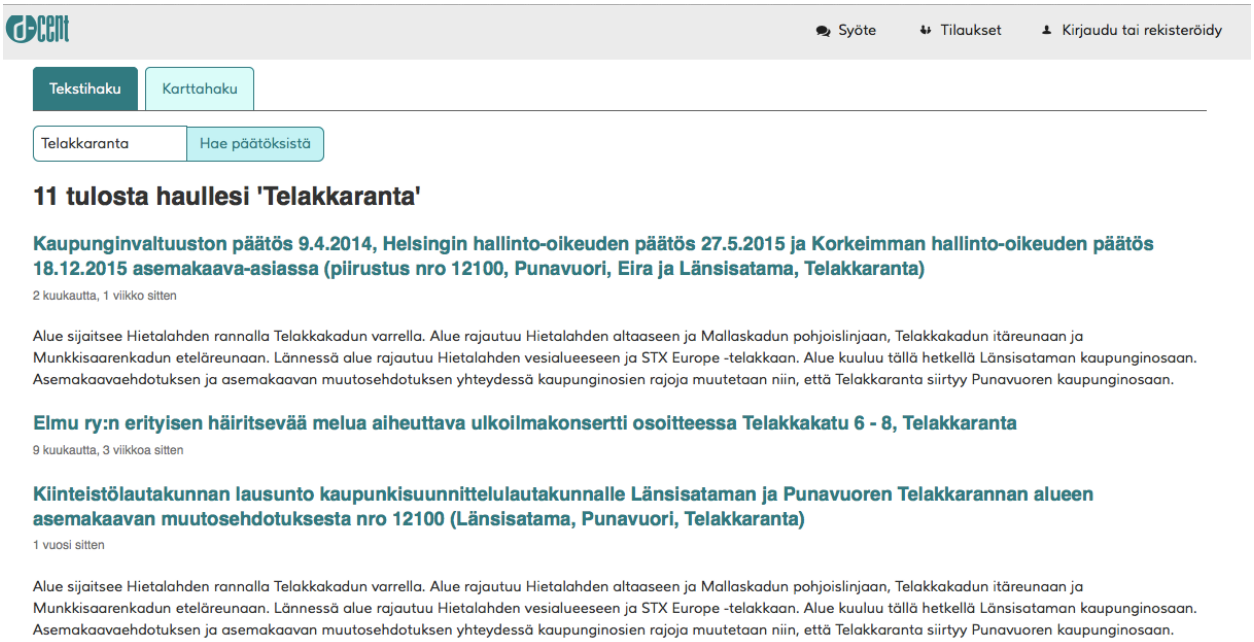


Fig.10 Decisions Helsinki discussion

3.4 Decidem.Barcelona

3.4.1 Past Pilots

Some of the first designs of Decidim.Barcelona are based on insights from:

- The study of the 15M movement in Spain
- D-cent pilots with different 15M collectives in 2013, 2014 and 2015, including Podemos and the Ethical code of Barcelona en comù used for the municipal elections.

3.4.2 Current and Future pilots

- Upcoming functionalities will include some of the D-CENT tools and features designed for pilots in Iceland, Finland and Madrid, such as participatory budgets, citizen initiatives, and collaborative legislation. This includes the current deployment of Decidim in Barcelona City hall that saw the participation of over 20000 citizens for the participatory strategic planning that is documented below and in D2.5.

Fig.11 Decidim Barcelona participatory planning

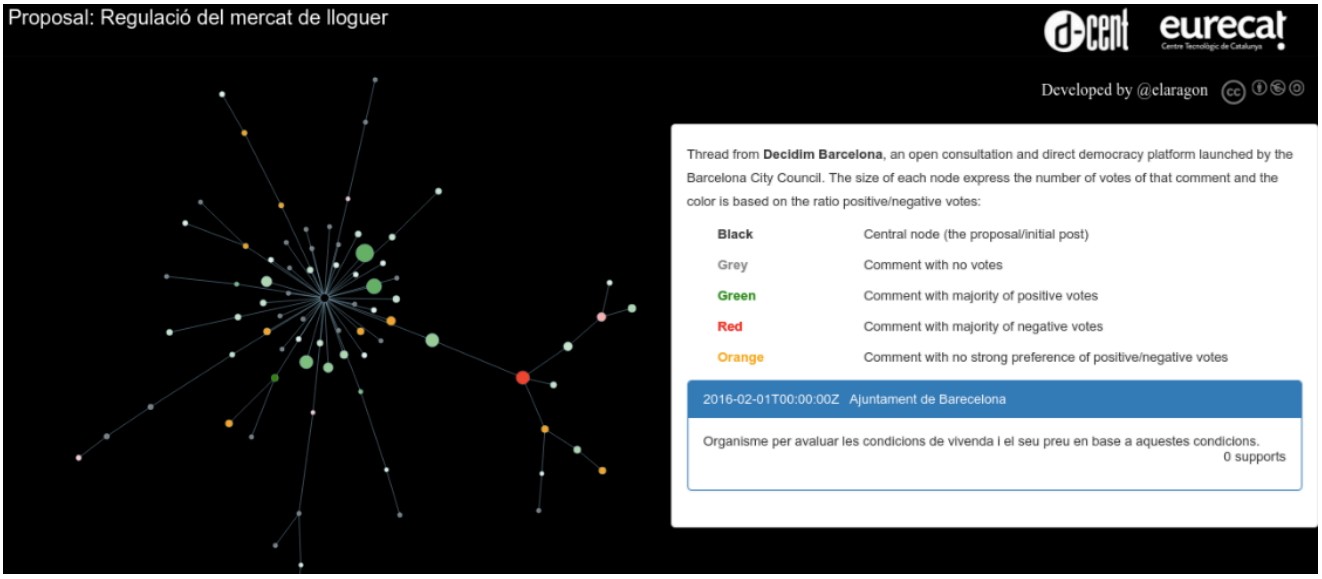


Fig.12 Decidim Barcelona Data analysis of deliberations

3.5 Your Priorities

3.5.1 2008

Work on the Your Priorities democracy app starts (ongoing)

Work starts on Your Priorities, first with the name Open Direct Democracy, then Open Active Democracy, then Social Innovation and finally as it is currently known, Your Priorities. Referred to below as Your Priorities.

3.5.2 2009

Shadow Parliament

First Your Priorities website launched that scrapes law proposals from the Icelandic parliament and gives citizens the opportunity to prioritize and debate those issues as well as adding their own ideas for improvement of Icelandic society.

Development grant for Shadow Parliament from the Icelandic Parliament

The Icelandic Parliament awarded the Citizens Foundation a development grant for Your Priorities development.

Iceland's EU ascension participation portal

In cooperation with the Foreign Ministry of Iceland, a citizen participation portal Iceland's EU ascension. After development and testing was completed it was decided not to launch it, for "political reasons".

3.5.3 2010

Shadow city opened 10 days before city election - 25. May

On 25 May 2010 we sent out emails to all the parties running for Reykjavik City Council in the upcoming elections offering them their own site within Shadow City (later Better Reykjavik). The Social Democrats (Samfylkingin) experimented a bit with it, other parties didn't touch it but the Best party jumped on the opportunity to connect to its followers and asked them to help in creating their platform, deciding on their focus in running the city.

Name changed to Better Reykjavik after elections - 31. May

The result of the election was a huge victory for the Best Party and they started majority talks with the Social Democrats. They contacted us and wanted to use our website to gather ideas for majority talks but wanted a more positive name. We came up with Betri Reykjavik (Better Reykjavik) which became its name. Many ideas from the website found their way into the majority agreement.

Ministry of Education in Iceland funding prioritization

Your Priorities was used to select the best education IT projects to fund.

Open data and crowdsourcing consulting for the Icelandic Prime Minister's Office

Advisors on a new 2020 strategy by the prime minister's office.

Constitutional assembly website

After the crash there was a demand for constitutional reforms in Iceland. The Citizens Foundation took part by creating a Your Priorities site where people put forward their ideas for constitutional changes.

3.5.4 2011

Formal collaboration with the City of Reykjavik (ongoing)

It took more than a year to formalize the collaboration between the Citizens Foundation and the City of Reykjavik, mostly due to concerns about how to handle the ideas coming in. The City committed itself to taking 10-14 top ideas (top five and one from each category) for formal consideration by its specialty councils and the City Council itself.

Better Neighborhoods started (ongoing)

Participatory budgeting in Reykjavik, capital of Iceland from 2011 to 2015. 300 million ISK (1.9+ million EUR) are allocated each year for ideas from citizens on how to improve the different neighbourhoods of Reykjavik.

420 ideas have been approved by citizens in Better neighborhoods from 2012 - 2015 with thousands of citizens having had a real influence on their surroundings through Better Neighborhoods. All neighborhoods of Reykjavik have been improved visibly through Better Neighborhoods.

Better Iceland started (ongoing)

Better Iceland is our umbrella for Icelandic organisations and communities. Three of the biggest towns in Iceland now have their own e-democracy website as well as some smaller ones. Anyone can register their own e-democracy group at no charge. https://betraisland.is/

yrpri.org launched (ongoing)

Your Priorities is not only our software but also a democratic website which includes example participation groups for every country in the world and also gives everyone the opportunity to register their own e-democracy group at no charge. https://yrpri.org

greece.yrpri.org experience

We did a trial run in Greece and we got over 15.000 people participating with over 1000 adding content. They came up with an interesting list of priorities on how to tackle the crisis in Greece. https://greece.yrpri.org/

World e-Gov Forum eDemocracy awards - 13. October 2011

The Citizens Foundation was recognised for developing and promoting tools for citizen democracy worldwide at the eDemocracy Awards 2011 held in Paris on the occasion of the two-day World e-Gov Forum (12-13 October 2011). The non-profit organisation serves as a neutral entity whose main objective is to foster collaboration between people and their politicians. All the software it creates is released as open source which anybody can use for free. 'Shadow Parliament' and 'Better Reykjavik' are two successful online platforms developed by the foundation to encourage dialogue and debate amongst Iceland's citizens and their political representatives. https://joinup.ec.europa.eu/node/123766 & http://www.eu-forum.org/home/item/28-e-gov-e-democracy-prize/

Róbert and Gunnar were Geeks of the Year in Iceland - 21. January 2012

Awards by the Icelandic IT industry for work on open source citizens participation tools. http://www.visir.is/gunnar-og-robert-eru-nordar-arsins/article/2012120129473 (IS)

3.5.5 2012

SVEF (the Icelandic Web Industry Association) Award - 03. February 2012 for 2011

Two awards, one for the most innovative website and one for the most interesting website.

- http://svef.is/frett/item4107/%C3%9Arslit_%C3%8Dslensku_Vefver%C3%B0launanna_2011/
- http://eldri.reykjavik.is/desktopdefault.aspx/tabid-4880/8496_read-30147/8496_page-37/

Better Reykjavik wins Nexpo website awards in Iceland for Brightest hope - 27. January 2012 for 2011

https://www.youtube.com/watch?v=UqbG4Fng-jQ&index=2&list=PLbz5i93bZZtNUXsrSDwokiV2SmEfR__Ee &
https://twitter.com/gommit/status/162996525146972160

Innovation awards for public administration for Better Reykjavík

By the president of Iceland.

Better Alamance (ongoing)

Citizen participation in North Carolina, USA. http://www.betteralamance.org/

bulgaria.yrpri.org experience

Unknown to us a group in Bulgaria started using our Bulgarian Your Priorities website to collect ideas to improve their national situation and find the common priorities of the Bulgarian people.
https://bulgaria.yrpri.org/

3.5.6 2013

Rahvakogu People's Assembly - Estonian law reforms

After political scandals in Estonia in 2012, grassroots organisations with official ties lead a law reform project. Ideas were gathered through Your Priorities which was installed and modified locally. Over 50,000 people took part and submitted over 2000 proposals. The president of Estonia submitted the top 15 ideas to the parliament. As of November 2014, seven of the ideas have become Estonian law.

True Stories from EVE Online

CCP Games used Your Priorities to crowdsource the best stories from 10 years of EvE Online multi-player game world. The top story has already been used for comic books.
https://truestories.eveonline.com/truestories/index.html & http://community.eveonline.com/news/news-channels/press-releases/eve-true-stories-graphic-novel-available-for-free-download/

European Commission Policy Workshop on Digital Social Innovation

Created participation website that was used in connection to the workshop to crowdsource digital social innovation policy ideas.

Balkan eDemocracy Startup project

Attempt to crowdfund 12 local eDemocracy projects in the Balkans, with support of the mayor of Reykjavík as amongst other things, a Jedi knight. https://www.youtube.com/watch?v=tJfAysjZ1RY Three projects were realized as part of this, Participatory Budgeting: Citizens' Subnational Budget Watch in Croatia, Maribor Participatory Budgeting in Slovenia and the Hungarian eDemocracy project (Ongoing).

Zero Heroes in Lewes County in England

Work with the Democratic Society and Lewes District Council on the Zero Heroes Community Competition. The core challenge of the project was to encourage more residents to reduce waste by using a variety of techniques, and the project achieved good results in this.

3.5.7 2014

NHS Citizen (ongoing)

NHS, the United Kingdom's National Health Service is using Your Priorities to connect with its customers. Ideas which generate the most online discussion or have the biggest national significance will be further processed by the NHS board.

Betri Hafnarfjörður (ongoing)

Better Hafnarfjörður is a consultation website that uses Your Priorities where the residents have the opportunity to put forward ideas on issues of service and operation of the town. The forum is open to scrutiny and participation with registration.

Betra Fljótsdalshérað (ongoing)

Better Fljótsdalshérað is a consultation website, where the inhabitants of the community have the opportunity to put forward ideas on issues of service and operations of the community.

Lublin Budget Games in Poland

The game will be tailored to the situation of Lublin Adaptation will take place in close cooperation with partners - Municipality of Lublin, ZMP and Citizens Foundation and with the participation of residents, municipal institutions and NGOs. It will be held in two stages – in the first stage 1 game will be played (06.2014), after which the further development of the game will lead to a series of games in 2015. The proposals of the budget issues to be used in the game will be jointly determined by the locals and the Municipality.

Project EXIT in Slovenia

Consulting for citizen participation in Slovenia.

1st Virtual Reality Meeting Experiment

Launched on Nov 1 2014 as part of Better Neighborhoods Participatory budgeting project. Over 300 citizens participated in a few hours in a 3D version of Your Priorities and added many interesting ideas that went into the Better Neighborhoods PB process.

3.5.8 2015

Better Pirates annual meeting 2015

The Icelandic Pirate Party (5% in parliament, 35% in polls) called out to its members to find their most important common priorities. The three top priorities online were to champion our new constitution proposal, improve democracy on all levels of administration and young people's participation in elections. All were carried with an overwhelming majority at the annual Pirate meeting in August.

Better Left Green Party (ongoing)

Better Left Green is a democracy forum where members of the Left-Green have the opportunity to put

forward ideas about politics, discuss them with other members and bring them forward for implementation within the organization. The forum is open to all registered members of the movement to participate in.

Better Hvalfjarðarsveit (ongoing)
Better Hvalfjarðarsveit is a consultative forum where residents have the opportunity to put forward ideas on issues of service and operation of the municipality. Registered users participate by presenting ideas, see other people's ideas, arguments, express an opinion or give ideas and arguments weight by supporting them or be against them.

Citizen participation for Hungary with the Dialogue Association (ongoing)
In this project (supported by the EEA/Norway Grant) we want to increase the citizens participation in the process of community planning, while we create a well-connected communication platform for citizens and elected representatives. We integrate the methods of e-democracy in the general process of community development.

In partnership with the Citizens Foundation we started to use the platform of Your Priorities in parallel with the offline methods of community planning.

Better Pula participatory budgeting in Croatia (ongoing)
The environmental e-democracy and e-participation platform is a democratic participatory tool that enables the electronically literate citizens of Pula to be environmentally and politically active in a simple way. The platform is focused on environmental and nature protection issues, as well as on the issues of spatial planning and other policies and practices of local authorities which strongly influence the everyday environment and quality of life of local citizens.

DEEP-YOU project funded by ERASMUS+ (ongoing)
The project will use our platform Your Priorities to enable a debate amongst citizens, stakeholders and politicians about the ECI, by proposing ideas and at the end come up with a set of recommendations for the revision to be presented to the European Commission and Parliament.

Better Maribor participatory budgeting in Slovenia
The project Ubrana skupnost, as carried out by the Association for support of Radio MARŠ, pursues as its primary goal the political activation of the population of Maribor. It aims to raise the awareness of citizens' rights and achieve an improvement in democratic culture in the city.

Nordic Best Practice Challenge prize for Better Neighborhoods - 7. - 8. May 2015
In 2015 Better Neighborhoods, a Your Priorities pilot, won the Nordic Best Practice Challenge in category 1 "Public Communications" with the following comment: "The aim of the project is to improve the quality of the inhabitants' surroundings. Through this inventive project, the residents are offered influence beyond what is normally seen in a representative democracy."

http://international.stockholm.se/International-Relations/nordic-best-practice-challenge1/
http://pbnetwork.org.uk/iceland-adopts-participatory-democracy-over-austerity-as-its-solution-to-the-

banking-crisis-and-it-works/
http://www.citizens.is/our-better-neighborhoods-wins-the-nordic-best-practice-challenge/

4 Open Source Contributions

To enable development of these tools to continue after the D-CENT project, at ThoughtWorks we have worked on making the documentation in the GitHub repositories clearer incorporating feedback from user testing. The documents describe how to set up a development environment, start the application and run the tests.

We have also worked on simplifying the deployment process. The tools can be deployed using Docker, and Objective8 can also be deployed using Ansible[5] or Heroku[6]. This work should empower individuals to set up an instance of the tools without requiring any help from us.

4.1 Metrics of Usage

4.1.1 Helsinki Decisions

The Decision tool will be launched to public beta on May 25th. The usage of the earlier alpha version was limited to about 30-50 test users. There was less software development time allotted to developing the Helsinki prototypes, as user testing with the larger Spanish user groups was prioritized for maximum user base.

4.1.2 Decidem.Barcelona

- Visitors and unique visitors: 220.000
- Number of users : 24.000
- Number of proposals (filtered by categories, origin and city districts): 10.945
- Number of supports of proposals: 165.000
- Number of comments (arguments in favor, neutral and against proposals): 18.680
- Number of votes in comments (positive and negative): 13.100
- Number of councillors and Mayor debates: 5
- Number of physical meetings: 480
- Number of participants in physical meetings: 10.800

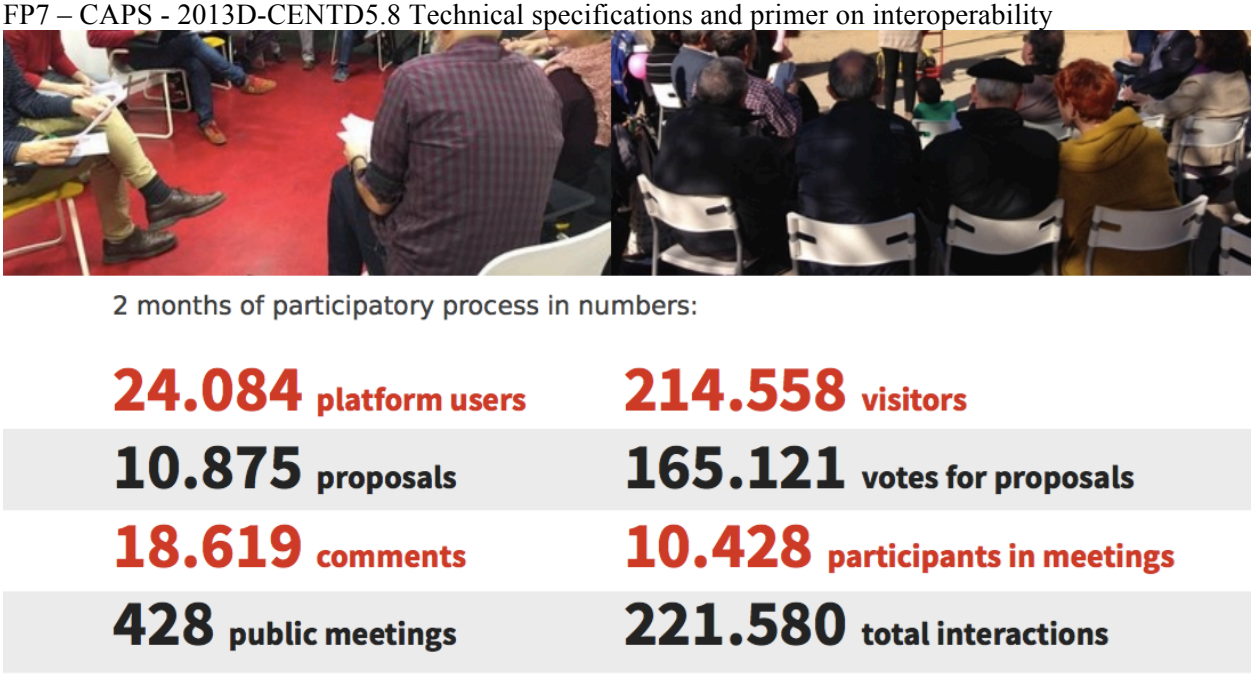


Fig.13 Decidim Barcelona participation in numbers

4.1.3 Your Priorities

Over 650.000 people have used Your Priorities in the past according to Google Analytics.

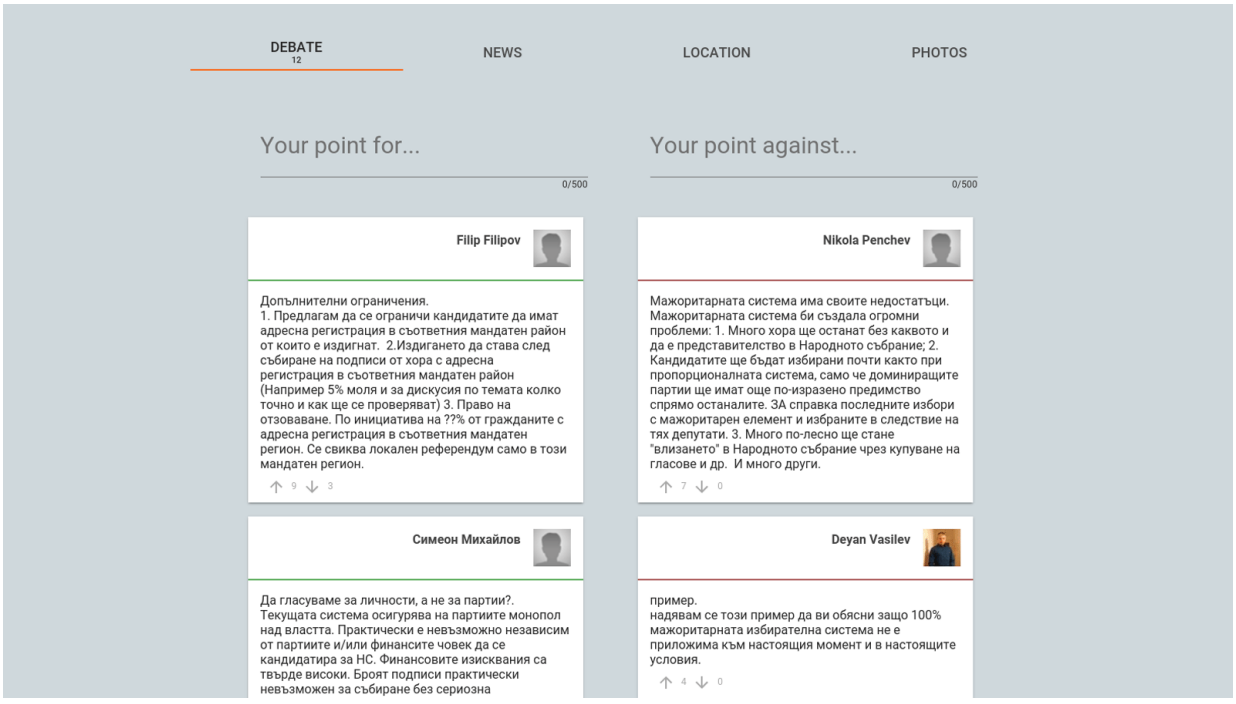
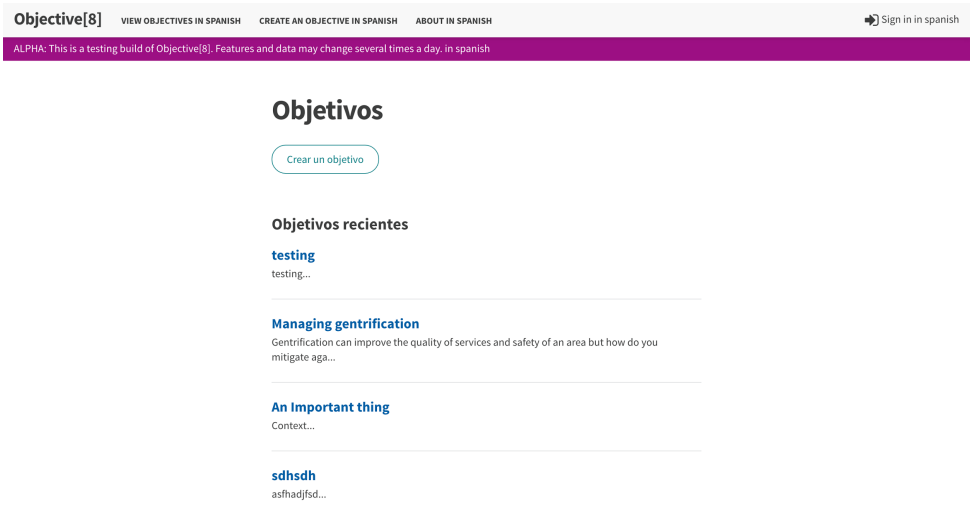
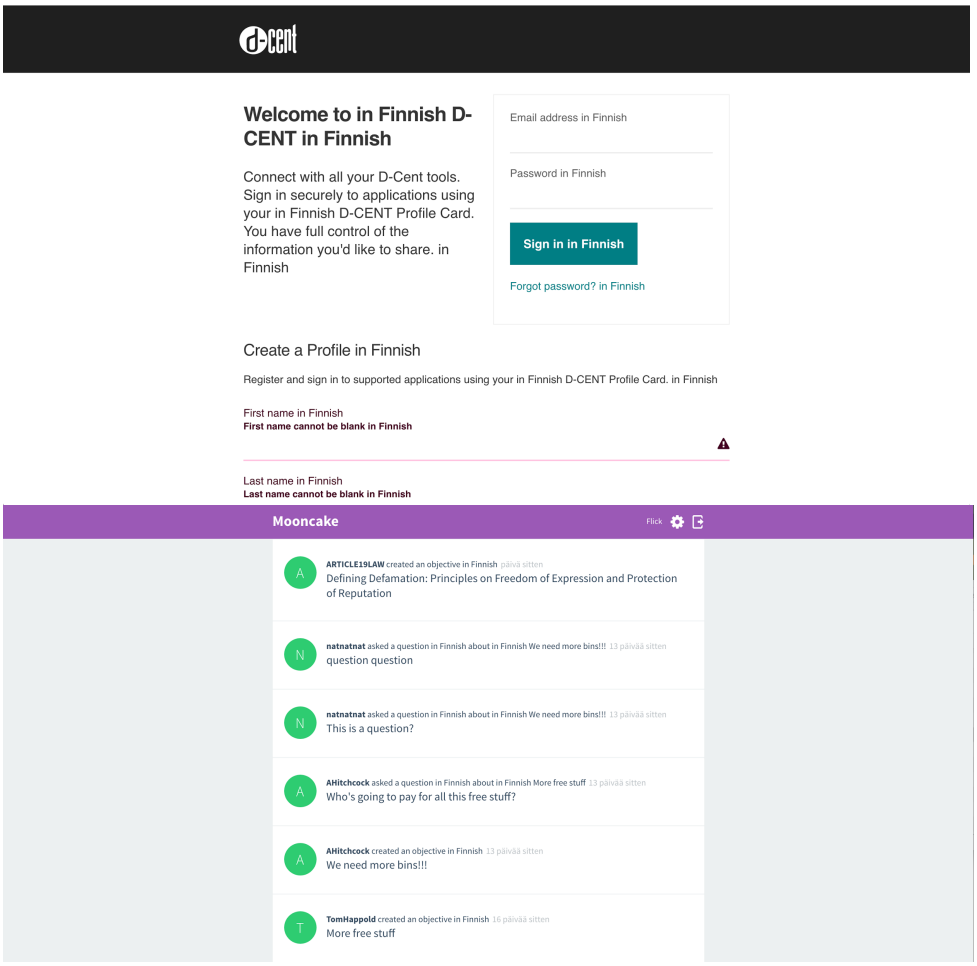


Fig.14 Your Priorities discussions

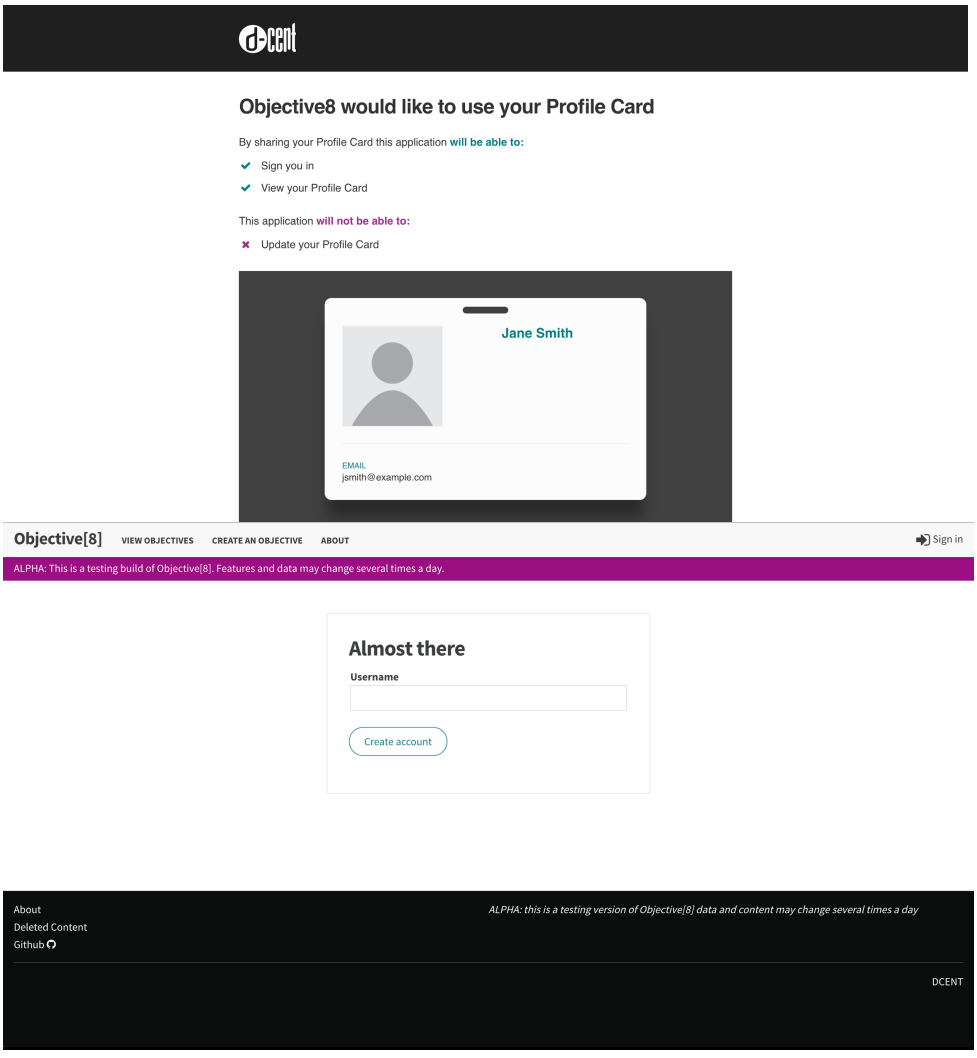
5 Iterating on Tools

Part of the specifications of D5.7 was to continue the development of the tools built in D5.3, D5.4 and D5.6.

Feature	Translations
Feature definition	Users can view and host the tools in supported languages.
User stories	As an organisation with multiple languages I want to be able to translate all parts of my D-Cent Ecosystem into various languages So that members of my organisation can comfortably use and understand the tools
Description	Throughout the development of the tools, multi language support had been included in every story. Through some further testing and as a result of increasing functionality, further translation stories were identified. Client side error messages have been added which required translation and the display of the time of an activity in Mooncake was only available in English.
Technical implementation	Error messages on the client side are automatically translated by the Tower library's clojurescript version, using the language preference detected from the user's browser. Mooncake uses Moment.js to do the same with the dates of activities, converting them into human readable relative times.
Screenshots	The following screenshots show mock translations to demonstrate functionality, and have not been accurately translated. 

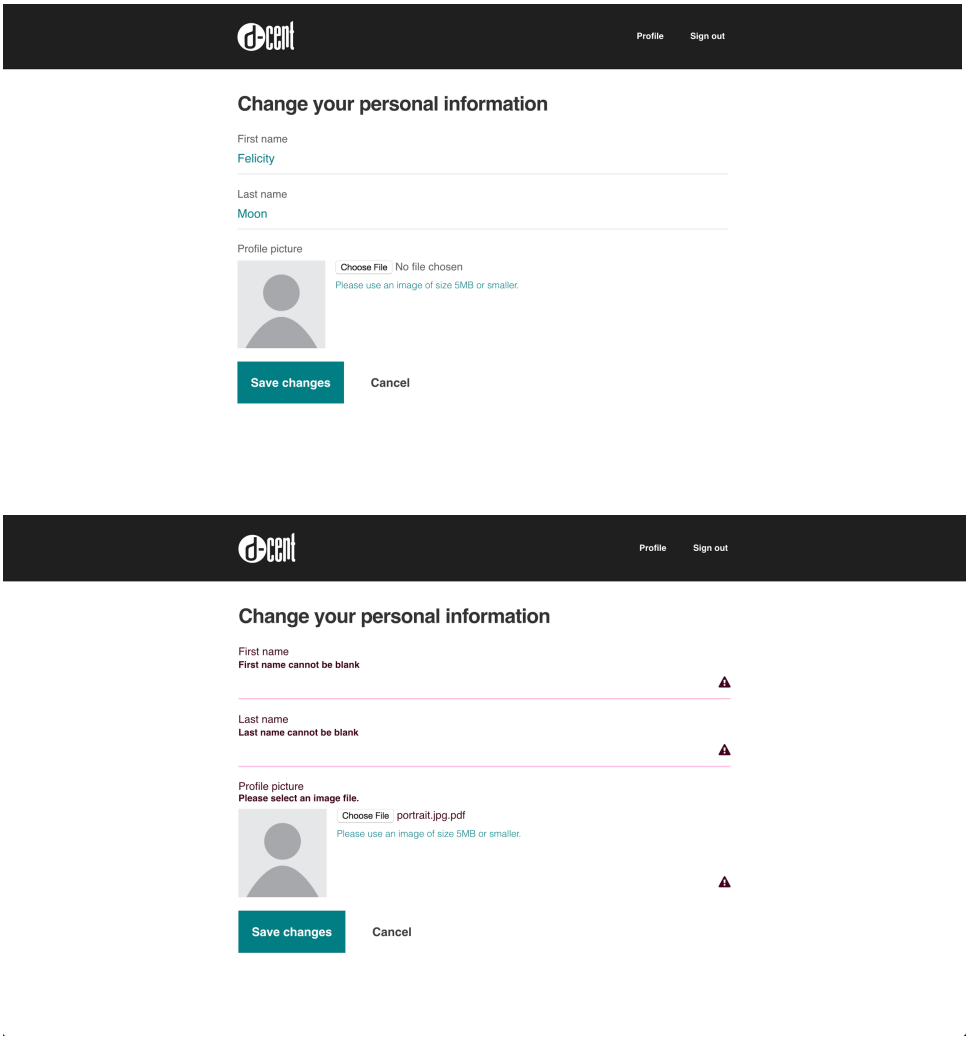


Feature	Improving user journey for signing in to Objective8
Feature definition	Share email addresses from single sign ons for Objective8 for a simpler user journey.
User stories	As a new member of an organisation I want a smooth and clear journey to sign up to their D-Cent ecosystem So that I am clear about the information I am sharing And I am not deterred from signing up by the complexity of the process
Description	There are currently up to 3 different ways an organisation can choose to allow members to sign in to their Objective8 instance. During usability testing we discovered the journey through Stonecutter when registering for the first time was causing frustration due to having to type in an email address twice, so Objective8

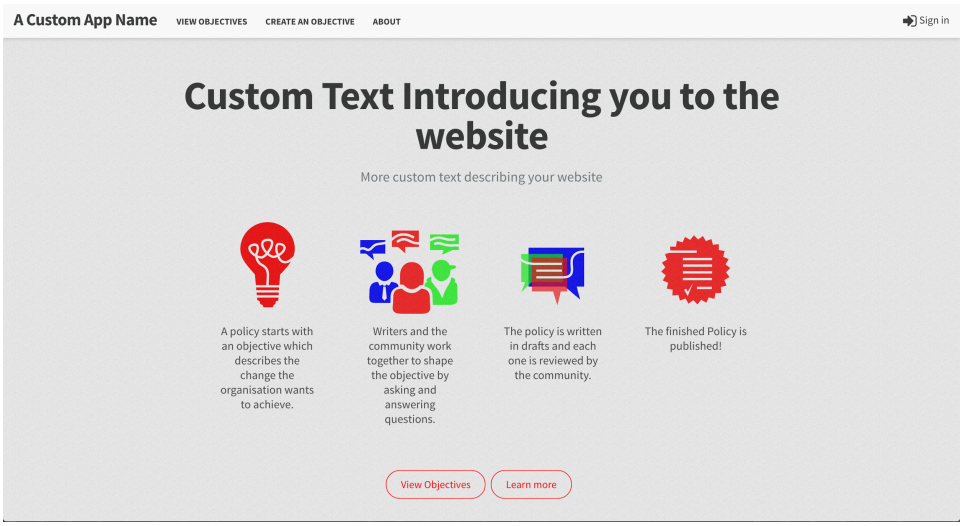
	now requests the user's email address (where possible) from all three possible sign ins. We also discovered that the Profile Card was confusing to new users and so we added a copy of the Profile Card to the Share Profile Card page for clarity. We added the ability to sign in via Facebook as requested by a potential pilot. After cancelling a Stonecutter registration through Objective8, we're sending the user back to the referring page so that they don't see a confusing error.
Technical implementation	Objective8 uses Facebook's Graph API [7] to authorise the user and retrieve their email address if they have one associated with their account. Objective8 stores the email received from Stonecutter or Facebook in the SQL database.
Screenshots	

Feature	Accessibility
Feature definition	Get Objective8 and Stonecutter to "A" Compliance under the WCAG standards
User stories	As a user with a disability that affects my interaction with websites I want to be able to navigate the site using my aids So that I am not hindered from using the site due to my disability
Description	The Web Content Accessibility Guidelines (WCAG 2.0) is a technical standard outlining how to make web content more accessible to people with disabilities. There are levels of compliance ranging from "A", the most basic level of web accessibility, to "AAA", all possible accessibility improvements made. We have implemented the basic level, which has an impact on the greatest number of people.
Technical implementation	Skip to content links were added to the default page layout, and alternative text was added to all important images while others were removed from the tab order. Locale is set in the head and automatically updated based on the locale in the request from the client.
Screenshots	

Feature	Managing Your Profile in Stonecutter
Feature definition	Allows Stonecutter users to customise their profile page
User stories	As a Stonecutter user I want to be able to customise my profile So that I can have more control over what I am sharing through the app
Description	A user can now upload a profile picture to Stonecutter. They can edit their profile if they change their name or have made a mistake when registering. We have also implemented usage of another open standard, VCards [8]. A user can download

	their profile card in VCard format to use as an online business card.
Technical implementation	Updates to the user's name are sent with a HTTP post, then validated using the same criteria as during registration. They are stored in Stonecutter's MongoDB database. Profile pictures are automatically cropped to the correct size and then stored in chunks in a MongoDB GridFS [9] database. If a user attempts to upload a picture of invalid file type or size greater than 5MB then the application warns the user and blocks the action. A new view was created to centralise all profile card updates.
Screenshots	

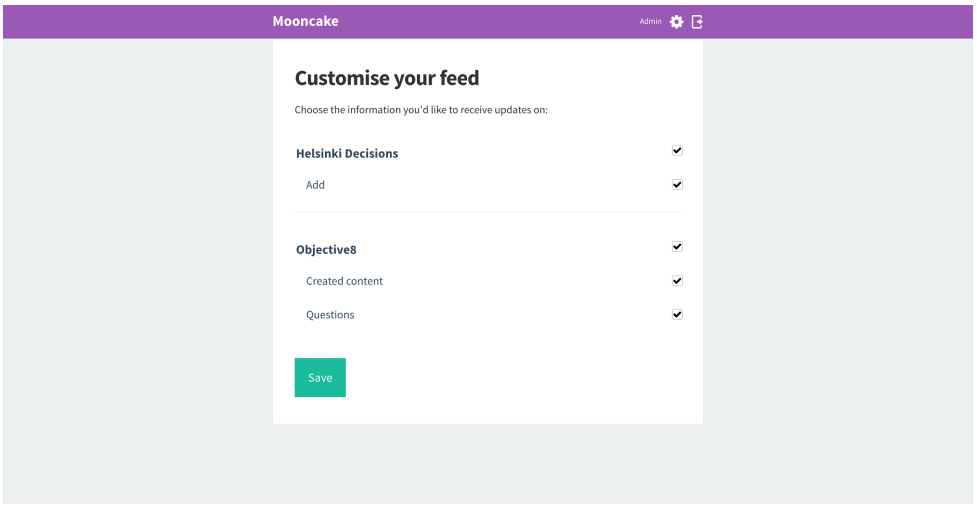
Feature	Customisation of Objective8
Feature definition	Improve user journey for technical teams to customise their instance of Objective8

User stories	As a founder of a political party I want to be able to customise the Objective8 application So that it is clearly associated with my party
Description	Functionality has been added for technical teams to easily configure which login methods they would like to use for Objective8. They can use Facebook, Twitter or Stonecutter, or any combination of these three. They can also customise Objective8 with their own branding. This was originally driven out by a discussion with a potential pilot that was concerned that certain colours would be associated with particular political parties. Technical teams can change the colour scheme, the title of the application, the text and the favicon.
Technical implementation	Before Docker starts the application it recompiles the CSS files, using the custom colours in place of the default theme if supplied. If the configuration doesn't contain all necessary details for a particular login method then the corresponding button on the sign in page is removed from the display.
Screenshots	

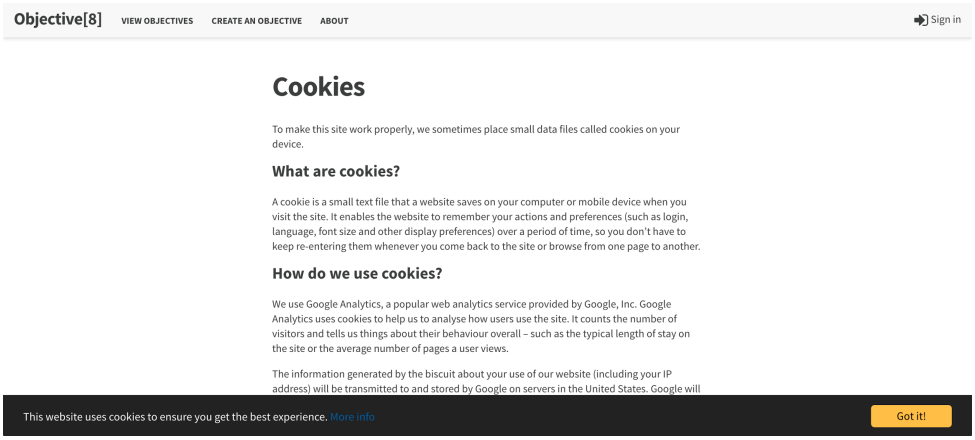
Feature	Improve deployment
Feature definition	Technical teams can deploy the tools quickly and with greater ease
User stories	As a technical team deploying D-CENT tools I want clear descriptions about how to deploy the tools And I want the process to be quick So that I can deploy the tools with ease and speed
Description	After receiving feedback regarding the complexity of the deployment process we worked to streamline and document the process. To that end the applications were

	containerised using Docker and hosted on DockerHub [10]. These containerised applications can be acquired and executed with a single command. Docker is a recent open source technology that aims to reduce the overhead from running multiple containers at once. The documentation has been updated to detail the process of deploying the applications, with the different methods of deployment separated to prevent confusion. Support is also provided for deployment on Heroku, a hosting platform that provides free developer environments, and for virtual linux servers. Additional detail regarding what the configuration variables mean has also been added to the documentation.
Technical implementation	All applications are configured using a Dockerfile to run from inside Docker containers. This ensures that they can run on all operating systems and can be started up quickly. The Dockerfile sets up the correct environment for the application, pulling all its dependencies. It also provides the command to start the application after the container is created. Customisations and custom translations are symlinked into the container and used instead of the default files.

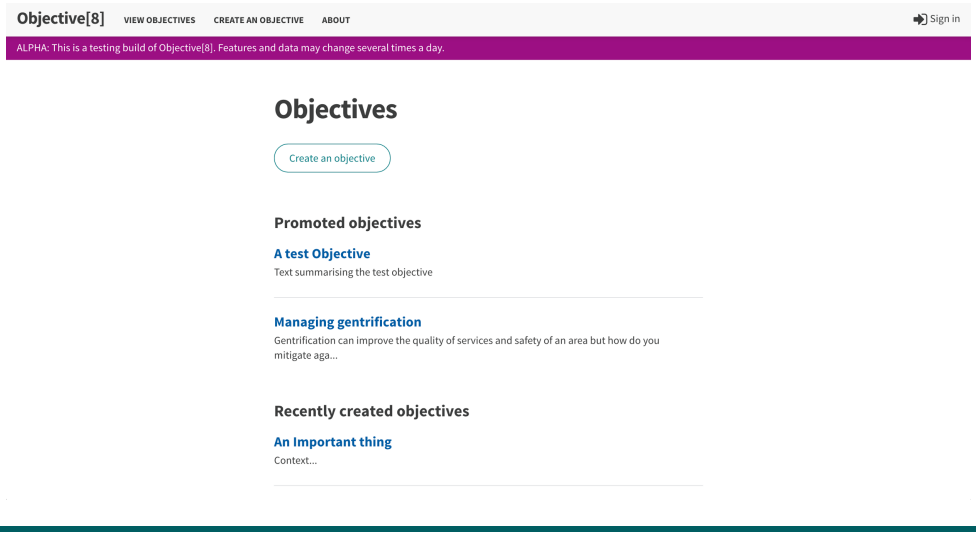
Feature	Improving Mooncake
Feature definition	Users can better understand the different activity types when customising their feed in Mooncake
User stories	AS A Mooncake user I WANT all the Activity Streams 2.0 data to be translated and displayed SO THAT I am not missing any information AND the process of customising the feed is more meaningful
Description	Functionality to add new activity types required translation so that non-English users can customise their feed. The activity types are now translated on customise feed page and the text to describe the activities is clearer. The target property is displayed with the url and connecting words (about/to). E.g. natalie asked a question about recycling
Technical implementation	Mooncake pulls the targets of the activities from its MongoDB database and displays them in feed items along with the link supplied if it exists. The user-friendly text to help with customising the feed is set by using the activity type values provided in the activity streams Mooncake is consuming. Mooncake uses this value as a reference to obtain the required translations.

Screenshots	

Feature	Cookie Messages
Feature definition	To comply with EU law, a cookie message must appear on the tools if the Google Analytics service is being used.
User stories	AS an Objective8 user I WANT to see a cookie message when I first view the website SO THAT the site is complying with EU laws AND so I know that they are using cookies
Description	Under EU Law [11], if we are using Google Analytics and using the site in the EU, we would need to show a message to the user to explain that we're using cookies. This is a configurable feature as it is not required if you are outside the EU or not using Google Analytics when using our tools.
Technical implementation	Objective8 uses the open source JavaScript library Cookie Consent [12] to add a banner to the bottom of the browser window if enabled in the application configuration. The colour of this banner is affected by any white-labelling. A page was added to explain why Objective8 uses cookies and how a user can block them.

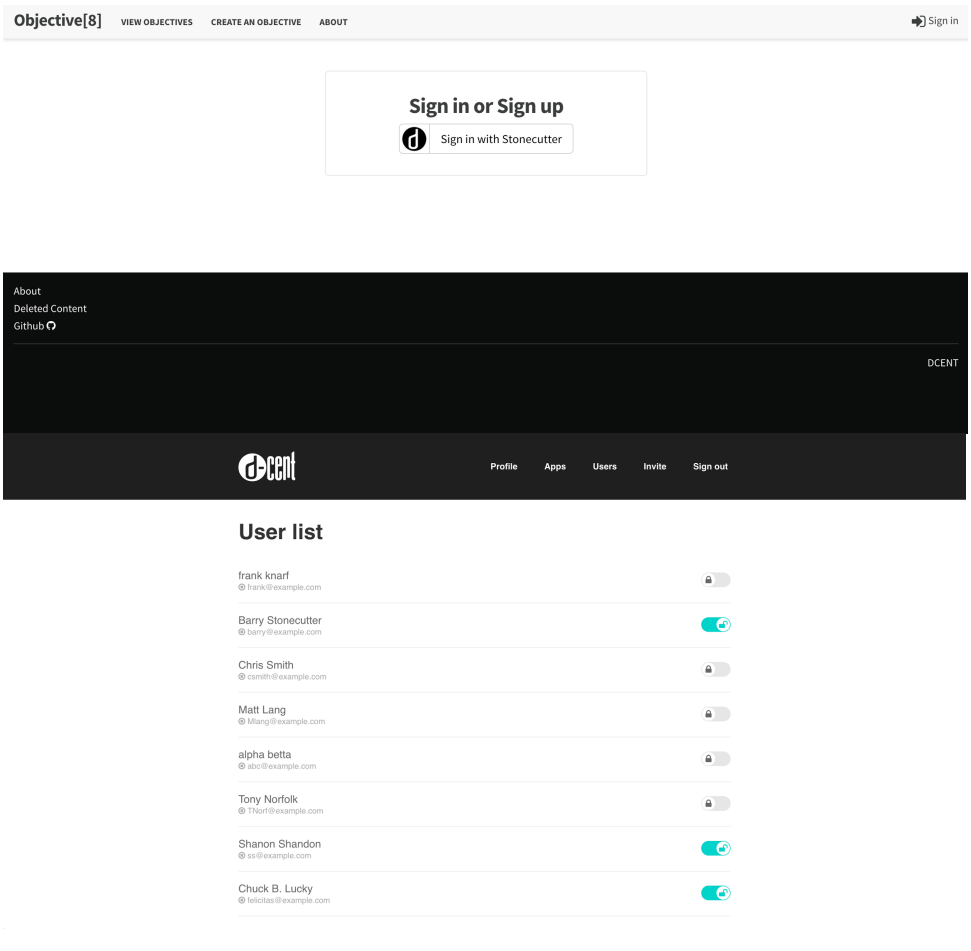
Screenshots	

Feature	Promoted Objectives
Feature definition	Administrators in Objective8 can promote particular objectives so they appear at the top of the page
User stories	AS a political party using Objective8 I WANT to be able to promote popular or current objectives SO THAT they get the attention they deserve and are not pushed to the bottom of the list
Description	Feedback from our pilots indicated that it would be useful to be able to mark a small number of objectives for promotion, to ensure that those of particular importance would receive more attention. The ability to promote objectives is reserved for Objective8 administrator accounts, and limited to three pinned objectives at a given time; a relatively small quantity of promoted objectives was seen as preferable so that it didn't obscure non promoted objectives significantly.
Technical implementation	If a user is marked as an admin in the database then Objective8 will add icons to all objectives that will pin them to the top, or unpin them if they are already at the top. These buttons will modify an additional boolean stored in the objective's entry in the database, which is used to differentiate between promoted and unpromoted objectives. If there are already three promoted objectives then the links will be disabled until one or more have been demoted.

Screenshots	

Feature	Private mode
Feature definition	Technical teams can configure Objective8 to prevent the content from being seen by unauthenticated users
User stories	AS an organisation that wants to crowd source private policy I WANT to be able to limit who can sign-in and view my instance of Objective8 SO THAT I can maintain the privacy of my colleagues/citizens AND keep our policy private
Description	Our pilot with the internal LGBT group at Thoughtworks indicated that it was necessary to provide an option to prevent external access to the content stored within the website, in this case due to its potentially sensitive nature. As such access to Objective8 was barred to anyone who created an account unless they were approved by an administrator, or were creating their account using an email invitation. If this private mode is enabled it will disable all other login options, since Facebook and Twitter don't provide an equivalent functionality
Technical implementation	A configuration variable modifies the permissions to prevent access to anything potentially sensitive from being accessed from outside the list of trusted users. Signing up to Objective8 is disallowed by any users whose account is not marked as trusted, instead redirecting to an error page providing the email for the Stonecutter administrator. Stonecutter provides a toggle on the user page which updates the trusted status within the database. Any users sent invitations by email will be directed to a create account page which will automatically trust the new user.

Screenshots



6 Freecoin Integration

6.1 Stonecutter

Freecoin integrates with Stonecutter using the OpenID Connect [13] protocol. It is the only sign in option provided.

6.2 Mooncake

Freecoin publishes an Activity Stream JSON API with activities describing the transfer of digital currency. Any HTTP GET requests to this endpoint result in a database query and return the resulting data transformed into Activity Streams 2.0 format. It supports the query parameters 'to' and 'from', referring to the published timestamp.Translations are provided for Freecoin activity types.

7 Platform Architecture

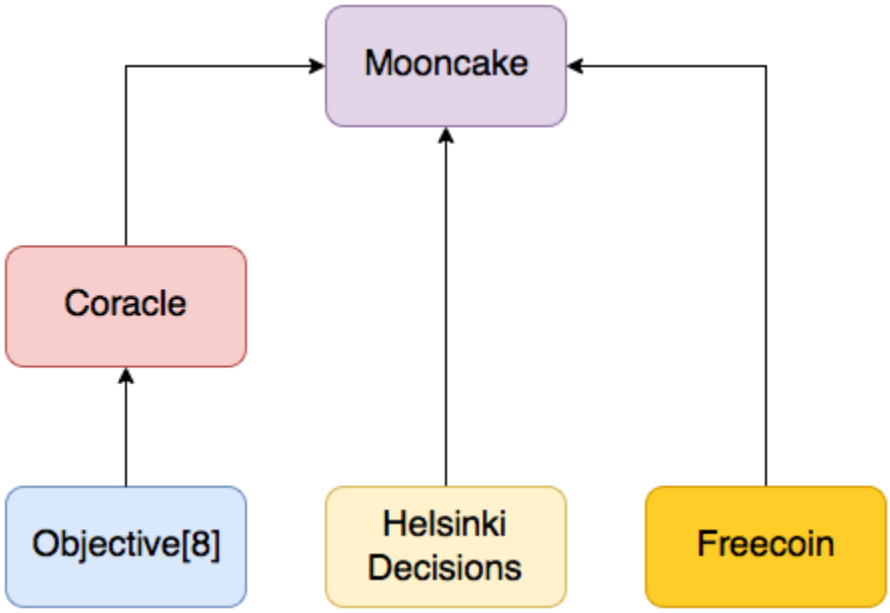


Fig. 15 Communication using the Activity Streams 2.0 standard

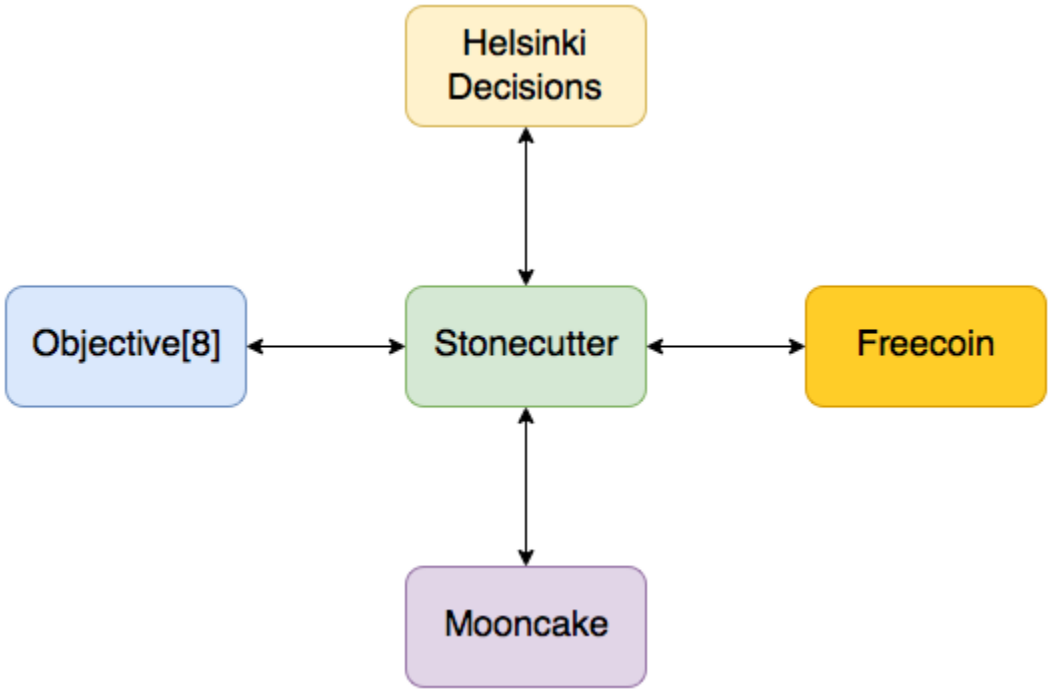


Fig. 16 Communication using the OpenID Connect standard

7.1 Objective8, Stonecutter & Mooncake Implementation

Objective8 is written in Clojure. Since this is a JVM-based language, it can be deployed and operated across a wide range of hosting options. Clojure was chosen because its functional approach allows for rapid development. The language is also cross compatible with java allowing many existing and mature libraries to be used during development.

All the applications require all client and user interaction to take place over a secure channel, using TLS and HTTPS. All form posts to the applications are protected against cross-site request forgery attacks via tokens bound to a specific user session. Stonecutter was built to the OAuth 2.0 protocols [14].

Objective8, Stonecutter and Mooncake communicate through the use of public APIs. These interfaces are freely available for any developers to use. They are structured to be compliant with open standards which define exactly how to communicate with the applications. It should be very little work to integrate an application if that application already implements communication using the same API. The application APIs should be familiar to any developer wishing to use them that has any familiarity with the standard.

All three applications use the OpenID Connect standard. Stonecutter provides authorisation tokens on request by any registered application. Mooncake and Objective8 request these tokens, and use them to permit access to restricted actions within the applications themselves.

Objective8, through Coracle, produces Activity Streams 2.0 JSON documents which can be consumed by any other application that queries the relevant endpoint. An example of an application that does so would be Mooncake. Mooncake queries the endpoint of any Activity Stream producer and consumes the result, combining the results into a single feed that can then be displayed to the user. This is one of the potential uses of an Activity stream. A user can freely implement another application that consumes Activity Streams data and use it in conjunction with Mooncake or instead of it. This goal of simple integration between both new and old applications within the same ecosystem should be made possible through the use of these standards.

7.2 Freecoin Implementation

Freecoin is written in Clojure, a dialect of LISP, and is designed to run on any JVM (including OpenJVM) as a website. Its security model is minimalism, it does not require any Javascript to navigate and all operations and interactions in Freecoin have test coverage. Freecoin is a readable implementation of a model-view-controller (MVC) architecture. The software interoperates and links other software made in D-CENT (Stonecutter and Mooncake) via open protocols: OpenID Connect and Activity Streams.

The code of Freecoin, for a recursive need of transparency, is written to be read and understood. Talented programmers have been keen to contribute to it, aiming for readability and simplicity. The Freecoin implementation has received applauses from the Clojure language community.

Freecoin source code is released as free and open source (GNU AGPLv3) on the D-CENT code repository.

8 Performance Testing Outcomes

When we began working on deploying Objective8 and Stonecutter for our pilots, we endeavoured to properly establish the level of performance of our applications. We feel that this is an important part of an ongoing and responsible software development process. The results of this testing enabled us to better judge and recommend what resources need to be allocated for deployments, especially in the case of large user bases.

8.1 Objective8

- At 150 users visiting the homepage, 64% of responses took a time greater than 1200 ms
- At 100 users visiting the homepage, 29% of responses took a time greater than 1200 ms
- At 80 users visiting the homepage, 15% of responses took a time greater than 1200 ms

Ideally we would have 80% of users taking a time less than 1200 ms but this shows that the website performs comfortably at 80 concurrent users. The website crashes when we have more than 1000 concurrent users. The slowdown is due to the CPU maxing out.

Due to the CPU maxing out, it was difficult to test whether database access by a large number of concurrent users would affect the performance.

8.2 Stonecutter

- At 10 users visiting the homepage, 100% of responses took a time less than 1200ms
- At 20 users visiting the homepage, 55% of responses took a time greater than 1200 ms
- At 30 users, visiting the homepage, 100% of responses took a time greater than 1200 ms

The website crashes when we have more than 300 concurrent users. The low number of users compared to Objective8 may be due to slow CPU recovery time. The slowdown is of responses is due to the CPU maxing out.

Due to anti-forgery tokens used in the application, it was not possible to simulate the creation of a user and therefore we were unable to test database access and its impact on performance.

8.3 Mooncake

- At 20 users visiting the sign-in page, 100% of responses took a time less than 1200 ms
- At 30 users visiting the sign-in page, 83% of responses took a time greater than 1200 ms
- At 50 users visiting the sign-in page, 100% of responses took a time greater than 1200 ms

We are using the sign-in page to test Mooncake because the index page redirects there. The website crashes when we have more than 400 concurrent users. As with the other applications, the slowdown of responses is due to the CPU maxing out.

9 References

1. https://www.docker.com/
2. https://www.w3.org/TR/WCAG20/
3. https://git-scm.com/
4. https://github.com/
5. https://www.ansible.com/
6. https://www.heroku.com/
7. https://developers.facebook.com/docs/graph-api/
8. https://en.wikipedia.org/wiki/VCard
9. https://docs.mongodb.com/manual/core/gridfs/
10. https://hub.docker.com
11. http://ec.europa.eu/ipg/basics/legal/cookies/index_en.htm
12. https://github.com/silktide/cookieconsent2
13. https://openid.net/connect/
14. http://tools.ietf.org/html/rfc6749