

A business case for a blockchain based e-voting system for student union elections

Craig Dillon

Technological University Dublin

x00205790@mytudublin.ie

MSc. DevOps

BTS

CA2

Excluding the abstract, references and appendix
this paper contains 3,200 words

Abstract

E-voting is a controversial topic largely due to failed implementations in the past with questions surrounding usability issues, verification, reliance on trusted auditors and a high cost of ICT systems to enable e-voting. Some governments have successfully implemented a secure and functioning e-voting system with Estonia being a notable success story. Estonia first introduced e-voting in 2005 with Parliamentary elections having the facility in 2007 and has seen an increase in participation since the service was introduced, with 2023 being the first year a country with an e-voting system achieving more than 50% of total votes through the platform. The focus of this paper is to examine the current state of e-voting solutions and to explore the potential of developing a secure and robust e-voting system that is suitable for student union elections by utilising blockchain technology. In doing so this paper aims to address issues with the current e-voting systems by offering a solution that improves transparency, trust and accessibility.

Keywords

Blockchain, e-voting, digital democracy, education, student union

Contents

Chapter 1: Introduction	4
Industry solutions	4
Technical value	5
Business value	5
Financial modelling	5
Evaluation	6
Best practice	7
Chapter 2: Business case analysis	7
Data collection	7
Client background	7
Requirements	8
Strategic alignment	8
Product/vision	10
Risk analysis	12
Chapter 3: Business case development	12
Future position	12
Resource requirements	12
Change management and governance	14
Project schedule	15
multi-annual business plan	15
Evaluation	16
Chapter 4: Conclusion	17
References	18
Appendices	21
Appendix A: Tables & figures	21
Appendix B: Excerpts from tender document	22
Appendix C: Response document with award criteria	27

Chapter 1: Introduction

Since the COVID-19 pandemic remote learning has seen increased adoption as the platforms supporting students continue to mature. However, one aspect of student life that has fallen behind in this regard is representation within student unions, where elections almost exclusively require the electorate to be present on campus to cast their vote. E-voting solutions are beginning to gain traction in academia and professional societies, with UCC Students Union adopting an E-voting system from 2021, MSL (2021), NUIG implemented an e-voting system for their 2021 Academic Council Elections NUIG (2021) and the Law Society of Ireland passed a vote in 2022 to use an e-voting solution for their 2022 Council Election, LSOI (2022).

E-voting is a controversial topic largely due to failed implementations in the past with questions surrounding usability issues, verification, reliance on trusted auditors and a high cost of ICT systems to enable e-voting, McGaley (2008). Some governments have successfully implemented a secure and functioning e-voting system with Estonia being a notable success story. Estonia first introduced e-voting in 2005 with Parliamentary elections having the facility in 2007 and has seen an increase in participation since the service was introduced, *"Since its introduction, the amount of people using e-voting has continued to increase; in their 2019 parliamentary elections, 43.8% of participating voters chose to vote through their i-voting system, an increase of 13.3% from the last parliamentary election four years earlier."* Mozley (2021) and in 2023 over 50% of votes were cast using the e-voting platform Piirmets (2023).

1.2 Industry solutions

Membership Solutions Ltd (MSL) is a UK based company offering e-services to educational institutions including an e-voting system which was provided to University College Cork (UCC) in 2021. This service is hosted by MSL and there is the option to use an electronic polling booth alongside the online voting service. MSL provide real time metrics, polling booth invigilation to ensure that the voter ID is valid and audit trails.

Simply Voting Inc. is a US based e-voting provider, which has provided a solution to the Law Society of Ireland. They provide a fully hosted service which is based in a datacentre in the USA, the database is encrypted at rest with AES-256 encryption, extensive auditing features and the service can be managed by the client or by the service provider, SimplyVoting (n.d.).

Another option is to develop a blockchain based system using Hyperledger and Fabric protocols as the framework. There has been extensive research in this area in recent years and the consensus amongst academics is that blockchain technologies are suited to the requirements of an e-voting system, *"The features provided by blockchain such as distributed ledger, immutability and enhanced security makes it ideal for making a voting system."* Vidwans et al. (2022), *"We have shown that the blockchain technology offers a new possibility to overcome the limitations and adoption barriers of electronic voting systems"* Hjálmarsson et al. (2018) and *"benefits include improved efficiencies, lower costs, increased transparency, and an unchangeable record of all voting transactions"* Abuidris et al. (2019).

1.3 Technical value

In 2013, a study was performed by Gritzalis (2002) to determine the principles and requirements of an e-voting system. They found that the constitutional requirements of a voting system were *"Generality, freedom, equality, secrecy and directness"* and Hussien & Aboelnaga (2013) in a similar study stated that *"Eligibility, secrecy, uniqueness, privacy and accuracy"* were key components of any electronic voting system. Another key feature that requires focus is usability and both Wang et al. (2017) and Budurushi et al. (2016) reference the ISO 9421-11 standard, *"Guidance on Usability"*. Other ISO standards that should be considered are ISO 27001 *"Information security management systems"*, Monev (2022), ISO 15408 *"Evaluation criteria for IT security"*, Pai & Mondal (2019) and ISO 25000 *"Software and data quality"*, Torre et al. (2022). When taking these technical requirements into account, a technical comparison can be performed.

Table 1: Technical comparison of e-voting solutions

	MSL	Simply Voting	blockchain solution
E-voting portal	Yes	Yes	Yes
Push notifications	No	Yes	Yes
Scalable	No	Yes	Yes
Variety of voting methods	Yes	Yes	Yes
Service desk	Yes	Yes	Yes
ISO compliant	No	No, Socs 2	Yes

1.4 Business value

Implementing an e-voting system in a university can bring several benefits such as increased participation, Taban et al. (2017) as a result of improved accessibility, Tsahkna (2013), cost-effectiveness *"the costs incurred initially can be amortized over the years in numerous elections"*, Agate et al. (2021) and real-time analytics, Pandey et al. (2019).

1.5 Financial modelling

While a financial investment is required from a client to implement an e-voting service, the return is not necessarily of a financial nature. Clients may want to measure the effect of implementing such a service by observing cost savings, greater accessibility, higher participation and gathering feedback from end users.

If the developer is a for-profit organisation they will perform a cost analysis to customise and deploy the e-voting service to each client and this analysis will influence the client cost. Developers in this space will have performed a business case analysis to determine the viability of the product and will help assess which financing models they offer, such as, licence agreements, pay-per-use or recurring subscription. For example, market sizing and analysis would provide these organisations with insights

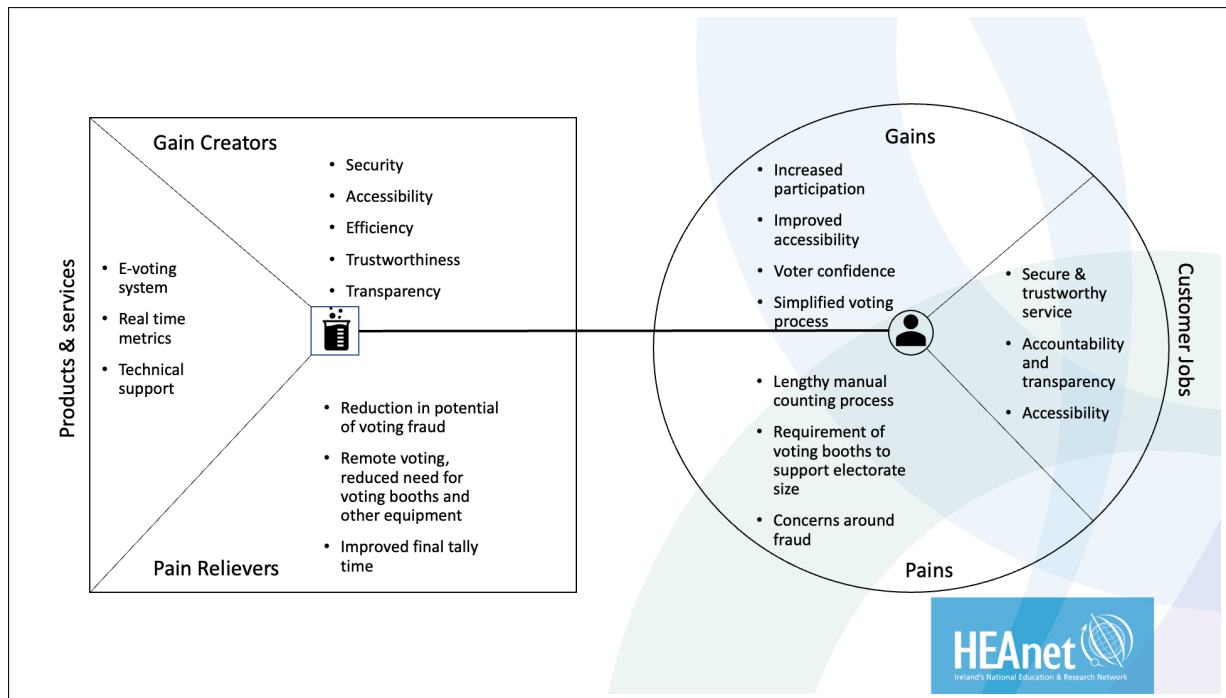


Figure 1: Value proposition canvas (Source: Author, 2023)

regarding potential client size, pricing models, market dynamics and potential revenue streams.

If the developer is a non-profit organisation they will be less concerned with financial return and have more focus on meeting customer requirements. Social return on investment (SROI) is a model that observes outcomes and the impact of projects to measure if the expected outcome was achieved, *"The SROI methodology provides a platform to systematically account for broader outcomes of interventions and the value for money of such interventions."*, Banke-Thomas et al. (2015). SROI can be used to observe the expected outcomes of increased participation, improved accessibility and cost-effectiveness to justify the financial investment.

1.6 Evaluation

There are several solutions available for e-voting and these range from commercial closed source solutions to free open source self-hosted services, there are also blockchain backed commercial products in this space. One recurring issue with investigating these services is lack of documentation around ISO and GDPR standards, with many potentially falling short of the requirement. Costing is often on a case by case basis with Simply Voting the only service researched that provides a calculator for self administrated elections with managed elections also priced on a per-case basis.

While free open source services can be manipulated and adapted to client needs, there are concerns around scaling and security. ConsulProject for example relies on a Postgres backend database which is in theory scalable but as time goes on, scaling further requires a significant amount of work to ensure data integrity and there is also the risk of DDOS to services built in this way.

By utilising blockchain technology as the backend for a self developed e-voting

system there are benefits in terms of scaling, security and redundancy. There has been extensive research into e-voting systems using Hyperledger/Fabric protocols that cover a variety of methods to ensure voter secrecy, network security and anti-tampering, Kyazhin & Popov (2020), Díaz-Santiso & Fraga-Lamas (2021), Mukherjee et al. (2020) and Kirillov et al. (2019).

1.7 Best practice

To ensure an e-voting platform it is imperative that it is usable, trusted by the electorate, Mozley (2021), is secure and auditable while maintaining privacy, Hussien & Aboelnaga (2013). Ensuring the privacy of each voters decision is key in building trust with homomorphic encryption methods often considered the most appropriate, Jabbar & Alsaad (2017), Chillotti et al. (2016), Shinde et al. (2013).

Chapter 2: Business case analysis

2.1 Data collection

The source of data for client requirements is from the tender documents released by TU Dublin for the e-voting service. The author made several attempts to contact the relevant people within the student union with no success. Vendors were also unwilling to provide any information that was unavailable on their websites.

The tender document provides a comprehensive overview of what TU Dublin expect from the service and in a proposal with the only unclear requirement being *"collate and provide final results, in accordance with ISO accredited procedures"* where research was performed to suggest relevant ISO standards for this service. The tender includes schedules and appendices for pricing schedule, service specification, charges, service level agreements and data protection agreements which are to be agreed upon after a successful application.

2.2 Client background

Technological University Dublin (TU Dublin) is a third level institution with a student population of around 28,500 across three campuses. TU Dublin is a recently formed institution as a result of merging IT Blanchardstown, IT Tallht and DIT and has a focus on expanding digital education capabilities.

2.3 Company Background

HEAnet is Irelands National Research and Education Network (NREN) providing networking and e-infrastructure services to educational institutions, schools and other state-sponsored bodies. HEAnet focuses on five core pillars to fulfil their strategic plans, which are Connectivity, Security, Identity, Brokerage and Research engagement. The strategic plan is created by collaborating with stakeholders and international

peers within the NREN community. The company mission is *"Delivering common, repeatable and shareable solutions for all of education."*

2.4 Requirements

The TU Dublin tender for an e-voting system for student union elections includes a number of technical and design requirements. The relevant requirements are as follows;

- An intuitive e-voting portal with candidate material
- Ability to communicate with the electorate with voting instructions
- Be able to handle variants in the numbers voting at any given time during the polling period
- Exemplary security and personal data privacy
- Ability to facilitate proportional representation and first past the post
- Have a service desk available during elections for queries
- Collate and provide final results within 48 hours of polls closing and in accordance with ISO accredited procedures

2.5 Current position

Commercial e-voting systems are usually closed source services provided by private companies that often operate outside the EU, which could raise some concerns such as data protection, compliance and security along with the possibility of the company ceasing to operate. TU Dublin have representatives on the board of HEAnet and the two organisations have an established relationship. As a result of this relationship, HEAnet have an understanding of the people and culture within TU Dublin and is in an ideal position to propose a solution that not only meets the requirements laid out in the tender, but to also apply cutting edge technology and share this knowledge with the wider educational and research community.

2.6 Strategic alignment

This project is aligned with several HEAnet strategies; Connectivity, Security, Identity and Research. This is an opportunity to not only provide a service to TU Dublin, it also presents an opportunity to meet the company mission of *"Delivering common, repeatable and shareable solutions for all of education."* as the blockchain is a decentralised, distributed network which can be shared by many organisations without compromising the security of their data on the network.

2.7 Financial analysis

HEAnet operates as a non-profit organisation and as a result financial returns are not a key priority. The Project Managers Office analyse budget/expenditure and tracking spend activity within a project, for example monitoring if the project is running under budget or beginning to overspend. They also focus on time spent on a project since engineer time will have been estimated and allocated with a portion of project budget allocated for this. Research in this paper shows that SROI would also be a useful model in measuring returns for such a project.

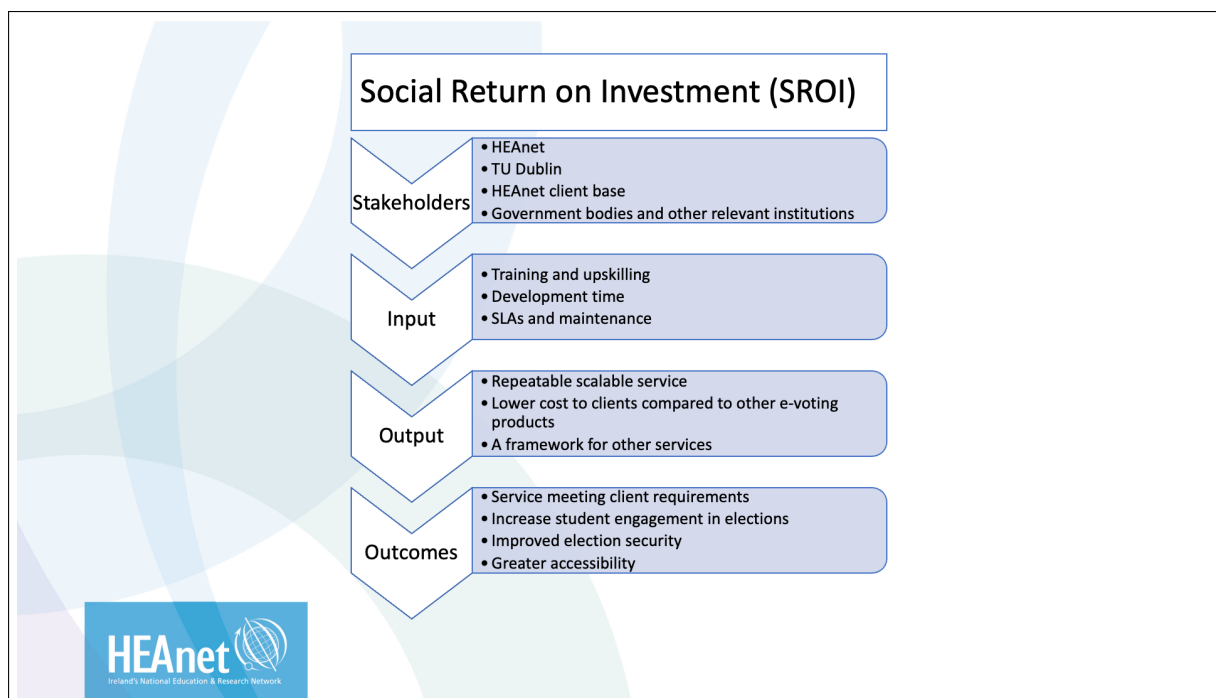


Figure 2: An overview of SROI (Source: Author, 2023)

2.8 Product/vision

The recommended solution is to put forward a proposal for a blockchain based e-voting system, using European Blockchain Services Infrastructure (EBSI) which supports Hyperledger and Fabric protocols, EBSI (n.d.). The EBSI is a European Commission initiative, with all EU member states as stakeholders and is a blockchain built on Hyperledger/Fabric protocols available for use by suitable organisations within the EU.

The proposed product will be available both on mobile and desktop devices and built entirely on the Hyperledger framework. Voting will be encrypted while the count can decrypt the vote without revealing how a person voted. Accounts and registration will be created in the form of a wallet and tied to the student Active Directory account while the e-portal will be a dApp built on top of the EBSI blockchain.

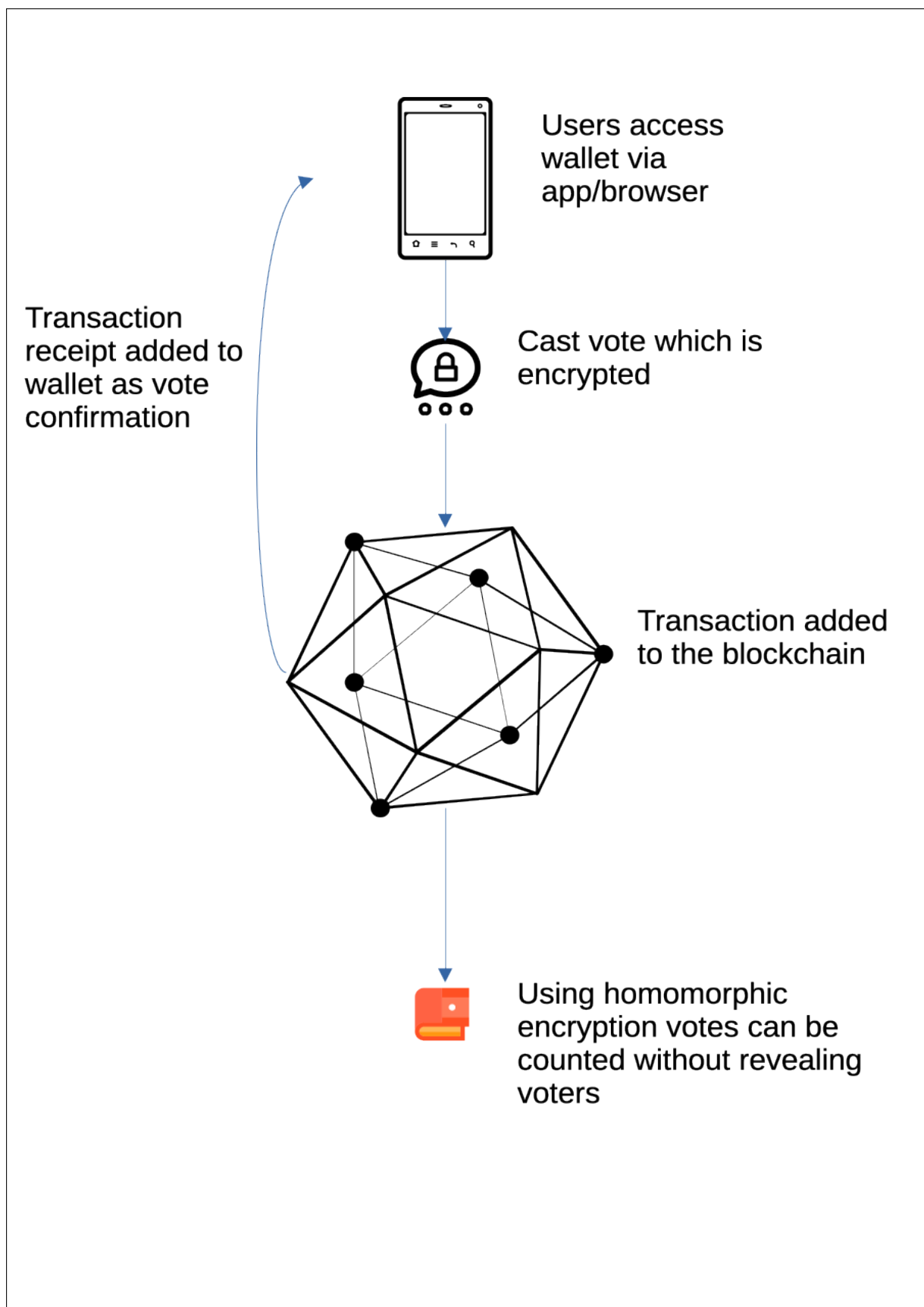


Figure 3: Basic service diagram (Source: Author, 2023)

2.9 Risk analysis

There are risks associated with proceeding with the proposed solution, such as exceeding the allocated budget and time for the project. To manage these risks there should be assistance from the internal HEAnet PMO team, who can provide support by providing feedback to stakeholders, interacting with any external vendors and ensuring the team has the resources required to meet milestones and deadlines. The service should also operate in a hybrid model, allowing administrators to assign a receipt onto the blockchain for anyone who provided a paper vote. Paper votes will still be required as some people may prefer this method or not have access to a device that is compatible with the service.

Chapter 3: Business case development

3.1 Future position

The initial goal of this proposal is to provide TU Dublin with a modern, secure e-voting solution that meets the requirements set out in the tender. There is a great opportunity to provide this service to other clients and suitable organisations along with providing valuable tooling and research to the community.

There is also the potential for developing a service that allows institutions to issue diplomas to graduates on the blockchain, providing a verifiable digital record of their achievements.

HEAnet is already an Identity provider (IDP) for many educational and research institutions in Ireland and blockchain technology has potential as a framework to build identity services on.

3.2 Resource requirements

This project will require training as there is a lack of knowledge within HEAnet regarding Hyperledger/Fabric and infrastructure costing will fall within the standard operating costs. Training should be made available to developers, system administrators and any other support staff and is estimated to take between 1-9 days depending on the level of knowledge required by different team members and at a cost of approximately €25,000. This would provide training for several team members and would be provided in an online classroom by NobleProg (2023) covering the following topics;

- Hyperledger for Beginners
- Hyperledger Indy for Identity Management
- Hyperledger Composer for Building a Network
- Hyperledger Iroha for Mobile Applications

A team consisting of 2 service architects/developers and 2 system administrators should be capable of building a service on the EBSI framework in 18 months including time allocated for training. As of April 2023, according to Glassdoor (2023) the average annual salary of a senior software engineer in Ireland is €78,000 and the average annual salary for a senior systems administrator is €64,000. Taking these figures into account and considering the project will require 2 of each of these roles to reach production, the cost would be €426,000 over 18 months. There will be other salaries to be considered as other teams will be engaged on an ad hoc basis throughout the project. The estimated cost of training, developing and deploying this service is in the region of €500,000 over the course of 18 months.



Figure 4: An example of measuring costs, output and impact (Source: Author, 2023)

3.4 Change management and governance

This project will follow Agile methodology which includes processes for change management such as making use of a product roadmap and Kanban boards as these allow the development team to both visualise their workload but also provides project representation to the wider organisation. Development will be incremental and continuously improving as a result of feedback and reviews of previous sprints. The assigned project manager will be the main point of contact between the team, client, other stakeholders and SMEs within the company who will be consulted regularly to ensure the project is conforming to ISO, GDPR and security standards throughout development. Change control will be handled on a review and test basis, where new code or features will be reviewed before being committed and built in a GitLab CI/CD pipeline, tested and deployed to the testnet for further testing and upon successfully passing this stage the development team can decide to deploy changes into the main production environment.

Roles and responsibilities within the project will be clearly defined from stakeholders to the development team to ensure decision-making is efficient and there is clarity for accountability for everyone involved in the project. HEAnet hosts a monthly company meeting where teams can provide feedback on how their projects are progressing and members of the development team should use this as a valuable time to provide visibility to the organisation. Documentation will be maintained in the form of issue tracking in GitLab making use of epics, milestones, tagging and merge requests as a form of both code review and historical code reference.

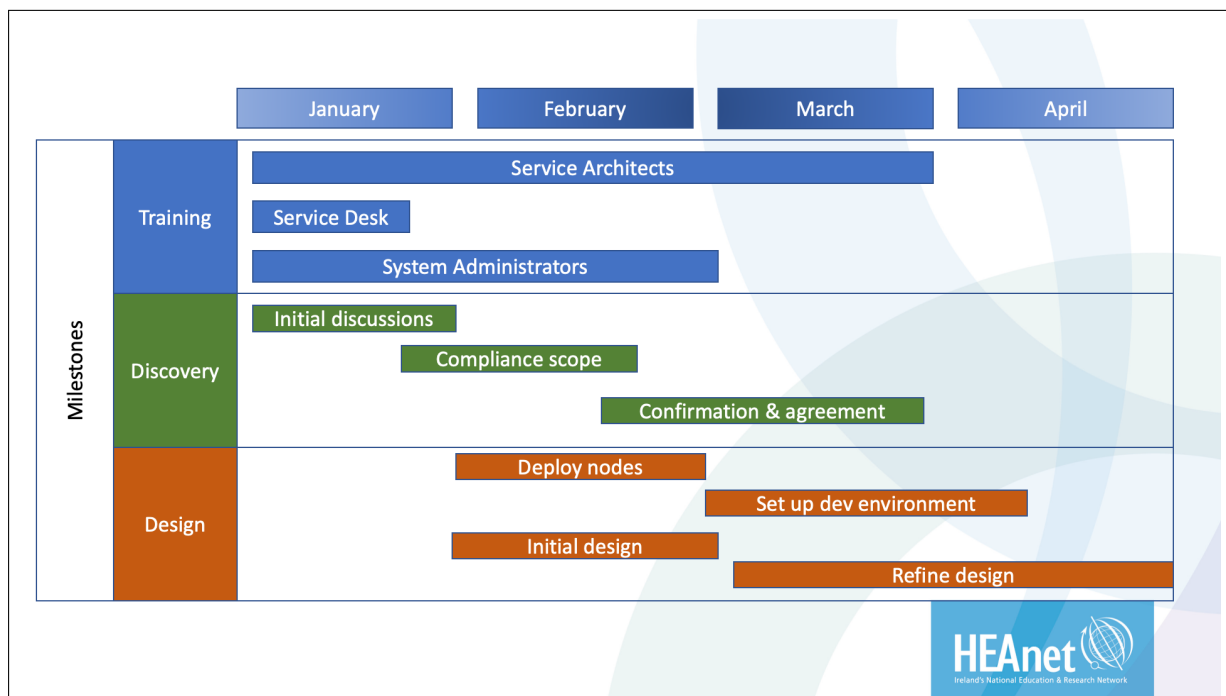


Figure 5: Example of a product roadmap for the first quarter (Source: Author, 2023)

3.5 Project schedule

The project will take approximately 18 months to complete taking into account training, requirement discovery, design, development, testing and deployment.

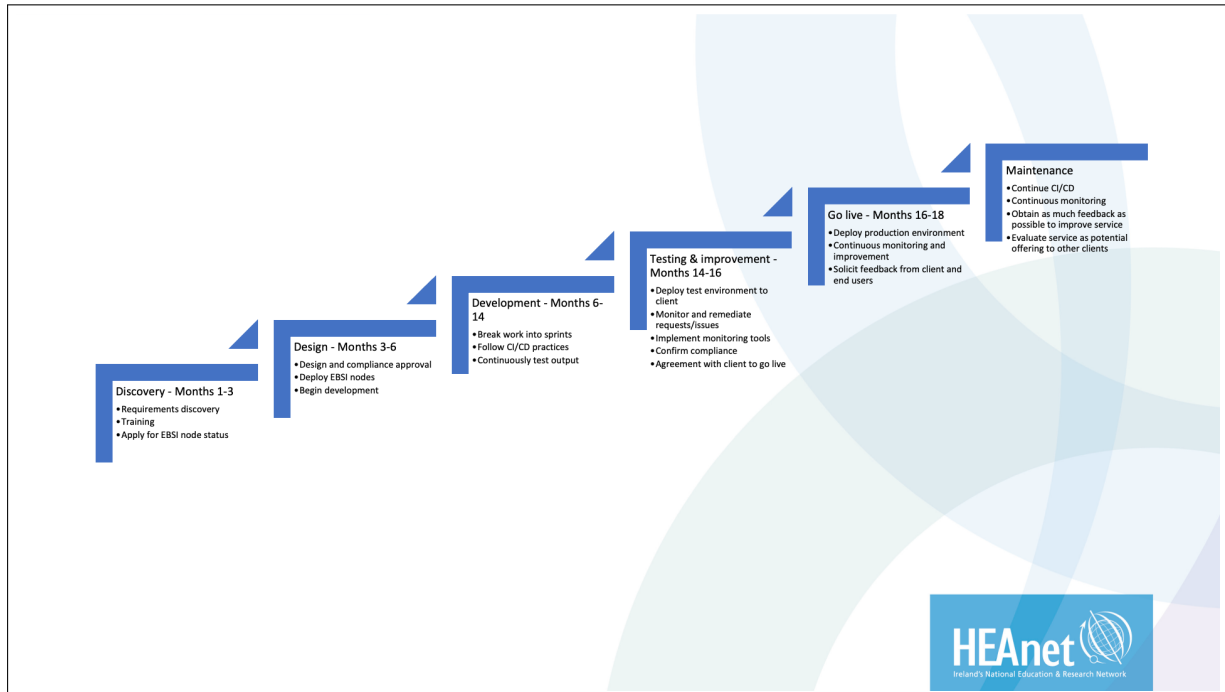


Figure 6: Project timeline with milestones (Source: Author, 2023)

3.6 Multi-annual business plan

This project is projected to take 18 months to reach completion by the end of 3 years there will be a product that has matured and is available as a service to the HEAnet client base.

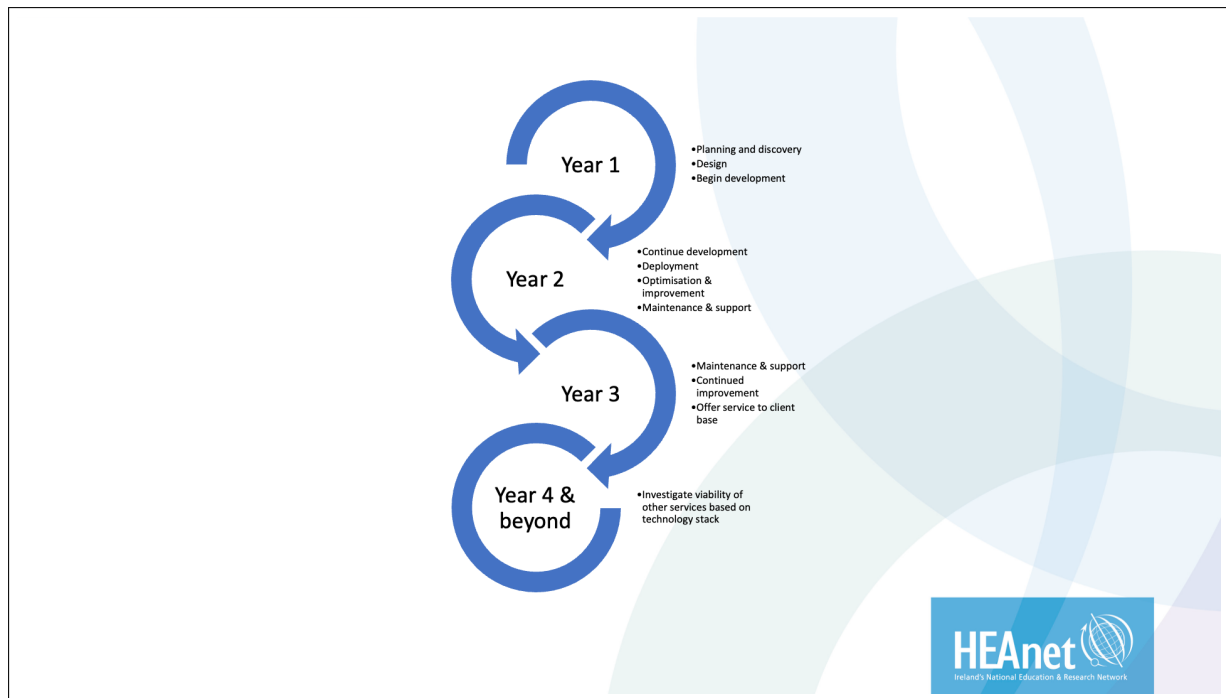


Figure 7: Multi-year project timeline (Source: Author, 2023)

3.7 Evaluation

Based on the information gathered in the secondary research section of this paper a service design can be composed for submission to tender. Taking into considerations the key features required by TU Dublin, blockchain is a suitable platform to build a service to meet their needs. The inherent security features of blockchain technology provide network resilience, auditability and anti-tampering features while the cryptographic nature of the technology supports concepts such as homomorphic encryption to ensure the votes remain anonymous. Having full control of the development process also ensures that the product meets all ISO/GDPR requirements as the research performed showed that there was a lack of information from providers, many of whom were unwilling to discuss financing or mechanisms in place to meet the required compliance standards. Hyperledger Fabric uses chaincode which is a form of smart contract that exists on other blockchains, the function of chaincode would be to handle voter eligibility, the voting process and result calculation. Since it is a form of contract and only the actions agreed within the contract are actioned then voting mechanisms can be customised for each election.

Chapter 4: Conclusion

HEAnet are in a position to provide not only TU Dublin with an e-voting service but their entire client base and with the training and knowledge obtained in doing so opens opportunities in developing other services based on the EBSI framework. In the past e-voting has been unsuccessful due to lack of oversight, understanding or financial will, however, as new technologies emerge then it is not unreasonable to continue to strive for a voting platform that provides security, trust, mobility and privacy. Estonia has shown that elections at all levels of government can be successfully conducted using digital methods and the fact that there have been consistent increases in uptake shows that there is demand for such a service. Blockchain technology provides a platform for e-voting services that is cost-effective, secure, accessible, tamper-proof and auditable.

References

- Abuidris, Y., Hassan, A., Hadabi, A. & Elfadul, I. (2019), Risks and opportunities of blockchain based on e-voting systems, in '2019 16th International Computer Conference on Wavelet Active Media Technology and Information Processing', IEEE, pp. 365–368.
- Agate, V., De Paola, A., Ferraro, P., Re, G. L. & Morana, M. (2021), 'Secureballot: A secure open source e-voting system', *Journal of Network and Computer Applications* **191**, 103165.
- Banke-Thomas, A. O., Madaj, B., Charles, A. & van den Broek, N. (2015), 'Social return on investment (sroi) methodology to account for value for money of public health interventions: a systematic review', *BMC public health* **15**(1), 1–14.
- Budurushi, J., Renaud, K., Volkamer, M. & Woide, M. (2016), 'An investigation into the usability of electronic voting systems for complex elections', *Annals of Telecommunications* **71**, 309–322.
- Chillotti, I., Gama, N., Georgieva, M. & Izabachène, M. (2016), A homomorphic lwe based e-voting scheme, in 'Post-Quantum Cryptography: 7th International Workshop, PQCrypto 2016, Fukuoka, Japan, February 24-26, 2016, Proceedings 7', Springer, pp. 245–265.
- Díaz-Santiso, J. & Fraga-Lamas, P. (2021), 'E-voting system using hyperledger fabric blockchain and smart contracts', *Engineering Proceedings* **7**(1), 11.
- EBSI (n.d.), 'What is ebsi?', <https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/What+is+ebsi>. European Commission EBSI, Accessed: 09-04-2023.
- Glassdoor (2023), 'Software developer salaries in ireland', https://www.glassdoor.ie/Salaries/software-developer-salary-SRCH_K00,18.htm. Glassdoor, Accessed: 18-04-2023.
- Gritzalis, D. A. (2002), 'Principles and requirements for a secure e-voting system', *Computers & Security* **21**(6), 539–556.
- Hjálmarsson, F. P., Hreiðarsson, G. K., Hamdaqa, M. & Hjálmtýsson, G. (2018), Blockchain-based e-voting system, in '2018 IEEE 11th international conference on cloud computing (CLOUD)', IEEE, pp. 983–986.
- Hussien, H. & Aboelnaga, H. (2013), Design of a secured e-voting system, in '2013 International Conference on Computer Applications Technology (ICCAT)', IEEE, pp. 1–5.
- Jabbar, I. & Alsaad, S. N. (2017), 'Design and implementation of secure remote e-voting system using homomorphic encryption.', *Int. J. Netw. Secur.* **19**(5), 694–703.
- Kirillov, D., Korkhov, V., Petrunin, V., Makarov, M., Khamitov, I. M. & Dostov, V. (2019), Implementation of an e-voting scheme using hyperledger fabric permissioned blockchain, in 'Computational Science and Its Applications–ICCSA 2019:

- 19th International Conference, Saint Petersburg, Russia, July 1–4, 2019, Proceedings, Part II 19', Springer, pp. 509–521.
- Kyazhin, S. & Popov, V. (2020), Yet another e-voting scheme implemented using hyperledger fabric blockchain, *in* 'Computational Science and Its Applications–ICCSA 2020: 20th International Conference, Cagliari, Italy, July 1–4, 2020, Proceedings, Part III 20', Springer, pp. 37–47.
- LSOI (2022), 'evoting', <https://www.lawsociety.ie/Solicitors/Representation/evoting>. Law Society of Ireland, Accessed: 09-04-2023.
- McGaley, M. (2008), E-voting: an Immature Technology in a Critical Context, PhD thesis, National University of Ireland Maynooth.
- Monev, V. (2022), Iso 27001 framework for securing election infrastructure and machine voting, *in* '2022 International Conference on Information Technologies (InfoTech)', IEEE, pp. 1–7.
- Mozley, K. (2021), 'Remote e-voting: More than a technical challenge', *no. March* pp. 1–11.
- MSL (2021), 'University college cork students' union celebrates the successful move to online elections', <https://www.ukmsl.com/case-studies/universitycollegecorkstudentsunioncelebratesthesuccessful-movetoonlineelections/>. MSL Ltd, Accessed: 09-04-2023.
- Mukherjee, P. P., Boshra, A. A., Ashraf, M. M. & Biswas, M. (2020), A hyper-ledger fabric framework as a service for improved quality e-voting system, *in* '2020 IEEE Region 10 Symposium (TENSYP)', IEEE, pp. 394–397.
- NobleProg (2023), 'Hyperledger training courses in ireland', <https://www.nobleprog.ie/hyperledger-training>. NobleProg, Accessed: 19-04-2023.
- NUIG (2021), 'Academic council elections 2021-2024', <https://www.universityofgalway.ie/academic-council-elections/>. National University of Galway, Accessed: 11-04-2023.
- Pai, N. D. & Mondal, S. (2019), A study on blockchain enabled applications and its security issues, *in* '2019 IEEE 5th International Conference for Convergence in Technology (I2CT)', IEEE, pp. 1–5.
- Pandey, A., Bhasi, M. & Chandrasekaran, K. (2019), Votechain: A blockchain based e-voting system, *in* '2019 Global Conference for Advancement in Technology (GCAT)', IEEE, pp. 1–4.
- Piirmets, E. (2023), 'How did estonia carry out the world's first mostly online national elections', <https://e-estonia.com/how-did-estonia-carry-out-the-worlds-first-mostly-online-national-elections/>. accessed: 24-04-2023.

- Shinde, S. S., Shukla, S. & Chitre, D. (2013), 'Secure e-voting using homomorphic technology', *International Journal of Emerging Technology and Advanced Engineering* **3**(8), 203–206.
- SimplyVoting (n.d.), 'Features', <https://www.simplyvoting.com/features/>. Simply Voting Inc., Accessed: 09-04-2023.
- Taban, H., Konde, S. & Sebwato, N. (2017), 'Design and implementation of electronic voting system'.
- Torre, L. M. J. D., Mengoy, R. V. M., Quindoza, R. E. E., Tamondong, N. J. S. & Tubola, O. D. (2022), Pupvote: Blockchain-based voting system using near protocol, in '2022 13th International Conference on Information and Communication Technology Convergence (ICTC)', IEEE, pp. 1127–1132.
- Tsahkna, A.-G. (2013), 'E-voting: lessons from estonia', *European View* **12**(1), 59–66.
- Vidwans, S., Deshpande, A., Thakur, P., Verma, A. & Palwe, S. (2022), Permissioned blockchain voting system using hyperledger fabric, in '2022 International Conference on IoT and Blockchain Technology (ICIBT)', IEEE, pp. 1–6.
- Wang, K.-H., Mondal, S. K., Chan, K. & Xie, X. (2017), 'A review of contemporary e-voting: Requirements, technology, systems and usability', *Data Science and Pattern Recognition* **1**(1), 31–47.

Appendix A: Tables & figures

List of Figures

1	Value proposition canvas (Source: Author, 2023)	6
2	An overview of SROI (Source: Author, 2023)	9
3	Basic service diagram (Source: Author, 2023)	11
4	An example of measuring costs, output and impact (Source: Author, 2023)	13
5	Example of a product roadmap for the first quarter (Source: Author, 2023)	14
6	Project timeline with milestones (Source: Author, 2023)	15
7	Multi-year project timeline (Source: Author, 2023)	16

List of Tables

1	Technical comparison of e-voting solutions	5
---	--	---

Appendix B: Excerpts from tender document

The entire tender document can be provided if required.

3.3 AWARD CRITERIA

- 3.3.1 The Services Contract will be awarded on the basis of the most economically advantageous tender(s) as identified in accordance with the following criteria:

Section B- AWARD CRITERIA				
	Criterion	%	Maximum Score Available	Minimum Required Score
B1	A) Security (20%) B) Ease of Use (10%) C) Robustness of the system to handle voting number variances (10%)	40%	4000	2400
B2	Communications	25%	2,500	1,500
B3	Project Management	10%	1000	600
B4	Costs	25%	2,500	
	Overall Total	100%	10,000	

***Minimum Pass requirement is 60%**

The award of contract will be on the basis of the **Most Economically Advantageous Tender** received, in accordance with the detailed award criteria and weightings set out above.

The lowest Ultimate Cost tender, will receive the maximum score achievable under this criterion.

$$\text{Pricing Score} = \frac{\text{Lowest Tendered Price} \times \text{Max Points}}{\text{Price of bid being evaluated}}$$

Scoring Matrix

Rating	Description	Score
Excellent	Satisfies expectations with significant extra business benefits. No reservations about proposal in this area. Services/solutions offered meet and exceed all requirements with significant benefits for the end user/purchaser (at no additional cost)	5
Very Good	Satisfies expectations with some extra benefits. Workable solution offering benefits beyond the stated requirement (at no additional cost)	4
Good	Satisfies expectations - Meets requirement but does not exceed.	3
Fair	Partially satisfies expectations. Minimally falls slightly below acceptable level. Lacking in some important areas. Would require additional effort or cost to make it work. Some aspects of the requirement not fully understood or ignored.	2
Poor	Partially satisfies expectations. Serious deficiencies in the solution offered. Unlikely to provide the services/solutions required. Services not offered as requested.	1
Unacceptable/ No Response	Does not satisfy expectations or answer/solution. Does not address requirement.	0

* Submissions must achieve the stated minimum score required (which equates to 60% of the maximum scores available) under each qualitative criterion.

Note that TU Dublin reserves the right to award half marks within the scoring band of 0 to 5 (i.e.3.5, etc.).

3.3.2 Subject to paragraphs 2.1 (Important Notices) and 3.5 (Standstill Period) of this RFT, appointment to the Framework Agreement to the highest ranked Tenderer (as determined by paragraph 3.3.1) will be conditional upon:

- (a) the Tenderer submitting the following evidence in respect of the Tenderer (including the Prime Contractor and any Subcontractors, as applicable in accordance with paragraph 3.1 above) to the extent not already provided, within seven (7) days of request by the Contracting Authority: (i) a Declaration in the form attached at Appendix 4; (ii) if applicable, evidence to the effect that measures taken by the entity concerned are sufficient to demonstrate its reliability despite the existence of a relevant Exclusion Ground; (iii) all or any of the supporting documents specified at paragraph 3.2; and

Appendix 1: Requirements and Specifications

Tenderers must address each of the issues and requirements in this part of the RFT and submit a detailed description in each case which demonstrates how these issues and requirements will be dealt with / met and their approach to the proposed delivery of the Services. A mere affirmative statement by the Tenderer that it can/will do so or a reiteration of the tender requirements is NOT sufficient in this regard.

e-Voting Service – Specification of requirements

TU Dublin would like to implement electronic voting, managed by a contracted service provider, by TU Dublin staff in the Academic Council, its Sub-Committees and other elections (as required) in Q4 2022 and beyond.

The type of processing involves:

- (a) Compilation by TU Dublin Election Team of an electoral register from the data gathered for quarterly HEA returns comprising name, surname, staff number, email address and description whether Academic or Professional Management & Support Services.
- (b) Publication on TU Dublin intranet of Academic or Professional Management & Support Services Registers comprising surname, name and campus for the purposes of verification by staff.
- (c) Transmission by SharePoint (or other means) of Academic or Professional Management & Support Services Electoral Registers comprising name, surname, staff number, email address to the contracted service provider entailing approximately 3,500 TU Dublin staff.
- (d) Email contact by the contracted service provider to individual TU Dublin staff on Electronic Voting.
- (e) Electronic voting by TU Dublin Staff through the contracted service provider's portal or other means.
- (f) Processing by the contracted service provider to determine voting outcomes, and transmission of same to TU Dublin Election Team.
- (g) Retention by the contracted service provider of staff data and voting data for three months.

The service provider should:

- Provide a dedicated contract manager for TU Dublin
- Prepare voting material and design an intuitive e-voting portal, to appropriately fit the requirements of TU Dublin, via which voters can access candidate information and cast their vote(s)
- Communicate with the "electorate" (details to be provided by TU Dublin) with voting instructions

- Be able to handle variants in the numbers voting at any given time during the polling period
- Be able to demonstrate that exemplary security and personal data privacy are built-in to their e-voting system
- be able to employ both “proportional representation” and “first past the post” voting system as required by TU Dublin, employing the use of electoral constraints where required
- have a service desk available to TU Dublin during elections for resolution of voter queries
- collate and provide final results, in accordance with ISO accredited procedures, within 48 hours of the close of polls, by means of a clear, concise report

Appendix C: Response document with award criteria

Tender Response Document



Request for Tender for a Single-Party Framework for the Provision of	E-Voting Service
Procedure	Open
Reference	NCTR2273
Issue Date	19/09/2022 at 2pm
Closing Date for Queries	03/10/2022 at 2pm
Contact for Queries	Via eTenders messaging facility
Closing Date / Time for receipt of Completed Responses	10/10/2022 at 2pm

Table of Contents

Section A	Requirements	Ps 3 - 6
Section B	Response Document	Ps 7 - 14

SECTION A: REQUIREMENTS

REF	PASS/FAIL CRITERIA	PASS REQUIREMENT
A1	Applicant Summary	Applicants must complete this section. If the Applicant is a grouping, then a separate questionnaire must be completed for each group member.
A2	Financial	Applicants are required to self-declare compliance with the requirements.
A3	Tax Compliance	Applicants should note that if invited to tender, they will be required to provide the evidence self-declared prior to receipt of invitation to tender.
A4	Insurance	
A5	References/Previous Experience	Applicants must supply contact details and information on services provided for three referees to whom you have provided similar services to the requirements of this RFT.

SECTION A: PASS/FAIL CRITERIA

A1. APPLICANT SUMMARY

Weighting: Pass/Fail only

Pass requirement: Applicants must complete this section

Organisation Name	Insert Response
Contact Name	Insert Response
Address	Insert Response
Telephone	Insert Response
Email	Insert Response
Legal Status (if any) (e.g., Company, Partnership, Sole Trader, etc.)	Insert Response

Please indicate the basis on which you are tendering (tick one box)

Requirement	Yes / No
a) your organisation would provide all the services tendered for, if awarded a contract	Choose an item.
b) your organisation would act as the prime contractor, using third parties to provide some of the services tendered for if awarded a contract	Choose an item.

The below is a requirement of each Applicant

Requirement	Yes / No
The Applicant must submit a signed Tenderers statement.as per Appendix 3 of the RFT	Choose an item.
The Applicant must submit a Signed Declaration as to Personal Circumstances. as per Article 45 of Directive 2004/18/EC & Regulation 53 of SI329); Appendix 4	Choose an item.

Subcontractors Details	
Subcontractors/Consortium Members	Role in this contract
Provide the names of all subcontractors and/or consortium members who will be involved in the provision of the Services	Describe the role to be fulfilled by each subcontractor/consortium member.

A2/A3/A4. FINANCIAL/ TAX COMPLIANCE / INSURANCE

Weighting: Pass/Fail only

Pass requirement: Applicants must confirm that they meet the following minimum rules

A2. Financial Summary	
Requirement	Yes / No
<p>The company is solvent and of good economic standing and can if requested supply an accountant's/ auditor's statement for the last two financial years.</p> <p>Availability of a signed statement from accountant/auditor confirming an annual company turnover of €100,000 for each of the last 3 years or 2017, 2018 and 2019 if your turnover was affected by COVID</p>	Choose an item.

A3. Tax Compliance	
Requirement	Yes / No
The Candidate holds a current and valid Tax Clearance Certificate(s) from the Revenue Commissioners or in the case of a Candidate outside of the Republic of Ireland hold or can provide an equivalent statement from the relevant taxation authority.	Choose an item.

A4. Insurances	
Requirement	Yes / No
That the Candidate holds, or will hold should they be successful, the following insurances. TU Dublin reserves the right to amend the requirements before a Purchase Order is issued.	
Employer's Liability - €13 million limit for any one claim or series of claims arising out of a single occurrence	Choose an item.
Public Liability - €6.5 million limit for any one claim or series of claims arising out of a single occurrence	Choose an item.

Documentary evidence of economic and financial standing is not required at this stage of the Competition. Instead, Candidates are asked to declare that they meet the minimum standards required by the Contracting

Authority and will be in a position to produce the necessary documentation (e.g., bank statements, audited accounts, proof of insurance, etc.) if prior to any award of contract.

A5: PREVIOUS EXPERIENCE/REFERENCES

Provide the details of 2 previous contracts delivered by your organisation/consortia within the last 5 years. These contracts must be similar to the requirements of this tender enquiry in terms of contract nature and scope. If previous contracts relate to the subcontractors or the members or the consortium, please specify it accordingly.

Please copy template below as required.

PREVIOUS EXPERIENCE (CONTRACT ONE)- e-Voting Service			
Client Organisation Name			
Client Name			
Client Contact Details	Contact Name		
	Contact E-mail Address		
	Contact Telephone Number		
Annual Value			
Start Date		End Date	
Please provide a summary of the project and indicate how it is similar to the services being sought by TU Dublin.			

PREVIOUS EXPERIENCE (CONTRACT TWO)- e-Voting Service		
Client Organisation Name		
Client Name		
Client Contact Details	Contact Name	

	Contact E-mail Address		
	Contact Telephone Number		
Annual Value			
Start Date		End Date	
Please provide a summary of the project and indicate how it is similar to the services being sought by TU Dublin.			

PLEASE NOTE

In the first instance, all submissions will be checked to ensure they meet the mandatory pass/fail requirements in Section A in order to determine compliancy and responsiveness. All submissions that meet the mandatory pass/fail criteria will be deemed to be compliant and responsive and will be assessed under the weighted criteria set out in Section B. Any submission that does not meet the mandatory pass/fail requirements will be deemed to be non-compliant and non-responsive and will be eliminated.

In relation to minimum score required - Tenderers should note that they must achieve a minimum rating set out for each of the individual qualitative criteria to avoid elimination from the competition

Section B- AWARD CRITERIA

	Criterion	%	Maximum Score Available	Minimum Required Score
B1	A) Security (20%) B) Ease of Use (10%) C) Robustness of the system to handle voting number variances (10%)	40%	4000	2400
B2	Communications	25%	2,500	1,500
B3	Project Management	10%	1000	600
B4	Costs	25%	2,500	
	Overall Total	100%	10,000	

***Note:

- Service brochures or links to websites in lieu of the required response will not be accepted.
- Where additional documents are requested, they must be appended as separate documents to the Tender response clearly identifying which question/section of this Form of Tender they relate to.
- Each field can be expanded as necessary to allow sufficient space for a comprehensive yet concise answer.
- Only those tenders which meet a minimum of 60% in each of the non-cost criteria above will be considered for award.

Requirement Table

The “**Requirement Provided**” column in this table must be completed. An “N” response to a mandatory requirement will imply rejection of the tender.

M= Mandatory

Requirement	Mandatory (M)	Requirement Provided? Yes(Y) /No (N)	Comments Please expand on your response to the requirement.

Can demonstrate that exemplary security and personal data privacy are built-in to their e-voting system (Award Criteria: Security)	M		
Be able to employ both “proportional representation” and “first past the post” voting systems as required by TU Dublin, employing the use of electoral constraints where required (Award Criteria: Ease of use)	M		
Service desk available to TU Dublin during elections for resolution of voter queries (Award Criteria: Communications)	M		
Collate and provide final results, in accordance with ISO accredited procedures, within 48 hours of the close of polls, by means of a clear, concise report. (Award Criteria: Communications)	M		

B1 (a) E Portal System

Tenders must provide details of the e voting portal to ensure TU Dublin’s requirements are met

Insert Response

B1 (b) Robustness of the system to handle voting number variances (10%)

Tenders must advise how they propose to to handle variances in the numbers voting at any given time during the polling period

Insert Response

B2 Communications

Please outline the process by which voters can access candidate information and cast their vote(s)

Please outline how you would propose to communicate with the voters to provide the relevant instructions.

Please outline how voting queries would be handled during the polling period

Insert Response

B3 PROJECT MANAGEMENT

Tenderers must provide a detailed description of the proposed contract management process

Please provide details of the proposed Contract Manager in the box provided below

Insert Response

Contract Manager's Name

Proposal for Quality Measurement

Contract Manager's Name

Proposal for Quality Measurement

--

*****All aspects of the service must be GDPR Compliant

Costs

B3. Costs

Weighting: 20% (Maximum 2,000 points):

All costs are to be shown in EUROS and should be exclusive of VAT but the VAT rate applicable should be indicated also.

Under the framework, no expenses in respect of travel time and costs will be payable unless agreed in advance for specific projects.

For the purposes of costings, On TU Dublin Site means the contractor will need to attend one of TU Dublin sites and Off site is work that can be carried out from the Contractors Office e.g., Telephone Calls.

The below Rate for Services (On TU Dublin Site) must include travel, subsistence and other necessary costs associated with travel.

All costs must include receipt of the electorate list, communication to the electorate, securely running the poll via an election portal and providing the result

Cost per election event	Total Cost (ex VAT)
E Portal System	
Communications	
Administration	
Project Management	

Please advise if a discount would be made available for multiple election events	
Any Additional Costs not specified above	

Please also confirm inclusion of the following documents

Description	Y/N	
Tenderer's Statement		

Declaration as to Personal Circumstances of Tenderer		
--	--	--

Signature of Tenderer

Signed: _____ Date: _____
