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## Horizon 2020

**Call: H2020-EIC-SMEInst-2018-2020**  
(SME Instrument)

**Topic: EIC-SMEInst-2018-2020**

**Type of action: SME-2**

**Proposal number: 850287**

**Proposal acronym: Irix**

**Deadline Id: H2020-SMEInst-2018-2020-2**

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#### *How to fill in the forms*

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the steps in the submission wizard.

Proposal ID **850287**

Acronym **Irix**

## 1 - General information

Topic **EIC-SMEInst-2018-2020**

Type of Action **SME-2**

Call Identifier **H2020-EIC-SMEInst-2018-2020**

Deadline Id **H2020-SMEInst-2018-2020-2**

Acronym

Irix

Proposal title

Trust-based search engine for businesses and citizens

*Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &*

Duration in months

24

*The first set of keywords (main keyword 1 and sub-keyword 1) will have the heaviest weight in matching the expert-evaluators who will evaluate the proposal, therefore it is crucial to ensure this first set of keywords reflects the area of your proposal as accurately as possible.*

*In order to ensure your proposal is matched to evaluators with the best expertise, we highly recommend that you choose at least one main keyword and one sub-keyword.*

Main Keyword 1

Information and Communication Technology (ICT)

Sub Keyword 1

Collaborative Systems

*It is highly recommended to select the highest number of relevant keywords that correspond to your proposal with a maximum of three main keywords and three sub-keywords. The main keyword can be repeated up to three times, but a different sub-keyword should be chosen if possible each time.*

Main Keyword 2

Information and Communication Technology (ICT)

Sub Keyword 2

Web and information systems, database systems, information retrieval and digital libraries, data

Main Keyword 3

Information and Communication Technology (ICT)

Sub Keyword 3

Communication networks, media, information society

Free keywords

Digital trust, search, security, digital economy, collaborative economy, gig economy, open access, digital confidence

# Proposal Submission Forms

Proposal ID **850287**

Acronym **Irix**

## Abstract

Trust is becoming a keystone for industry and society. In business, trust accelerates transactions by reducing the need to insure against deception. In the professional services, trust ensures matched standards between seekers and providers. Trusted recommendations help citizens choose tradesmen, doctors and helpers. And trust is at the heart of the sharing economy, which encourages access over ownership. Web search engines, like Google and Bing, have transformed our lives by providing fast and targeted access to information. But these search engines are not effective at finding individuals for trust-based relationships: employees, consultants, advisors, skilled workers and day-to-day services. The demand for trust-based search is stronger than ever, but technology has yet to meet that demand. Our solution is Irix, a trust-based search platform for finding the people we need by recursively harnessing the trusted contacts between individuals. Selecting on the basis of trust will have broad impacts on how business and citizens fill roles. Irix will benefit recruitment in firms, credibility in the professional services, and the livelihood of skilled workers. It will help citizens make better decisions in the services they choose.

Remaining characters

752

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under Horizon 2020 or any other EU programme(s)?

Yes  No

Please give the proposal reference or contract number.

823564

830778

# Proposal Submission Forms

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Acronym **Irix**

## Declarations

1) The coordinator or sole applicant declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	<input checked="" type="checkbox"/>
2) The information contained in this proposal is correct and complete.	<input checked="" type="checkbox"/>
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the <a href="#">European Code of Conduct for Research Integrity</a> — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	<input checked="" type="checkbox"/>
4) The coordinator or sole applicant confirms:	
- to have carried out the self-check of the financial capacity of the organisation on <a href="https://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html">https://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html</a> . Where the result was “weak” or “insufficient”, the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	<input checked="" type="radio"/>
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	<input type="radio"/>
- as sole participant in the proposal is exempt from the financial capacity check.	<input type="radio"/>
5) The coordinator or sole applicant hereby declares that each applicant has confirmed:	
- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	<input checked="" type="checkbox"/>
- they have the financial and operational capacity to carry out the proposed action.	<input checked="" type="checkbox"/>
The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

### Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the [privacy statement](#). Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the [Privacy statement for the EDES Database](#).

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## 2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	Conaissance Ltd	United Kingdom	

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---------------------------	---------------------	------------------------

## 2 - Administrative data of participating organisations

<b>PIC</b>	<b>Legal name</b>
910620287	Conaissance Ltd

Short name: Irix

### Address of the organisation

Street 35a, South Street  
 Town London  
 Postcode W1K 2XF  
 Country United Kingdom  
 Webpage

### Specific Legal Statuses

#### Research and Innovation legal statuses

Public body .....no	Legal person .....yes
Non-profit .....no	
International organisation .....no	
International organisation of European interest .....no	Industry (private for profit).....yes
Secondary or Higher education establishment .....no	
Research organisation .....no	

#### Enterprise Data

SME self-declared status.....07/06/2017 - yes  
 SME self-assessment .....07/06/2017 - yes  
 SME validation sme..... unknown

**Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.**

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Short name **Irix**

## Department(s) carrying out the proposed work

### Department 1

Department name

not applicable

Same as proposing organisation's address

Street

Town

Postcode

Country

# Proposal Submission Forms

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Short name **Irix**

## Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex  Male  Female

First name **Tingey**

Last name **ANTONIA**

E-Mail **antoniatingey@gmail.com**

Position in org.

Department

Same as organisation name

Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax



## 3 - Budget for the proposal

No	Participant	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)	(I) Reimbursement rate (%)	(J) Max.EU Contribution / € (=H * 1%)	(K) Requested EU Contribution/ €
			?	?	?	?	?	?	?	?	?	?	?
1	Conaissance Ltd	UK	1191300	178099	119130	0	0	342349.75	0	1830878.75	70	1281615.13	1281615.13
	Total		1191300	178099	119130	0	0	342349.75	0	1830878.75		1281615.13	1281615.13

Please note that budget amounts are represented in full, NOT as multiples of 1000.

## 4 - Ethics

<b>1. HUMAN EMBRYOS/FOETUSES</b>		Page
Does your research involve <a href="#">Human Embryonic Stem Cells (hESCs)</a> ?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human embryos?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of human foetal tissues / cells?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>2. HUMANS</b>		Page
Does your research involve human participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve physical interventions on the study participants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>3. HUMAN CELLS / TISSUES</b>		Page
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>4. PERSONAL DATA</b>		Page
Does your research involve personal data collection and/or processing?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve further processing of previously collected personal data (secondary use)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>5. ANIMALS</b>		Page
Does your research involve animals?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>6. THIRD COUNTRIES</b>		Page
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
In case your research involves <a href="#">low and/or lower middle income countries</a> , are any benefits-sharing actions planned?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Could the situation in the country put the individuals taking part in the research at risk?	<input type="radio"/> Yes <input checked="" type="radio"/> No	

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Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Does your research involve the use of elements that may cause harm to humans, including research staff?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>8. DUAL USE</b>		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS</b>		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>10. MISUSE</b>		Page
Does your research have the potential for misuse of research results?	<input type="radio"/> Yes <input checked="" type="radio"/> No	
<b>11. OTHER ETHICS ISSUES</b>		Page
Are there any other ethics issues that should be taken into consideration? Please specify	<input type="radio"/> Yes <input checked="" type="radio"/> No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents.

[How to Complete your Ethics Self-Assessment](#)

## 5 - Call specific questions

### Call specific declaration(s)

I declare on my honour that: Neither I nor any of the members of the consortium (if relevant) are involved in concurrent submission or implementation with another SME instrument Phase 1 or Phase 2 project.



Does your proposal build on a SME instrument Phase 1 project? Please indicate.

Yes  No

### Excluded Reviewers

You can provide up to three names of persons that should not act as an evaluator in the evaluation of the proposal for potential competitive reasons.

First Name

Last Name

Institution

Town

Country

Webpage

### Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default participate in the [Pilot on Open Research Data in Horizon 2020<sup>1</sup>](#), which aims to improve and maximise access to and re-use of research data generated by actions.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a [Data Management Plan \(DMP\)](#), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

# Proposal Submission Forms

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We wish to opt out of the Pilot on Open Research Data in Horizon 2020.

Yes

No

Further guidance on open access and research data management is available on the participant portal: [http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination\\_en.htm](http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm) and in general annex L of the Work Programme.

<sup>1</sup> According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.

# Trust-based search engine for businesses and citizens



Short title: Trust-based search

1 Coordinator: Conaissance Ltd, UK

## Colophon

This proposal was written collaboratively with Google Docs by the Irix core team.

Figures were made with Adobe Illustrator, Adobe XD and Mathematica.

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# 1 Excellence

## 1.1 Challenge and solution

### 1.1.a Summary of problem and solution

Trusted relationships are key to the future of industry and society.



But today's search engines cannot handle trust-based relationships.



Therefore we created Irix, a trust-based platform for finding people.

Trust is becoming a keystone for industry and society. In business, trust accelerates transactions by reducing the need to insure against deception. In the professional services, trust ensures matched standards between seekers and providers. Trusted recommendations help citizens choose tradesmen, doctors and helpers. And trust is at the heart of the sharing economy, which encourages access over ownership.

Web search engines, like Google and Bing, have transformed our lives by providing fast and targeted access to information. But these search engines are not effective at finding individuals for trust-based relationships: employees, consultants, advisors, skilled workers and day-to-day services. The demand for trust-based search is stronger than ever, but technology has yet to meet that demand.

Our solution is Irix, a trust-based search platform for finding the people we need by recursively harnessing the trusted contacts between individuals. Selecting on the basis of trust will have broad impacts on how business and citizens fill roles. Irix will benefit recruitment in firms, credibility in the professional services, and the livelihood of skilled workers. It will help citizens make better decisions in the services they choose.

### 1.1.b What we have done and will do

#### What we have done so far

We conceived, designed and built Irix (irixit.com), a trust-based search platform for businesses and citizens. Irix has had 270 users. To date we have:

- Built, tested and refined three versions of the Irix platform for the web.
- Raised €60,000 to develop and promote the Irix platform.
- Integrated financial transactions for rewarding connectors.
- Performed a range of technical and usability tests using automated models and real users.
- Demonstrated the platform in a relevant environment to find web developers and postdocs.

#### What we will do in Phase 2

We now need to increase platform availability and accelerate market uptake and commercialization. In the two years of Phase 2 we will:

- Make our platform more widely available by launching a mobile app for iOS and Android.
- Integrate seamless payments allowing users to pay and receive bounties directly from their phone.
- Extend the range of ways to add contacts to include WhatsApp, SMS and Facebook Messenger.
- Enhance the search process for success and profit by optimizing the trust tree size and depth.
- Achieve market penetration for businesses by targeting software, film and academia.
- Achieve market penetration for citizens by targeting tradesmen, medicine and law, and tutors.
- Harness a built-in viral growth engine where users generate new users by inviting their contacts.
- Develop a distributed architecture to manage large-scale search volumes.

### 1.1.c What Irix does

#### 1 Irix extends the community of trusted persons

Humans have a fundamental predisposition towards trust. Trust enables them to make important decisions better and more quickly. Irix combines the human inclination towards trust with a technology platform to build and track trust corridors. A trust corridor is trust between two people that do not know each other, based on a pathway of trusted connections between them. In other words, if Alice trusts Bob, and Bob trusts Carol, Alice tends to trust Carol too. Trust corridors can dramatically extend the community of people that a person trusts beyond the contacts that they know directly.

#### 2 Irix combines human intuition and digital efficiency

Trust is a deeply human concept that involves aligned standards, integrity and reliability. Humans know instinctively which of their friends and colleagues they trust for different purposes. Technology cannot replace that. But humans are less good at making and tracking the combinatorial trust corridors that extend beyond their local patch of the fabric of society. This is where technology can help. Central to Irix is a synthesis of human intuition and digital efficiency that harnesses the best of both worlds. Instead of replacing human instinct with technology, Irix enhances it and transforms it.

#### 3 Irix rewards people who make valuable connection

Connectors provide a valuable service to society. They create value by matching supply and demand within the community of their known contacts. To encourage people to make more connections, Irix uses a cash bounty system. The size of the bounty is set by the seeker. Everyone along the path of connectors from the seeker to the provider gets paid, but not everyone gets the same amount. The connector closest to the provider gets  $\frac{1}{2}$  of the bounty, the next connector along gets  $\frac{1}{4}$ , and so on, with Irix taking whatever is left over as a fee (see the Fig. in §1.2.a).

#### 4 Irix recursively headhunts headhunters

The way Irix works is simple. When searching to fill a specific role, every one of our personal contacts becomes a potential headhunter. But they are not just hunting for the right candidate; they are also on the lookout for further headhunters. In fact, Irix doesn't differentiate between candidates and headhunters, since potential candidates tend to make the most informed headhunters. By recursively tracking the experts that know the experts we know, and so on, Irix combines the local information of connectors to matchmake the needs of seekers and providers.

### Case study

#### Creating a search

A- business wants to hire a mobile app developer. Using Irix, the business sets a bounty and sends the job description to a select number of its contacts that are most familiar with mobile app development. Each of these contacts can either apply for the job themselves, or they can pass the job description on to a small number of their most relevant contacts. This process can repeat indefinitely.

#### Why it works

As this process gets repeated, two things happen. First, the number of people who learn about the job grows exponentially. Second, the job description is sent to precisely those people who are most relevant to the job. Anyone who receives the description can apply for the job. Only when the business hires one of the applicants does the search come to an end.

#### Who gets rewarded

At the end of the search, all of the connectors between the business and the hired developer get paid part of the bounty. But they don't all get paid the same amount: connectors closest to the hired developer get the biggest cut of the bounty. Irix gets a cut, too, which depends on how many layers the search has: shorter searches mean Irix gets more.



### 1.1.d User needs and advantages

Irix addresses six user needs. The top three relate to search, and the bottom three relate to trust. We discuss competing technologies in §1.1.f and compare Irix to them across the six user needs in §1.1.g.

Search

#### Cheaper

**Problem.** Today’s recruitment technologies are expensive. Recruitment agencies charge 15–25% of the worker’s annual salary: for a €50,000 p/a job, the fee is €7,500–12,500. Job boards charge €200–1000 per month, and freelance platforms charge 10–20% of the salary.

**Our solution.** Irix lets users set their own fee (bounty) based on their resources and need to incentivize. Because Irix makes it easy to pass on a search to relevant contacts, even modest bounties can be an effective incentive. Irix’s running costs are low because it does not rely on staff to matchmake; instead, it outsources this to connectors.

#### Faster

**Problem.** Current technologies for recruiting people take weeks to months. As businesses become more agile and citizens change jobs more frequently, the need to quickly find the right person or the right job is greater than ever.

**Our solution.** Irix lets users find the person they need in days rather than weeks or months. The recursive nature of the Irix technology means that each search uses many individuals acting simultaneously to parallel process. In technical terms, it operates in logarithm time rather than linear time.

#### More targeted

**Problem.** Sharing platforms tend to broadcast to all of a user’s contacts rather than a tailored few. This means that the audience is less targeted. When this process is repeated by friends of friends, and so on, the result is that many people receive requests that are not relevant to them.

**Our solution.** Instead of broadcasting to all of a user’s contacts, Irix “thincasts” to a select few, tailored by each user to the search. The benefit is twofold: targeted users are more likely to be the right person for the role (provider); and those that are not are more likely to pass the search to relevant contacts of their own (connectors).

Trust

#### Aligned standards

**Problem.** One part of trust is aligned standards, meaning that the seeker and provider value things in a similar way. But because current recruitment technologies select on the basis of first impressions or ratings, many seekers and providers with different standards get matched, resulting in dissatisfaction.

**Our solution.** Because connectors know the standards of their contacts, searches in Irix get passed on to people with aligned standards. In this way Irix helps user select people that more accurately reflect the long-term success of their match.

#### Integrity

**Problem.** A second part of trust is integrity, meaning that the provider has good intentions and is not opportunistic. Because current recruitment technologies do not rely on longstanding relationships, it is hard to spot malicious intent.

**Our solution.** All connections made through Irix are between contacts that are already known to each other. The resulting trust corridors between seekers and providers help mitigate the risk of bad intentions or deception.

#### Reliability

**Problem.** Another part of trust is reliability, meaning that the provider is motivated to deliver consistently over time. But current recruitment technologies can select for providers that impress at first, but to not reliably follow through later on.

**Our solution.** Trust corridors provide an extra incentive to consistently deliver. The provider doesn’t want to let down the seeker, of course, but he also doesn’t want to let down the connector whom he already knows personally.

### 1.1.e Importance of trust

Businesses	Citizens
<p>Trust plays an important role in business recruitment. Referrals from known contacts (or chains of contacts) are more trusted, meaning that there is stronger belief in their standards, integrity and reliability. According to Jobvite 2017, referrals are five times more likely to get hired than other forms of recruitment. They are hired 55% faster than using job boards or recruitment agencies. Nearly half, 46%, of employees hired through referrals stay for over three years, compared to 14% of those hired through conventional means.</p>	<p>Citizen recruitment includes consumer recruitment of businesses services (e.g., a plumber), but it is broader. ‘Recruit’ means to get someone to do or assist in doing something, and here we also include services provided by other citizens, paid or not (e.g., a babysitter). Often trust plays an even bigger role when people seek citizen-to-citizen roles and services, because they often relate to our personal and family wellbeing. Trust and trust corridors, successfully tracked and traversed, can provide citizens with the standards and integrity they seek.</p>

To understand how Irix users perceive trust and the value of our platform, we interviewed a range of customers. They are chosen from across the six targeted user groups described in §2.1.a.

	Academia	Film	Software
Business	<p>“Overall there are a lot of postdocs out there but in any given subfield it’s a small world. I advertise on [the job board] jobs.ac.uk but most of the time it’s someone who worked with someone who worked with me that I end up hiring. Usually by emailing colleagues who pass on the message. It means you trust...the calibre of what you’re getting.” —Anthony, Researcher</p>	<p>“[Word of mouth is] very important, definitely in the 8–10 range... It’s how I’ve gotten most of my jobs in film, by word of mouth or networking, rather than by job posts. It means someone vouches for your work ethic and quality output, which is really important on a high pressure, low budget, tightly scheduled film shoot.” —Venla, Producer</p>	<p>“I have had fairly good results from using LinkedIn in the past but my main successes have come from the recommendations of other developers I [meet or] work with. It seems to be a pretty tight community and once you know someone great you tend to stick with them. Sometimes they aren’t available but they recommend a friend in their place.” —Richard, Developer</p>
Citizen	Medicine	Instructors	Tradesmen
	<p>“When I had my knee operation I didn’t know where to start. I was uneasy with the consultant [I got], I knew nothing about surgery. I looked on the internet and asked friends if they knew someone with the same issue. If I had been able to find someone who had had the same issue and then had the same operation I may not have made the decision I made.” —Matthew, Lawyer</p>	<p>“When I looked for a language tutor I asked friends if they knew someone to recommend. I think searching online can be confusing and I don’t always trust what’s written on the sites of [language] schools. Reviews are hard to trust in my experience, I prefer... word-of-mouth referrals from people I know.” —Roman, Expat designer</p>	<p>“Using an app like Irix would make hiring builders so much easier and reduce stress levels. It’s hard to know if a builder is honest...or value for money. Someone with a personal connection would...instill confidence and save time. It reduces the fear of strangers in your home. Irix could spell the end of cowboy tradesmen and benefit [them] with further referrals. Win-win.” —Felicity, Homeowner</p>

### 1.1.f State-of-the-art competing technologies

Here we outline two kinds of competing technologies: general search and recruitment. Our product does not compete directly with these technologies, but rather creates new demand in an uncontested market space.

#### General search



##### Category-based search

Low threat ●

Web search engines, like Google and Bing, are not effective at finding individuals to fill roles. They identify the most relevant information by web crawling and indexing. But not all data lends itself to these processes, because of its complexity or context-dependent usefulness. Search engines are poor at identifying people with aligned standards because, first, people tend to present themselves in the best possible light, so their qualifications are often exaggerated. Second, privacy concerns mean that many candidates are not willing to make their details available to automated search engines.



##### Word-of-mouth

Low threat ●

Word-of-mouth includes all forms of recommendation between individuals that are known to each other. Word-of-mouth search is a deeply ingrained human behaviour: we use it daily to find trusted doctors, plumbers, babysitters, lawyers, designers and tutors. But the effectiveness of word-of-mouth search is limited by the small number of trusted contacts that any one individual has. Multi-layered trust corridors are rarely pursued and are not digitally tracked, making word-of-mouth search difficult to systematize and scale. That is where our trust-based search engine, Irix, comes in.



##### Social media

Low threat ●

Social media, like LinkedIn, is used in two ways to recruit others. In the first way, jobseekers or employers advertise to their immediate contacts. This approach has the advantage of relying on trust, but has limited reach because it does not recursively harness trust corridors; it reaches friends, but rarely friends of friends, etc. In the second way, jobseekers or employers join larger, purpose-built groups that focus on a particular industry. These groups are in effect miniature job boards, since most of their members do not know each other and do not have long-standing relationships.

#### Recruitment



##### Freelance platforms

Low threat ●

Freelance platforms, like Upwork, help independent professionals (freelancers) and businesses collaborate remotely. Because the freelancers and businesses don't meet in person, freelance platforms rely on ratings system. But ratings systems have limitations. First, they are not personalized: a freelancer who has been good for other businesses may not be good for your business. Second, results are skewed by "grade inflation", since many ratings are solicited from users who are predisposed to rate well. The result is that freelance platforms have limited ability to match standards and reliability.



##### Job boards

Medium threat ●

Job boards, like indeed.com and totaljobs.com, have their origins in print classified ads for jobs, which were first brought online in the 1990s. Today job boards are the most common way to find a job. Job boards have proved effective in bringing together communities of supply and demand, but have not managed to intelligently match-make between the two groups. The situation is reminiscent of dating apps today, which bring together a pool of single men and a pool of single women, but do not effectively match them together at the individual level.




##### Recruitment agencies

Medium threat ●

Recruitment agencies, like Adecco and Randstad, are middlemen between businesses and workers. They try to match the needs of businesses with CVs they have on file or with candidates that they headhunt. Because agencies focus on a particular sector, they profess to be better at matchmaking than the businesses they represent. But since they do not have personal relationships with either party, their placements rely on first impressions more than trust. Technology is removing middlemen from other sectors, like travel agents and estate agents, and we expect a similar change in recruitment.

### 1.1.g How Irix is beyond the state-of-the-art


#### Digital search meets human intuition



Irix uniquely combines human intuition with digital efficiency create and track trust corridors to achieve trust-based search of persons.

The Irix search engine uses a recursive (rule-repetition) process for creating, tracking and rewarding trust corridors: the connected paths of trusted relationships between individuals. This sets Irix apart from purely digital search, on the one hand, and pure referrals and word-of-mouth, on the other. Instead, Irix unifies the insight of human intuition for relationships with the speed and capacity for parallel processing of digital technology.


#### “Thincasting” beats broadcasting



Irix removes the need for mass broadcasts that generate a lot of incoming information but little relevant information.

Platforms like Twitter tend to broadcast to everyone on a person’s contact list. The approach of Irix is the opposite: it ‘thincasts’ to only a small number of a user’s contacts that they deem relevant. This means users receive more targeted requests and fewer distractions. The result is that users are more likely to be able to assist with a search and more likely to hold Irix in a positive light and engage again.


#### Global insight from local vision



Everyone has a mental map of the connections in a small patch of society. Irix combines these pieces to form a global view to match supply and demand.

A person’s knowledge of his contacts and ability to make rapid associations about them is a valuable asset. Each one is a latent connector of their own local patch of society. Until now, no technology could harness these local maps to gain insights at a global level. Irix fastens together local connections into trust corridors to link up supply and demand.








#### Turning connections into a commodity



Connectors provide a service to society. Irix rewards connectors each time that they are part of a successful search.

Connectors provide a valuable service to society, but tend to go unrecognized. Irix gives connectors their just recognition by rewarding them when they are part of a successful search. Connectors at all levels are rewarded, but just how much depends on where they are in the tree. Irix turns making connections into a commodity: something that can be effectively bought or sold at a repeatable price.

Below we compare Irix to the six competing technologies in §1.1.e across the user needs in §1.1.d.

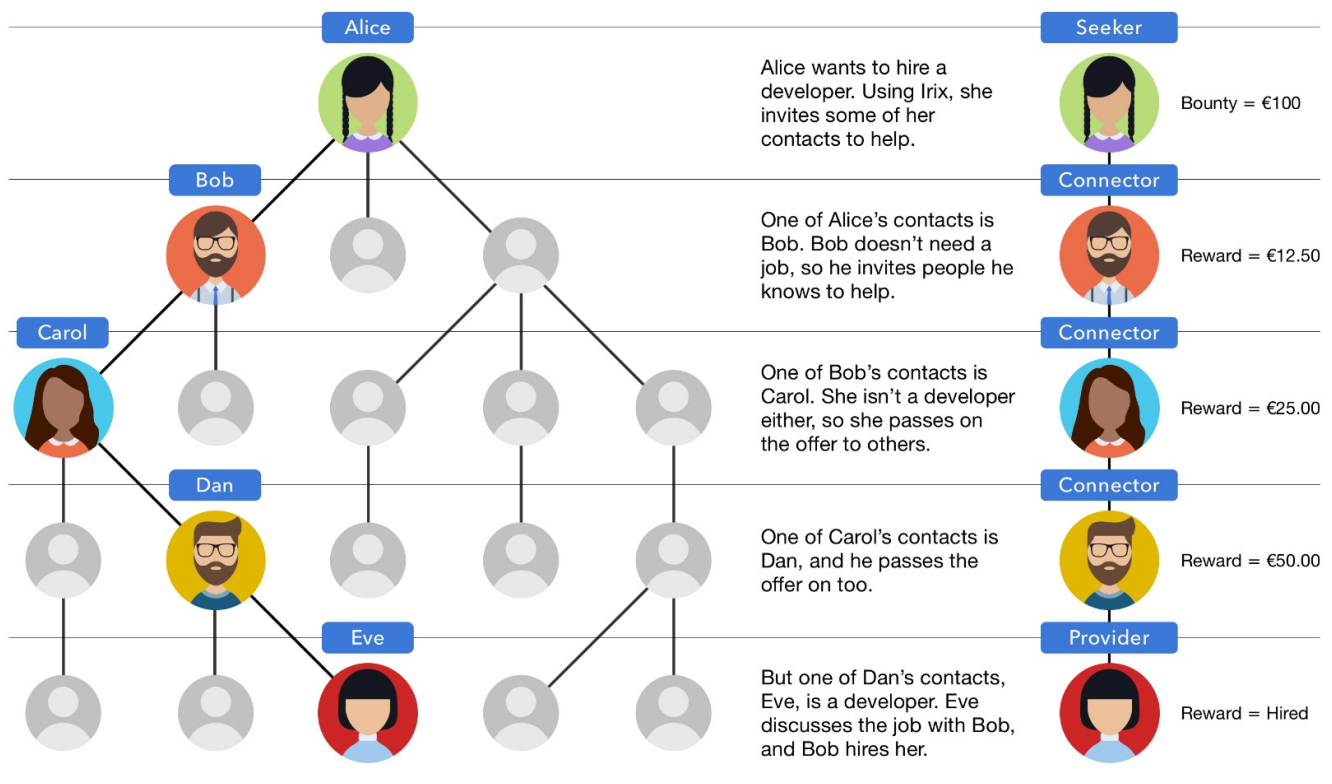
Competing technology	Cheaper	Faster	Targeted	Standards	Integrity	Reliability
 Search engines	✓	✓				
 Word-of-mouth	✓			✓	✓	✓
 Social media	✓	✓	✓			
 Freelance platforms			✓		✓	
 Job boards				✓		✓
 Recruitment agencies			✓		✓	
 Irix	✓	✓	✓	✓	✓	✓

## 1.2. Approach

### 1.2.a. Summary of approach

Irix helps find people that users can trust. It matches supply and demand by harnessing the trusted relationships within each person’s community of contacts. The two key Irix concepts are the search tree and the winning chain.

Search tree	Winning chain
<p>Key to Irix is the search tree, in which invited users (daughter nodes) of any given user are personal contacts of that user. Overall two things determine the outcome of a Irix search. The size of the tree determines how likely the search is to succeed: trees with many nodes have a higher reach and more relevant people who know about the search request. The depth of the tree determines how much money Irix makes: the shallower the tree (the fewer the number of connectors), the more revenue Irix brings in.</p> <p>In the example below, Alice is the seeker that wants to hire a developer, and Eve is the provider that eventually takes the job. Alice passes the search request to three of her contacts, each of which can take the job or pass it on to some of their contacts. The search continues until Eve applies for the job and Alice hires her. The path from Alice to Eve then becomes the winning chain, described to the right. If multiple people apply for the job, the search continues until one is accepted by Alice.</p>	<p>The winning chain is the path of trusted connections from the seeker to the provider. As we show in §1.2.a, the fee that Irix gets depends on the depth of the trust tree: shallower trees earn Irix more. We estimate the average fee to be 10% (§2.2.a). Irix pays higher rewards to the connectors closest to the target acquisition, which incentivizes users to pass on the search only to their most relevant contacts.</p> <p>In the example below, the winning chain is from Alice to Bob to Carol to Dan to Eve. Alice and Eve are the seeker and provider, and Bob, Carol and Dan are connectors. The three connectors all get a share of the €100 bounty, with Irix getting the remainder as revenue. So Dan gets €50, Carol gets €25, Bob gets €12.50, and Irix gets the remaining €12.50.</p>



Total payouts to connectors = €87.50  
 Irix takes the remaining €12.50

### 1.2.b Our product so far

We have built three versions of our Irix platform. Each subsequent version was based on feedback generated from technical tests and real users.

Irix 1.0: Concept	Irix 2.0: Demand	Irix 3.0: Usability
Aug – Dec 2017	Jan – Apr 2018	May – Sep 2018
<p>We built the first version of Irix to demonstrate the concept of a recursive (rule-repetition) trust-based search engine. This proof-of-principle pilot version was built as a WordPress website, and was tested internally by the Irix core team and their acquaintances.</p>	<p>We built the second version of Irix to test our value hypothesis around Laravel, PHP and MySQL. This also enabled us to separate the business and presentation code. We incorporated the bounty system for rewarding connectors and secure authentication of the winning chain and payouts.</p>	<p>We build the third version of Irix to enhance useability and reliability to promote user uptake. Irix 3.0 has a reliable email client and complete trust-tree tracking so users can see the search tree in real time. The tech stack for Irix 3.0 is HTML, CSS, JavaScript, React, PHP and MySQL.</p>

Irix is at Technology Readiness Level (TRL) 6: Technology demonstrated in a relevant environment.

TRL	Requirement	Date	How we satisfied the requirement
1	Basic principles observed	Jan 2017	• Formulation of a general search tool based on trust corridors
		Feb 2017	• Founders studied recursive solution to the DARPA Network Challenge
		Feb 2017	• Founders mathematically modelled trust and bounty dynamics
2	Technology concept formulated	Mar 2017	• Modeling and simulations of growth model to support development
		Apr 2017	• Recruitment selected as best entry market for Irix trust-based search
		May 2017	• Study of structure of Irix trust trees (a.k.a. Galton Watson trees)
3	Experimental proof of concept	Aug 2017	• Irix 1.0: User flow established and wireframe designed
		Sep 2017	• Irix 1.0: First platform developed in WordPress (subcontracted)
		Oct 2017	• Internal user testing for UX and edge cases
		Nov 2017	• Iterative feedback cycles between user testing and redesign
4	Technology validated in lab	Jan 2018	• Irix 2.0: Second platform developed in-house around Laravel
		Feb 2018	• Secure authentication system developed and implemented
		Feb 2018	• Tested for technical correctness and ability to track tree layers
		Mar 2018	• Bounty and variable payout system implemented
5	Technology validated in relevant environment	Mar 2018	• Redesign of web spec user flow in Adobe XD for clarity and usability
		Apr 2018	• Irix 3.0: Third version of Irix built to enhance useability and reliability
		Apr 2018	• Website optimised for performance on smartphones
		May 2018	• Reliable email client incorporated to increase confidence of new users
		Jun 2018	• Trust tree tracking built and checked for consistency
6	Technology demonstrated in relevant environment	Jun 2018	• Usability interviews conducted across target sectors
		Jul 2018	• Feedback from users lead to improvements in UX and UI
		Aug 2018	• Dedicated account set up for payment transactions via PayPal
		Sep 2018	• Platform used to match freelancers and jobs in the filming industry
		Sep 2018	• Platform used to recruit science postdocs as an alternative to jobs.ac.uk

### 1.2.c Next steps for our product

Months 1–24 below refer to the 24 months of the SME Phase 2.

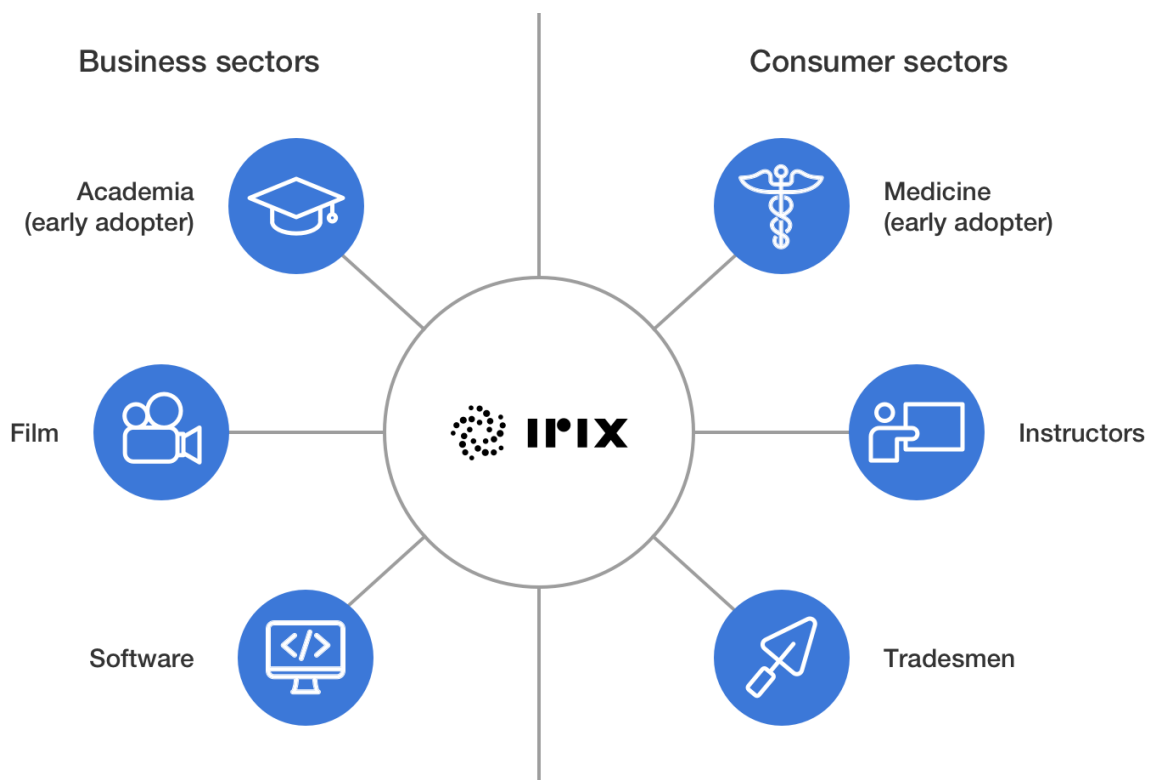
TRL	Requirement	Start date	How we will satisfy the requirement
7	System prototype demonstration in operational environment	Month 01	<b>Product</b>
		Month 02	<ul style="list-style-type: none"> <li>Enhance current website stability and security for higher traffic</li> </ul>
		Month 04	<ul style="list-style-type: none"> <li>Move server-side code to a scalable microservices-based architecture</li> </ul>
		Month 06	<ul style="list-style-type: none"> <li>Spec the platform as a mobile phone app in Adobe XD</li> </ul>
		Month 08	<ul style="list-style-type: none"> <li>Build mobile app in React Native for iOS (iPhone)</li> </ul>
8	System complete and qualified	Month 08	<ul style="list-style-type: none"> <li>Extend React Native iOS build to Android, test and refine by hand</li> </ul>
		Month 11	<b>Commercialization</b>
		Month 17	<ul style="list-style-type: none"> <li>Confirm value hypothesis by collecting feedback from users</li> <li>Extension to offer users multiple language access for expansion into EU</li> </ul>
		Month 12	<b>Product</b>
		Month 13	<ul style="list-style-type: none"> <li>Battery of tests for performance on range of mobile hardware</li> </ul>
		Month 13	<ul style="list-style-type: none"> <li>Extend range of connection channels (WhatsApp, SMS, Messenger)</li> </ul>
		Month 13	<ul style="list-style-type: none"> <li>Integrate seamless in-app financial transactions for bounties</li> </ul>
		Month 15	<ul style="list-style-type: none"> <li>Launch mobile app for iOS and Android</li> </ul>
		Month 16	<ul style="list-style-type: none"> <li>Optimize incentive structure to optimise no. of user connections</li> </ul>
		Month 12	<b>Commercialization</b>
9	Actual system proven in operational environment	Month 12	<ul style="list-style-type: none"> <li>Optimise profit incentives and margins on Galton Watson trees</li> </ul>
		Month 13	<ul style="list-style-type: none"> <li>Optimise our digital ads to drive maximum traffic per advert</li> </ul>
		Month 14	<ul style="list-style-type: none"> <li>Use content marketing to drive relevant users to our website</li> </ul>
		Month 06	<b>PR (with subcontractor THRSXTY)</b>
		Month 12	<ul style="list-style-type: none"> <li>Create proactive (Message House) and reactive (Q&amp;A) vision modules</li> <li>Create digital advertising campaign to build awareness and attract users</li> </ul>
		Month 04	<b>Product</b>
		Month 11	<ul style="list-style-type: none"> <li>Enhance search for speed and profit by optimizing the trust trees</li> </ul>
		Month 13	<ul style="list-style-type: none"> <li>Seamlessly integrate contacts to include Facebook and LinkedIn</li> </ul>
		Month 13	<ul style="list-style-type: none"> <li>Early adopter market penetration: film industry, academia.</li> </ul>
		Month 20	<ul style="list-style-type: none"> <li>Mainstream user market pen.: tradesmen, tutors, developers</li> </ul>
		Month 14	<ul style="list-style-type: none"> <li>Harness our built-in viral growth engine for expansion, profit</li> </ul>
		Month 16	<ul style="list-style-type: none"> <li>Targeted marketing campaigns for identified audience segments</li> </ul>
		Month 16	<ul style="list-style-type: none"> <li>Develop a distributed architecture for large scale search volumes</li> </ul>
Month 17	<b>Commercialization</b>		
Month 18	<ul style="list-style-type: none"> <li>Increase digital marketing budgets from successful campaigns</li> </ul>		
Month 16	<ul style="list-style-type: none"> <li>Target mass users by large scale-advertising: billboards, print and news</li> </ul>		
Month 21	<ul style="list-style-type: none"> <li>Focus on identified target segments and users for advertising spend</li> </ul>		
Month 21	<ul style="list-style-type: none"> <li>Friend referral program to drive more users</li> </ul>		
Month 12	<b>PR (with subcontractor THRSXTY)</b>		
Month 14	<ul style="list-style-type: none"> <li>Create PR strategy and launch campaign directed at recruiting</li> </ul>		
Month 17	<ul style="list-style-type: none"> <li>Identify user segments and target industries for launch</li> </ul>		
Month 19	<ul style="list-style-type: none"> <li>Drive awareness by featuring Irix in relevant publications</li> <li>Interviews, editorial and adverts in recruitment trade press</li> </ul>		

## 2 Impact

### 2.1 Entering the market

#### 2.1.a Targeted user groups

Two domains	Six sectors	Early/mainstream users
<p>Irix will be used by two distinct domains: businesses and citizens. The businesses domain includes all recruitment efforts used by business workers. The citizens domain includes all efforts used by citizens to choose or persuade someone to assist them.</p>	<p>The range of potential sectors in each domain is broad, but for concreteness we focus on three sectors within each domain. These were chosen because of their need for trust-based search and their overall complementarity as a whole. For businesses, the sectors are academia, film and software. For citizens, they are medicine, instructors and tradesmen.</p>	<p>To accelerate market uptake, we differentiate between early adopters and mainstream users. Early adopters have a strong need for the technology and are therefore more accepting of limitations. They also provide validated learning by assessing our minimum viable product. As Irix is user-tested and refined, we will increasingly target mainstream users.</p>





## Businesses

## Academia

Early adopters ●

Academia relies heavily on word-of-mouth recommendations. Young researchers change jobs frequently, typically every one to three years. Nearly half of postdocs—research apprentices to senior researchers—are selected by word-of-mouth recommendations. Recruitment agencies do not have the expertise to select for academic roles. Job boards, on the other hand, bring together pools of supply and demand, such as jobs.ac.uk, but like dating sites there is little basis for making successful matches with confidence.

## Film

Mainstream users ●

The film and television production industry is a strong sector for Irix because it relies heavily on word-of-mouth recommendation for hiring. Quick turnaround times are essential to meeting tight schedules and keeping production costs down. The majority of editors, cameramen, technicians and sound engineers are freelancers, taking on short jobs ranging from a few days to several months. There are no global or even national platforms for matching these workers to industry jobs; the current state-of-the-art tends to be social media groups and word-of-mouth.

## Software

Mainstream users ●

As more and more products go digital, the number of web and mobile app developers continues to rise. Developers vary both in their expertise—the specific languages and development tools they know—and in their standards—not all jobs require the same standard of work (e.g., personal websites versus large-scale online shops). Current recruitment technologies for finding developers are expensive and slow, particular in light of the need for rapid growth in new and agile software companies.

## Citizens

## Medicine

Early adopters ●

When it comes to finding the right doctor, dentist or therapist, citizens often rely on the advice of others that they trust. This is no surprise—these professions have significant and immediate consequences on the health and wellbeing of the people who seek them. In many European countries, there are national tables assessing the medical profession, but these give little indication of the subjective suitability or personality compatibility that users look for.

## Instructors

Mainstream users ●

Instructors include any specialist who is employed to help a person get better in a specific skill. This broad sector includes tutors, trainers, music teachers, sports coaches and language teachers. In many cases, the skill level required to be a tutor is not high, such as tutors for children, and personality compatibility is a strong determinant of success. Personality compatibility is hard to infer through job boards and freelance platforms, where instructors are most often found, making this sector a natural one for trust-based search.

## Tradesmen

Mainstream users ●

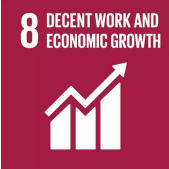
Builders, plumbers, electricians and other tradesmen are often selected because of a referral from a trusted contact. This is because it is hard to judge the work of tradesmen upfront; only after they have finished the job does low quality work become apparent. Websites such as Rated People, Taskrabbit and Houzz's Professionals provide a ratings system. However, there is no standard trust-based platform for selecting tradesmen.

## 2.1.b Sustainable development and social benefit

In 2016, the United Nations introduced 17 Sustainable Development Goals. These new goals will “mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind”.

Our project contributes to four Sustainable Development Goals. For each one, we explain how we address it and the implications for social benefit.

### Decent work and economic growth



Irix creates a more efficient employment market by making it faster and easier to find work and change jobs.

We are entering a world in which no one has to stay in the same job for life. As their skills develop and circumstances change, citizens are able to change jobs and types of jobs more easily. Secondary and tertiary careers are becoming the norm. By making it easier to change jobs, and reducing the time it takes to do so, our technology helps workers stay employed and reduces unemployment.

### Industry, innovation and infrastructure



Trust is the fundamental basis for industry in modern society because it significantly reduces the friction of transacting.

Firms, organizations and individuals spend enormous resources insuring against deception and mismatched standards. The result is bloated contracts, excessive due diligence, slow uptake of new opportunities and adversity to change. Irix removes these transaction frictions by raising confidence in appropriately matched standards and reducing the risk of deception. By helping citizens and companies identify trusted workers, partners and experts, Irix accelerates industrial growth and technological innovation.

### Reduced inequalities



Irix helps turn employment into a commodity by enabling firms and individuals to quickly find the work skills and the job opportunities that they seek.

The opportunity to find work appropriate to one's skills helps everyone share in progress. By providing an indication of integrity and reliability as well as skill levels, Irix can help those who seek work but have been left behind find it. This has a positive knock-on effect as well. Finding work quickly commensurate with one's skills in turn promotes economic growth, particularly in underdeveloped nations, where it is most needed.

### Sustainable cities and communities



Irix provides a basis for creating new kinds of sharing economies by extending the boundaries of the trusted community.

The sharing economy has transformed how we go on holiday, travel within cities and access to practical items like bikes and tools. As well as providing greater convenience, the sharing economy contributes to sustainability by encouraging access over ownership: more people enjoy goods and services for less material and energy expenditure. Trust is at the heart of the sharing economy, and is forming a new kind of “social contract” for the 21st century. By extending the boundaries of the trusted community, Irix is amplifying the sustainability benefits that go hand-in-hand with the sharing economy.

## 2.1.c Market

The market for Irix is broken down into two domains: businesses and citizens. Each domain has many different sectors within it that are relevant to Irix. In Phase 2 we will focus on three sectors for each domain: academia, film and software for business; and medicine, instructors and tradesmen for citizens. However, Irix is not limited to these, and we assess the full range of sectors below.

### Businesses

The annual global business recruitment market is valued at €400 billion.

#### What it is

The businesses domain includes all recruitment efforts used by business to find and hire full-time, part-time and consultant workers.

#### Size of the market

According to the Recruitment Industry Analysis, the 2018 global recruitment market is valued at €400 billion and is predicted to grow by 3% each year. Recruitment in the European Union alone is valued at €140 billion, with 226 million jobs being recruited per year. Of these, 188 million were for permanent roles, with the remaining 38 million for consultant and temporary jobs.

#### High prices

The cost of recruiting is high. Recruitment agencies typically charge fees of 15% – 25% of the annual salary they are recruiting for. This is on the order of €5,000 to €15,000 per hire. Job boards, such as Indeed.com and Monster.com, typically charge €100 to €600 per listing per month. Freelance sites like UpWork charge 8.8% – 12.5% of the value of the entire project, meaning that the fee for a €10,000 project would be €880 to €1,250.

#### Why now?

The size of the market and its high prices provide a great opportunity for Irix, because it means there is strong demand for a competitive alternative. While business recruitment has not kept pace with technology, there are signs that new recruits are keen for that to change: 83% of young adults report searching for jobs online. This, combined with the fast adoption of online tools and mobile applications, suggest that there has never been a better time for business recruitment to change the way it works.

### Citizens

We estimate annual global citizen recruitment market to be €100 billion.

#### What it is

The citizens domain includes all efforts used by citizens to choose or persuade someone to assist them. This includes finding a babysitter, dentist, builder, dog walker, cleaner, tutor or accountant.

#### Size of the market

The size of the potential market is difficult to pin down precisely, because transactions are often off the books and Irix will shape the market by creating new demand in an uncontested space. However, we can infer the size of the market from some observations about freelancers. According to a report partly commissioned by Elance, 17% of the population do some sort of freelancing. This workforce is made up of contractors, moonlighters, diversified workers and temporary workers, and in the US alone they contribute €600 billion to the economy. Using business recruitment demographics to infer the global population of freelancers, we estimate the potential market for recruitment fees paid by citizens to be \$100 billion worldwide.

#### Why now?

Using technology to help match citizens with the people and services they need was until recently a poorly developed market, based around word-of-mouth and the occasional handout for a particularly good reference to a builder or a babysitter. However, with the advent of digital apps helping people find roles, from dog walker to plumber, we are seeing an increased awareness of the potential for improved matchmaking through technology. While the estimated market for citizens is a quarter of that for businesses, we believe that there is greater potential for growth in this domain.

## 2.1.d Competing companies

Job seekers and employers are often overwhelmed by the current recruitment solutions available to them. A number of these solutions deliver unqualified applicants which makes the process very inefficient. This leads to overworked employers and unhappy employees.

Businesses sectors			Citizen sectors		
<p><b>Indeed</b> €810 m <span style="color: green;">●</span> Low threat</p> <p>Indeed is an American worldwide employment-related search engine for job listings launched in 2004. Indeed is currently available in over 60 countries. In 2010, Indeed.com passed Monster.com to become the highest-traffic job website in the US. In 2005, Indeed launched their beta version of what they refer to as a 'pay-per-click job advertising network'. However, Indeed does not promote trusted connections or trust corridors.</p>			<p><b>Task Rabbit</b> €60 m <span style="color: orange;">●</span> Medium threat</p> <p>TaskRabbit is an online and mobile marketplace that matches freelance labor with local demand, allowing consumers to find immediate help with everyday tasks, including cleaning, moving, delivery and handyman work. The company has received \$38 million in funding and currently has tens of thousands of vetted "Taskers" available to help consumers across a wide variety of categories. TaskRabbit was created when the founder had no time to buy dog food, basing it on the idea of 'neighbors helping neighbors'. The Irix team has investigated TaskRabbit by using it extensively, and find it very hit-and-miss. It suffers from the same fundamental problem as other recruitment technologies: an introduction or rating is not sufficient to provide matched standards and reliability.</p>		
<p><b>LinkedIn</b> €22 bn <span style="color: orange;">●</span> Medium threat</p> <p>LinkedIn created a job board to boost the chances of getting hired through people you know. There are 11 million active job listings on LinkedIn at any one time. Many recruiters also use LinkedIn to vet candidates online. The Irix team tested the LinkedIn job board to try to recruit new members to its team, and found it one of the less effective methods. It operates essentially as a job board.</p>			<p><b>Rated People</b> €346 m <span style="color: green;">●</span> Low threat</p> <p>This is the UK's number one online marketplace connecting homeowners with quality local tradesmen. Over 50,000 tradesmen use their site to fill gaps in their diary, grow their reputation and expand their business. Between them they specialise in over 30 trades. £2.5billion jobs have been billed through the site to date.</p>		
<p><b>Upwork</b> approx. €700 m <span style="color: green;">●</span> Low threat</p> <p>Upwork, formerly Elance-oDesk, is a global freelancing platform where businesses and independent professionals connect and collaborate remotely. Three million jobs are posted annually, worth a total of \$1 billion USD, making it one of the largest freelancer marketplaces along with Fiverr.</p>			<p><b>Airtasker</b> €9 m <span style="color: orange;">●</span> Medium threat</p> <p>Airtasker is an Australian company which provides an online and mobile marketplace enabling users to outsource everyday tasks, similar to TaskRabbit above. Users describe the task and indicate a budget, and community members then bid to complete the task. Airtasker was founded in 2012 by Australian entrepreneurs Tim Fung and Jonathan Lui and has raised AUD \$3.5 million to date.</p>		
<p><b>Adecco</b> €720 m <span style="color: green;">●</span> Low threat</p> <p>Adecco is the largest recruitment company in the world. They have 5,100 branches in over 60 countries and territories, making their services widely available. Adecco's headquarters are located in Zurich, Switzerland.</p>			<p><b>Hospitals / Surgeries</b> €N/A <span style="color: green;">●</span> Low</p> <p>There are no well-known apps that provide suggestions for patients other than the government site, NHS direct.</p>		

## 2.2. Business model

### 2.2.a Revenue

Each time a new search is created by a seeker, the seeker chooses how much bounty to offer (fee to pay) and pays this to Irix. Irix distributes some of this bounty to connectors along the winning chain and keeps some as revenue, where the winning chain is the path of connectors from seeker to provider. Just how much of the bounty is kept as revenue depends on how many connectors there are.

Guaranteed revenue	Number of connectors	Average income																				
<p>Irix makes money no matter how many connectors that it rewards in a search.</p> <p>Irix always makes money because the combined payout is always less than the bounty: the final connector gets <math>\frac{1}{2}</math> of the bounty; his connector gets <math>\frac{1}{4}</math> of the bounty; and so on. Whatever remains is Irix revenue. Since <math>\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots &lt; 1</math>, Irix is always guaranteed to get some revenue. The shorter the winning chain (number of connectors), the more revenue Irix receives. This also encourages Irix to optimize for efficient (short) searches, because this is how it makes more money per search.</p>	<p>The average number of connectors in a successful search is 4.</p> <p>Based on data from users so far and modelling of our platform, we estimate the number of connectors in a winning chain to be binomially distributed, with a mean of 4:</p> <table border="1"> <thead> <tr> <th>No. of connectors</th> <th>Probability</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.4%</td></tr> <tr><td>1</td><td>3.1%</td></tr> <tr><td>2</td><td>10.9%</td></tr> <tr><td>3</td><td>21.9%</td></tr> <tr><td>4</td><td>27.3%</td></tr> <tr><td>5</td><td>21.9%</td></tr> <tr><td>6</td><td>10.9%</td></tr> <tr><td>7</td><td>3.1%</td></tr> <tr><td>8</td><td>0.4%</td></tr> </tbody> </table>	No. of connectors	Probability	0	0.4%	1	3.1%	2	10.9%	3	21.9%	4	27.3%	5	21.9%	6	10.9%	7	3.1%	8	0.4%	<p>The average Irix revenue is 10.0% of the bounty.</p> <p>With the distribution for the number of connectors shown left, we calculated mathematically that the average Irix revenue is <math>(\frac{3}{4})^{\mu}</math> of the bounty, where <math>\mu</math> is the mean number of connectors. For a mean of <math>\mu = 4</math>, the typical Irix revenue is <math>(\frac{3}{4})^4 = 10.0\%</math> of the bounty. We use 10% in our estimates of revenue throughout this proposal.</p>
No. of connectors	Probability																					
0	0.4%																					
1	3.1%																					
2	10.9%																					
3	21.9%																					
4	27.3%																					
5	21.9%																					
6	10.9%																					
7	3.1%																					
8	0.4%																					

### A revenue example

Consider a seeker who offers a bounty of €100. The table below shows the payout to connectors and the revenue kept by Irix. Irix's revenue depends on how many connectors there are in the winning chain.

	Seeker →	Connector payout →	Connector payout →	Connector payout →	Connector payout →	Connector payout →	Provider	Irix revenue
0 connectors*								<b>€100</b>
1 connector						€50		<b>€50</b>
2 connectors					€25	€50		<b>€25</b>
3 connectors				€12.50	€25	€50		<b>€12.50</b>
4 connectors			€6.25	€12.50	€25	€50		<b>€6.25</b>
5 connectors		€3.12	€6.25	€12.50	€25	€50		<b>€3.12</b>

\*Having zero connectors means that one of the seeker's initial contacts takes the role, but this will happen rarely.

## 2.2.b Scalability

One of Irix's strengths is its scalability. This is a result of three things: the absence of network effects, built-in guaranteed revenue (see §2.2.a) and exponential growth due to a combined value and growth hypothesis.

### No network effects

The Irix business logic is unusual in that it does not suffer from network effects: the chicken and egg situation in which the more users a system has, the more useful it is to users. Irix circumvents network effects because each user passes on a search to trusted contacts, regardless of whether those contacts have used Irix before. Any recipient that wishes to fill the search or pass it on must do so through the Irix platform—thereby effortlessly joining the Irix system.

### Exponential growth

A unique aspect of Irix is that the value hypothesis and growth hypothesis are one and the same. This means that increasing the value of Irix—passing a search to another trusted candidate—also increases the growth of Irix, since that candidate is newly aware of Irix and may start a new search of his own. Since the growth rate at one level matches the growth rate at every level, Irix exhibits exponential growth. A similar concept was famously used by Hotmail and was key to the firm's rapid growth.

## 2.3. Financing

### 2.3.a Costs and income

We forecast that Irix will have total revenue of €3.08 million over the three years following Phase 2. While there are many potential applications of trust-based search for businesses and citizens, for concreteness we focus on three specific sectors within each domain. As explained in §2.2.a, on average Irix will receive 10% of the bounty put up for each search.

	Business sectors			Citizen sectors		
	Academia	Film	Software	Medicine	Instructors	Tradesmen
Average bounty	€300	€400	€600	€300	€100	€200
Average Irix revenue	€30	€40	€60	€30	€10	€20
Year 3 searches	1000	2000	3000	1000	4000	4000
Year 4 searches	2000	4000	6000	2000	8000	8000
Year 5 searches	4000	8000	12,000	4000	16,000	16,000
Irix revenue/sector	€210k	€560k	€1260k	€210k	€280k	€560k

Total Irix income €3,080,000

Below we explain some of our base assumptions for the above revenue forecast.

### Businesses pay more

Business will pay 2–4 times as much per trust-based search as citizens, for two reasons. First, the salary rates of the employees and consultants that business hire are higher. Second, the duration of work that they do for businesses is higher, typically one to three years or more.

### Citizens search more

Citizens will use Irix more frequently than businesses, because the services they seek through Irix are more short-lived: typically one to several months.

### Searches double at first

During the first three years following Phase 2, we expect rapid growth in the number of trust-based searches through Irix. We assume a doubling of search numbers per year for the first three years, though we expect this to tail off to 20–40% in the years that follow.

	2021: Year 3	2022: Year 4	2023: Year 5
Employees	18	24	40
Total Stand Alone Searches	15,000	30,000	60,000
<b>Costs</b>			
Operating expenditure	€540k	€720k	€1,200k
Capital expenditure	€15k	€50k	€50k
Commercial development	€25k	€50k	€120k
Total costs	€580k	€820k	€1,370k

	Income/search	2021: Year 3	2022: Year 4	2023: Year 5
Academia	€30	€30k	€60k	€120k
Film	€40	€80k	€160k	€320k
Software	€60	€180k	€360k	€720k
Medicine	€30	€30k	€60k	€120k
Instructors	€10	€40k	€80k	€160k
Tradesmen	€20	€80k	€160k	€320k
Total income		€440k	€880k	€1,760k

### 2.3.b Impact and funding

An SME Instrument Phase 2 award will have three main impacts on our company. It will enable us to accelerate our user growth and commercialization, create new employment opportunities, and amplify the H2020 SMEI investment by using it to secure private funding.

#### Accelerate growth

Irix is at TRL 6 (§1.2.b) and SMEI funding will enable it to accelerate user growth and commercialization.

Irix has demonstrated the technological feasibility of trust-based search, and has shown that there is demand that is willing to pay for it. SMEI funding will: make Irix more widely available as a mobile app; enable Irix to enter new sectors and territories; and accelerate commercialization by expanding its sales and marketing team.

#### Create jobs

SMEI funding will enable Irix to employ 16 people during Phase 2 and 40 more people over the next three years.

Europe is becoming a global technology powerhouse and Irix will contribute to its leadership. As we outline in (§3.3.a), Irix will employ 16 people during the two years of Phase 2. Over the next three years, we anticipate employing 40 more people.

Irix will contribute to job creation on a much broader scale as well by generating thousands of matches between job seekers and job providers.

#### Amplify investment

Money invested into Irix now will have an amplifying effect, enabling us to attract further funding from private sources.


As we commercialise our product across Europe and beyond, we will seek further financing from private sources. We are in contact with venture capital organisations, including UK-based Balderton Capital, to ensure that we can finance Irix well beyond Phase 2. We anticipate raising an additional €4.5 million to continue commercialisation and global expansion during the three years after Phase 2.

The total funding required for Phase 2 is €1,830,879. We are requesting 70% of this as the EU contribution, and we will raise the remaining 30% ourselves. Connaissance, the company that created Irix, is owned by its founders, apart from a small fraction which is owned by external investors.

Breakdown of funding	
H2020 SME Instrument contribution (70%)	€1,281,615
External and founder investment	€318,585
Commercialization during the first 24 months	€230,678

## 2.4 Knowledge protection and freedom to operate

Connaissance owns all of the exploitable IP involved in this project. In devising our plan to protect IP, we considered the reports IP Management in Horizon 2020, and Commission Recommendation on the Management of IP.

Software	Database	Logo and logotype	Trademark
<p>We own the copyright to the Irix websites and will own the copyright to the mobile app.</p> <p>Connaissance, the company that created Irix, owns the copyright to the code for the websites of Irix 1.0, 2.0 and 3.0. Connaissance will own the copyright to the Irix mobile phone application, including the iOS and Android incarnations.</p>	<p>Copyright of our database data is protected for 15 years by the Database Directive.</p> <p>Irix makes use of database information stored as trust trees and relational data. This database is protected for 15 years by the Database Directive: Directive 96/9/EC of the European Parliament.</p>	<p>We own the copyright to the Irix logo and logotype.</p> <p>The Irix logo and logotype were created by graphic designer Daniel Eris, a member of the Irix core team. Connaissance, the company that created Irix, owns their copyright.</p> 	<p>We are seeking trademark protection of the Irix name.</p> <p>Connaissance, the company that created Irix, is seeking trademark protection of the Irix name in the UK. Connaissance will extend trademark as Irix enters new territories; activity in a territory is a prerequisite for trademark protection.</p>

Freedom to operate	Patents	Data compliance
<p>No patents impinge on our freedom to operate.</p> <p>We have assessed the market and considered our competitor technologies. We found no patents which impinge on our freedom to operate in the EU and globally, based on a patent search of the "Patbase" database.</p>	<p>We will file appropriate patents of our trust-based search technology by Jun 2019.</p> <p>Connaissance, the company that created Irix, will file appropriate patents of its own by Jun 2019 on "complex network search using recursively generated trust corridors".</p>	<p>Our software complies with current data protection regulations, including the GDPR.</p> <p>Any personal data generated by the Irix platform is owned and controlled by the owner of the individual profile and therefore complies with standard data protection regulations and the European General Data Protection Regulation.</p>



## 2.5 Dissemination and communication

This project will foster wide technological awareness and industrial uptake, stimulating innovation in sectors that go far beyond our current work plan. In this sense, this project will contribute to the Horizon 2020 portfolio of innovative European companies at the forefront of technology. Our activities focus on the following audiences:

### Recruitment and services community

#### Intern recruitment

We will host three-month internships for product development and PR and marketing. This will attract bright minds to our company and also help promote Irix's technology and values. Interns will be mentored by one of the core team so that they develop valuable skills for the future.

#### Job board promotion

We will actively promote Irix as a service in and around job boards, and in newspaper jobs classifieds, such as the Guardian and Metro. This will help capture active job seekers to use the platform.

#### Domestic service users

We will be actively seeking users of other service platforms by creating engaging content marketing and advertising,

#### Referral program

We will develop a referral program whereby users can suggest service providers to join Irix. When the service joins, the referrer will receive Irix credits, which will in turn grow the user base and searches.

### Wider technology community

#### Project platform/ website

The project will have a stand-alone, dedicated platform. It will include: a summary of our technology and vision; access to beta-version software; press clippings and popular summaries of our work; and links to events at which team members will be present. This is the main Irix platform where we will attract users to.

#### Popular technology press

We will engage with the popular science and technology media by preparing and presenting press releases on our most important innovations. Specifically, we will target Wired, Technology Review and the New Scientist, which have a keen interest in the future of trust.

#### Trade shows and conferences

We will attend a number of trade shows to showcase the Irix platform. This would be in the form of guest speaker slots, event stands and sponsorship. These events include Wired London, Figaro Digital, Graduate Jobs and many more.

### Society beyond the technology world

#### Social networks

Social networks offer real-time exchange of information with unprecedented flexibility and reach. Utilising targeted campaigns with specific content we will be able to engage with key potential users of the Irix platform.

#### Popular press

Our PR subcontractor THRSXTY has connections at various media outlets to engage with editors for reviews, interviews and advertorial content in print and digital media, like Time Out, which we'll pursue.

#### Public engagement

Members of our team have a record of public speaking at schools and industry events. These offer good channels to inform and create interest in Irix and trust-based search across a wide audience outside of technology.

### Industry and other stakeholders

#### Doctors, dentists and pharmacists

We believe that citizens seek a high level of trust when searching for medical professionals and we envisage Irix being user to recommend a doctor, surgeon, dentist or hospital for procedures.

#### Universities and research organisations

Consumers find it difficult to navigate looking for the right university or research organisation as there is no set place to search for recommendations. However using Irix could make this process fast and more reliable.

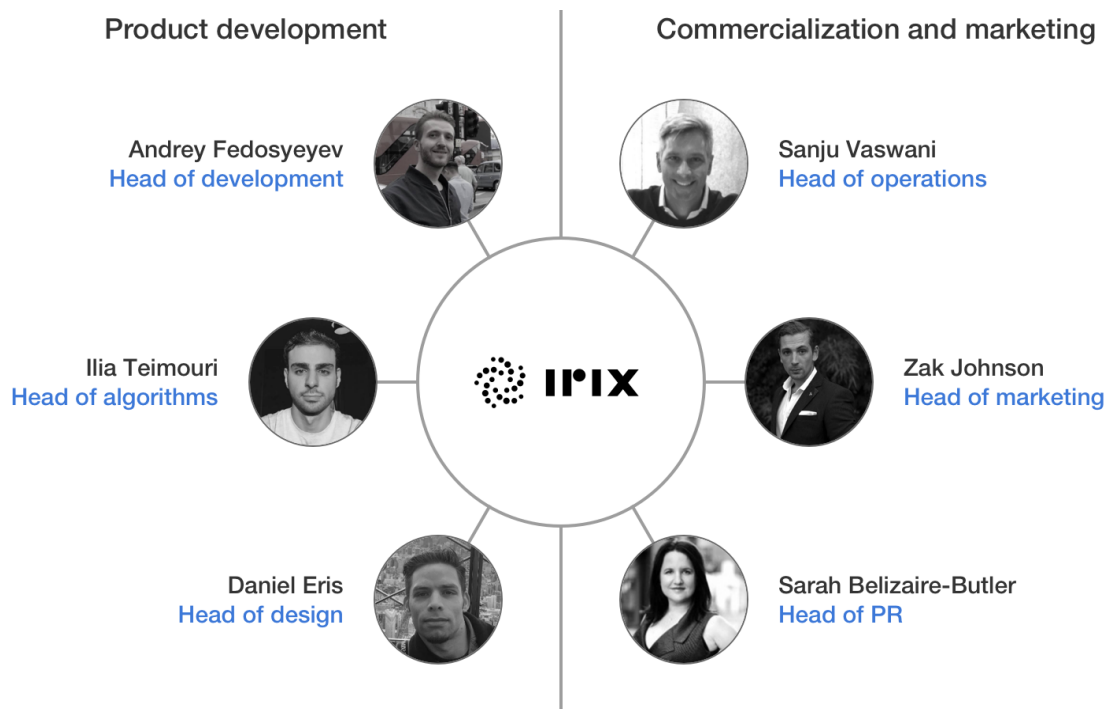
#### Tradesmen sites and organisations

There is strong growth in tradesmen review sites like Rated People and Checkatrade, and we see significant potential for Irix in this sector. We will liaise directly with these sites, as well as trade guild organizations, to promote platform sharing with Irix.

## 3 Implementation




### 3.1 Team

#### 3.1.a Core team



#### 3.1.b Core team skills

Half of our core team is focused on product development and half is focused on commercialization and growth. The combined team of six has the skills to further develop and commercialize our product and generate profit.

						
	Andrey	Ilia	Daniel	Sanju	Zak	Sarah
<b>Product development experience</b>						
Web development	✓					
Mobile app development	✓		✓			
React and React Native	✓					
Technological innovation	✓	✓				
Graph and network theory		✓				
UX and UI design			✓			
Graphic design	✓		✓			
Grid systems	✓		✓			
<b>Commercialization and marketing experience</b>						
Business development		✓		✓	✓	
Finance and fundraising				✓		
Investment strategy		✓		✓		
Software marketing					✓	✓
Digital marketing strategy				✓	✓	
Public relations					✓	✓
Consumer marketing						✓
User growth and viral marketing					✓	✓

### 3.1.c Management structure

#### Operations officer

Sanju will act as the project operations officer. He will be responsible for: hiring and assisting staff; synchronising the work packages; marketing campaign logistics; ensuring budgets are correctly allocated; and assisting with the annual reports.

#### Decision-making mechanisms

The project Board will be made up of the six core team members, led by Andrey for product and Sanju for commercialization and marketing. The Board will align the tasks within the work packages and ensure that any interdependencies are satisfied.

#### Appropriateness of mechanisms

We have distributed responsibility and set detailed deliverables (§3.2.b) and milestones (§3.2.c) which will help us chart progress and pace ourselves. We outline the risks that we are most likely to encounter and how we will mitigate them in §3.2.d.

#### Work package leaders

- 1 Scalability and expansion to mobile Andrey & Dan
- 2 Local uptake and search optimization Iliia
- 3 Growth and market replication Sarah
- 4 Commercialisation of trust-based search Zak
- 5 Management and communication activities Sanju

### 3.1.d Subcontracting

We intend to subcontract to one third-party contractor, THRSXTY, to lead our European and global PR. Subcontracting costs are 10% of the total budget.

What are they?	THRSXTY is one of the leading UK PR firms with a global presence. They specialise in public relations, digital and influencer marketing and event production. THRSXTY represent some of the world’s largest brands, including Penguin, Lacoste, Polaroid, Jumeirah, Herschal and Jack Wills.		
Who are the key people we will work with?	<b>Sarah Belizaire</b> is our client manager and our lead point of contact, described in more detail in §4.1.b. Sarah has over 10 years’ experience in PR and a knowledge of mainstream media mixed with extensive knowledge of the technology and digital world.	<b>Oliver Wheeler</b> is the CEO of THRSXTY. He spent 17 years at Freud Communications before leaving to found THRSXTY. He led the PR for the expansion of Airbnb into Europe and has advised global brands including PepsiCo, Nike, Nestle, Unilever and Disney.	<b>Rob Lester</b> leads THRSXTY’s Reputation division, working to protect and promote the reputations of clients. He has 16 years’ media experience in PR and journalism. He is also an experienced media trainer and has developed programmes for Shell, Intel, Bombay Sapphire and Visa.
What will they do?	THRSXTY will build Irix a national presence and oversee traction across our business and citizen domains. With their extensive reach they will replicate our market in Europe and other countries.		
Why did we choose them?	The Irix core team have a previous relationship working with THRSXTY’s Sarah Belizaire and Rob Lester. THRSXTY’s clients users have similar demographic profiles to Irix’s target users. They have experience and strong track record in digital products.		
Value for money?	We approached eight other UK PR firms with international experience, none matched THRSXTY’s energy and they were the most commercially competitive.		
Relevant tasks	WP 3.1, WP 3.2, WP 3.4, WP 3.5, WP 3.6, WP 4.3, WP 5.5, WP 5.6, WP 5.8		

## 3.2 Work packages, deliverables and milestones

### 3.2.a Work packages

WP	Work package title	Lead person	Person months	Start month	End month
1	Scalability and expansion to mobile	Andrey & Daniel	42	1	15
2	Search optimization and local uptake	Ilia	38	4	18
3	Growth and market replication	Sarah	50	7	21
4	Commercialisation of trust-based search	Zak	56	10	24
5	Management and communication activities	Sanju	34	1	24

### 3.2.b Deliverables

WP	No.	Deliverable	Dissem. type	Deliv. month	Deliv. month
1	D1	Scalable search engine via migration to microservices architecture	Other	Public	3
	D2	Mobile app (iOS and Android) available for download	Other	Public	15
2	D3	Report on optimisation gains in speed and successful search rate	R	Public	9
	D4	First fully in-app users using in-app connection channels	R	Public	12
3	D5	Message House and Q&A pack for Irix's proactive and reactive message	R	Public	6
	D6	Analysis of 3 business & 3 citizen sectors and where to next concentrate	R	Public	18
4	D7	Analysis of incentive schemes and how they compare to current vs	R	Public	9
	D8	Report of security efficacy for avoiding fraud and loops	R	Public	21
5	D9	Recruitment of technical and commercial employees and interns.	R	Public	15
	D10	First-year and second-year reports prepared and submitted to portal.	R	Public	12/24

R = document, report






Other = software, etc.

### 3.2.c Milestones






WP	No.	Milestone	Means of verification	Month
1	M1	iOS mobile app	iOS Irix app is uploaded and approved on App Store	12
	M2	Android mobile app	Android Irix app is uploaded and approved on Play Store	15
2	M3	Fully in-app connections	Connections can be made and browsed on mobile	6
	M4	Fully in-app searches	Successful search can be done without going off-mobile	12
3	M5	National press	Media training done and first press story released	9
	M6	Paying mainstream users	First paying mainstream users using mobile	15
4	M7	Transaction management	Transaction management provider (e.g., Stripe) live	8
	M8	First international users	IP address of 'business root' is outside UK	21
5	M9	Product team recruitment	3 product team members and 2 interns are hired	15
	M10	Commercial. team recruitment	3 commercial. team members and 2 interns are hired	18

### 3.2.d Risks

**Technical risks** relate to potential difficulties in implementing our technology.

WP	Level	Name	Risk	Mitigation
1	 Low	Unscrupulous users	Users adopt a shotgun approach by passing on searches to many unsuitable contacts in the hope of getting lucky and being part of a winning chain.	We will track a trustworthiness score: the fraction of times that a user has been part of a successful trust corridor (winning chain). Because this score will be seen by others, users will be less likely to pass on searches to unscrupulous users.
1	 High	Multiple mobile platforms	Developing the mobile app for multiple operating systems and handset types is too expensive and time consuming.	We will adopt React and React Native, a new language environment developed by Facebook to eliminate the need to build separate app implementations by automatically exporting them from a single source.
2	 Low	Slow connector speed	Search times are too long because individual users may take a day or more to pass on a search to further contacts.	We only need some users to be fast, not all, since the fast ones will make connections to the next generation, and so on. If needed, we will prompt users to act within hours by tracking and rating their response times (e.g., like Airbnb does).
2	 Med	Confusion	Users find the recursive nature of connectors of connectors underlying Irix confusing	We will introduce pictorial instructions when users sign in, and overlay prompts throughout the process.
2	 Low	Fraud	Users try to defraud the system by impersonating a user that is part to the winning chain and entitled to a reward.	Each user node will have a 512 bit random string which acts as its "DNA", passed from one generation to the next. A daughter node inherits half of its DNA from its parent, with the other half a random string unique to the daughter. This gives a secure record of the lineage of winning chains.

**Commercial risks** relate to potential difficulties in how users derive value and we generate growth.

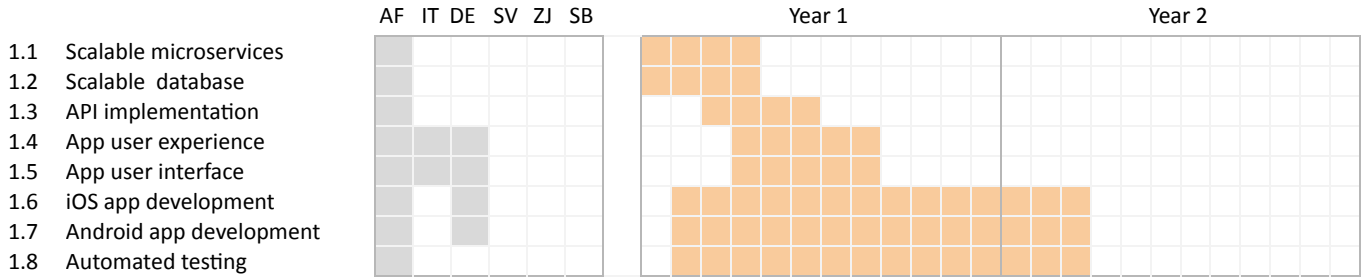
3	 Low	Insufficient incentive	Recipients are not sufficiently incentivised to pass on a search and make further connections.	We will test a range of incentive structures, in addition to the exponential increase down the winning chain described in §1.2.a., e.g., flat and power-law.
3	 Med	Revenue but little growth	We are making enough money per user, but users are not catalyzing enough other new users to create a viral growth engine.	Irix growth is directly linked to the size (number of nodes) of trust trees, since each node is an advertisement to a potential new paying user. We will notify all nodes on the tree if a search is successful, encouraging them to instigate a new, different search of their own.
4	 Low	Growth but little revenue	The number of users is growing, but we are not making enough money per user.	Irix revenue is directly linked to the depth (number of layers) of trust trees. To increase revenue, we will reduce tree depth by encouraging more targeted connections.
4	 Low	Users go "off-system"	A user tries to circumvent the trust tree and link the seeker and provider more directly.	We will ensure that loops in the trust tree are forbidden by blocking any second connection to a user already in the trust tree.
5	 High	Slow recruitment	We cannot recruit qualified new employees for Irix fast enough.	Our core team has pre-existing relationships with recruitment agencies for developers and designers. The agencies provide quick turnaround times for finding and hiring new team members.

### 3.2.e Timeline (Gantt chart)

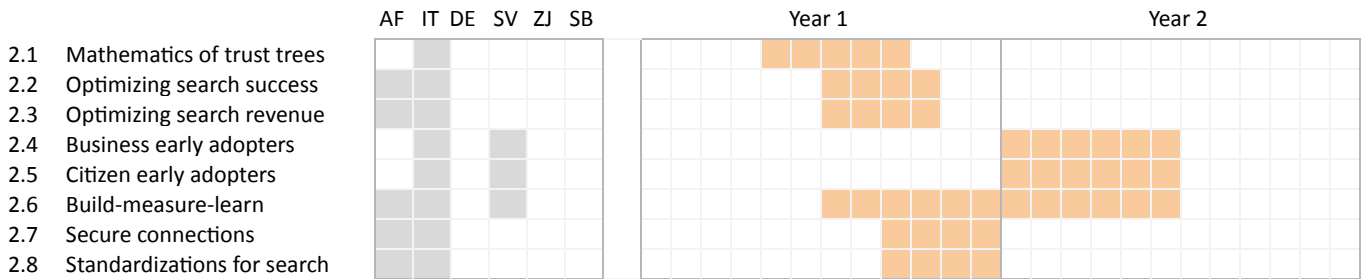
■ = Lead person    ■ = Task month

**AF** Andrey Fedosyey    **IT** Ilia Teimouri    **DE** Daniel Eris    **SV** Sanju Vaswani    **ZJ** Zak Johnson    **SB** Sarah Belizaire

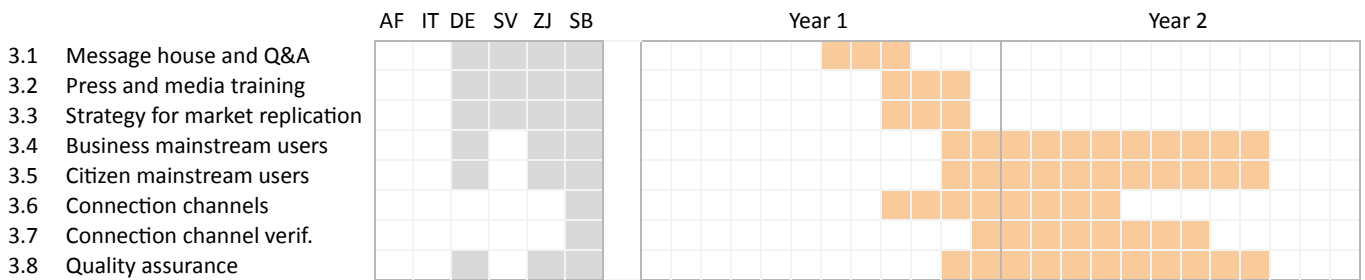
#### WP 1 Upgrade to mobile and scalability



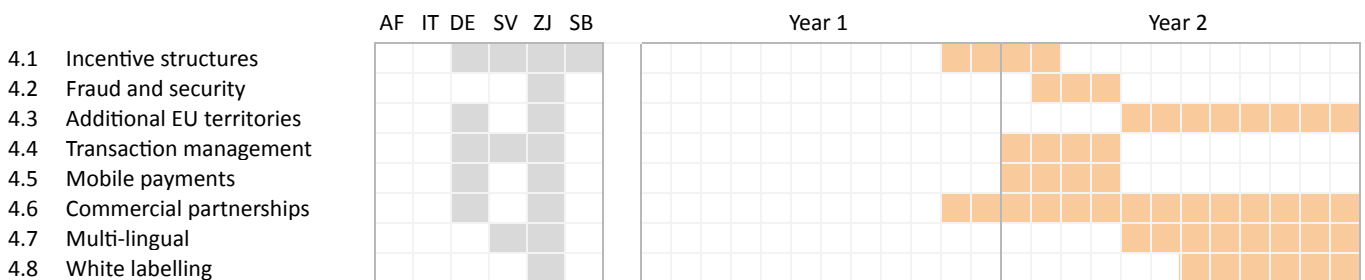
#### WP 2 Search optimisation and local uptake



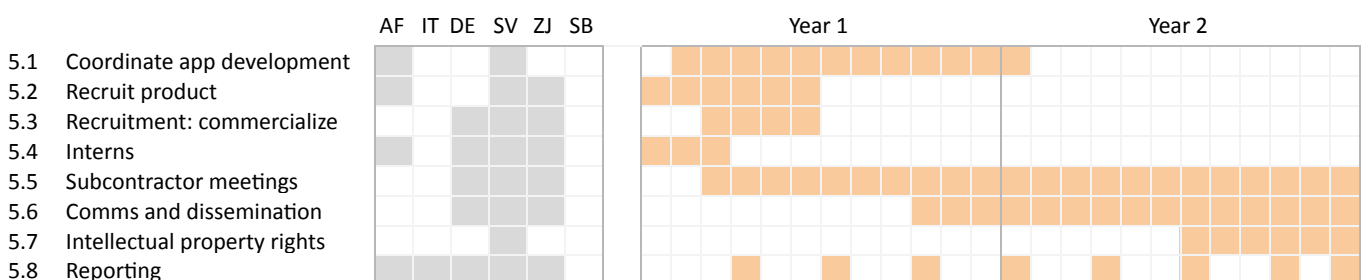
#### WP 3 Growth and market replication



#### WP 4 Commercialisation of trust-based search



#### WP 5 Management and communication activities



### 3.2.f Detailed work plan

#### WP1 Upgrade to mobile and scalability

Months 1–15

Lead: Andrey &amp; Daniel

Obj. 1 Upgrade server infrastructure for scalability.

Obj. 2 Develop Irix as a mobile app for iOS and Android using React Native.

Task	Name	Description
1.1	Scalable microservices	Microservices use multiple independent services to handle specific tasks. Andrey will migrate to scalable microservices from the current monolithic server-side code. The benefits of this architecture are greater scalability, easier testing in isolation, and a range of third-party services like authentication and image storage.
1.2	Scalable database	Irix trust trees can have periods of extreme growth before a successful candidate is found, and this 'bursty' behaviour requires delicate database management to minimize problems due to latency or many data writing operations. We will therefore migrate our relational MySQL database to a horizontally scalable NoSQL database.
1.3	API implementation	Application programming interfaces (APIs) are communication protocols and tools for building software, and Andrey will integrate the APIs to be shared by our current web app, iOS app and Android app. We will write tests for each API endpoint to ensure correct functionality and prevent regression errors due to changes and bug fixing.
1.4	App user experience	Irix is designed as a solution to a problem, and serves its users as a functional tool. The user must be able to intuitively complete the required tasks and feel comfortable doing so. With this in mind Daniel will will create a logical structure and user flow to eliminate user pain-points and provide an intuitive experience.
1.5	App user interface	Daniel will update and newly design where needed the Irix user interface, conforming to iOS, Android and React Native standards. The user interface will be further iteratively redesigned in line with any functional changes to Irix. This will be done with the prototyping tool Adobe XD and tested in real mobile device environments.
1.6	iOS app development	React and React Native is a library and programming environment developed by Facebook to eliminate the need to build separate app implementations for web, iOS and Android. Andrey will lead the development of the Irix iOS mobile app using the user interface and user experience designs created by Daniel above.
1.7	Android app development	We will develop the Android app with almost the same functionality as the iOS app. Thanks to React Native, the Android app will share 80–90% of the iOS code. The remainder will need to be written as native Android code to handle any platform specific features, which Andrey and Daniel will manage.
1.8	Automated testing	Andrey will lead the planning and writing of end-to-end and unit tests for the Android and iOS apps. This will help maintain quality control and accelerate the development of new features by ensuring stability and avoiding regression bugs.

#### WP2 Search optimisation and local uptake

Months 4–18

Lead: Ilia

Obj. 3 Optimize trust tree size and depth for search success and profitability.

Obj. 4 Acquire early adopters: academics for businesses and medicine for citizens

Task	Name	Description
2.1	Mathematics of trust trees	The growth of Irix trust trees can be considered a kind of stochastic branching process. Each seeker sits at the root of a tree and has $n$ offspring, where $n$ is a

		random variable. Each of those offspring have $n$ children, and so on. These so-called Galton-Watson trees will be studied by Ilia. He will mathematically study the typical size, depth and profitability of trees using graph theory and generating functions.
2.2	Optimizing search success	The size of the tree determines how likely the search is to succeed: trees with many nodes have a higher reach and more relevant people who know about the search request. Ilia will computationally model trust tree size and how to optimize them for growth, and Andrey will incorporate appropriate modifications into Irix.
2.3	Optimizing search revenue	The depth of the tree determines how much money Irix makes: the shallower the tree (the fewer the number of connectors), the more revenue Irix brings in. Ilia will computationally model trust tree depth and how to minimize it for profitability (while maintaining targeted connections), and Andrey will make Irix modifications.
2.4	Business early adopters	For businesses we will target the academic sector as an early adopter. Academic hires, especially young researchers like postdocs, already rely heavily on primary, secondary and even tertiary recommendations, but lack a platform to track and traverse these trust corridors. We will liaise with the academic job board jobs.ac.uk, work directly with universities, and apply a PR campaign through popular academic journals.
2.5	Citizen early adopters	For citizens we will target medical services as an early adopter, such as doctors, dentists and specialist consultants. This will be split into two parts: patients looking for a supplier of a service; and patients looking for other patients with a similar condition. We will work with patient groups, and government and private medical reference schemes.
2.6	Build-measure-learn	With both early-adopter groups above, Zak, Ilia and Andrey will closely monitor the use of Irix and the outcomes to the searches. Based on this, and feedback solicited directly from early adopters, we will iteratively modify the platform and the search algorithms to improve both user experience and search results.
2.7	Secure connections	To give a secure record of the lineage of a winning chain, Ilia and Andrey will incorporate into each search a 512 bit random string which acts as its "DNA", passed from one generation to the next. A daughter node inherits half of its DNA from its parent, with the other half a random string unique to the daughter.
2.8	Standardizations for search	Based on Zak's observations and feedback, Andrey and Ilia will develop standardizations for seekers (formats for describing searches) and for potential providers (formats for communicating their qualifications, such as simplified CVs).

### WP3 Growth and market replication

Months 7–21

Lead: Sarah

Obj. 5 Replicate successful market sectors using lessons learnt from targeting early adopters in WP2.

Obj. 6 Acquire mainstream users: film and software for businesses and instructors and tradesmen for citizens.

Task	Name	Description
3.1	Message house and Q&A	Working with our PR subcontractor THRSXTY, Sarah, Zak and Sanju will distill our core values in the form of a proactive 'message house' and a reactive Q&A. Message house is a technique advocated by THRSXTY to identify a product's key values, and evidence in support of them. Q&A is the preparation of a catalogue of modular responses to likely questions at interviews and media exchanges.
3.2	Press and media training	THRSXTY has extensive links with the popular press and journalists and will promote articles about Irix. With Sarah liaising, Zak and Sanju will be trained by the THRSXTY



		media team to ensure that they are capable of delivering effective, on-message press interviews and interacting with clients and suppliers with a unified strategy.
3.3	Strategy for market replication	Sarah, Sanju and Zak will work with THRSXTY to develop a European-wide marketing strategy. This will help us identify key marketing and advertising partners for penetration into our mainstream users, below, across territories.
3.4	Business mainstream users	Sarah and Zak will target mainstream users in the film and software sectors with campaigns based on lessons learnt in WP2. We expect to target specific skills within each sector, such as producers, editors, front-end developers, and so on. We will market in various industry publications and digital outlets and use influencers, in addition to our strong THRSXTY PR presence.
3.5	Citizen mainstream users	Likewise Sarah and Zak will target mainstream users in the instructors and tradesmen sectors, based on lessons learnt in WP2. We will target specific skills within each sector, such as plumbers, electricians and 11+ tutors. We will market in various publications and digital outlets, and intend to run a campaign in partnership with a UK national paper for tutoring.
3.6	Connection channels	Currently Irix allows connections to be made via email addresses of contacts. Sarah and Andrey will lead extending the range of connection channels to other forms of digital communication, such as WhatsApp, SMS and Facebook Messenger.
3.7	Connection channel verification	With multiple connection channels in place, Zak and Sanju will build a secure method of uniting different channel identities to stop one person being duplicated. Avoiding such 'loops' is a key part of Irix security for avoiding fraud.
3.8	Quality assurance	Zak and Andrey will ensure that searches run on Irix are reviewed, manually at first and then using automated software, to ensure that the standard is high. If searches persistently fail, the team will interact with users to find ways to improve them. Data will be obtained for all searches to support this quality assurance work.

## WP4 Commercialisation of trust-based search

Months 10–24

Lead: Zak

Obj. 7 Optimize incentive structures for search effectiveness.

Obj. 8 Develop transaction management and payment technologies for mobile payments.

Task	Name	Description
4.1	Incentive structures	Currently, the reward for connectors increases exponentially as they near the 'target acquisition' (provider). In light of the modelling results in tasks 2.2 and 2.3, Zak, Sanju and Andrey will explore variations to the functional form of incentives. We will also consider non-monetary aspects, like social proof and altruism.
4.2	Fraud and security	Irix offers financial incentives, and security and fraud prevention will be a focus. Sanju, who has experience in this, will work with Zak to ensure that payments arrive securely and on time, which is key to customer loyalty and our own trust building.
4.3	Additional EU territories	Once Irix has a strong presence in our local market, we will launch in other EU countries which we find to have the strongest need: France, Germany and Belgium. Sarah will help us hire an international marketing manager to assist us with this.
4.4	Transaction management	For digital payments from a mobile app, we will need a third party service to manage the transactions. We will use Stripe, which Andrey has prior experience of. Zak, Sanju and Andrey will develop a service that handles the communication between the client apps (web, iOS and Android) and the Stripe service. We will not need to store any confidential payment information, such as CC numbers.

4.5	Mobile payments	Currently the web version of Irix uses PayPal only. We will add other payment methods to the mobile app to make payment maximally accessible: Apple Pay, Google Pay, and possibly the awaited Facebook system if it is in Europe by then.
4.6	Commercial partnerships	Commercial partnerships will be developed with organisations outside the UK that will be able to promote and operate the local Irix platforms in new territories for a license fee. This enables Irix to increase its expansion rate.
4.7	Multilingual	Sanju and Zak will lead Irix's extension to offer users multiple language access. This is especially relevant to expansion into the EU via commercial partners.
4.8	White labelling	The Irix product may be offered to organisations whereby they can 'white label' the platform with their own brand and use the platform in a closed network. For example, banks and government departments wishing to accelerate recruitment.

## WP5 Management and communication activities

Months 1-24

Lead: Sanju

Obj. 9 Overall coordination of the core team and liaising with subcontractor THRSXTY.

Obj. 10 Recruitment of product development and commercialization and marketing employees and interns.

Task	Name	Description
5.1	Coordinate app development	Andrey will coordinate the development of the Irix mobile app for iOS and Android. Daniel will oversee the app spec and UI and UX, including consistency between the app and existing web platform.
5.2	Recruitment: product	For a rapidly growing company, recruiting talented people fast is one of the most challenging tasks. We will use a combination of recruitment agencies, job boards, and Irix itself to secure employees. Andrey will oversee recruitment for the product team vacancies. This includes: an assistant developer in React; an assistant developer in React Native; and financial security and transactions.
5.3	Recruitment: commercialization	Sanju will oversee recruitment for the commercialization and marketing team vacancies. This includes: an international marketing manager; operations and marketing support; and database, sales and outreach.
5.4	Interns	Andrey will lead finding and interviewing technical interns to help with mobile app development and scalability. Zak will lead finding and interviewing commercialization and marketing interns to help with market replication and digital marketing.
5.5	Subcontractor meetings	We will meet our PR subcontractor THRSXTY monthly, alternating between their London office and the Irix London base. This will be led by Zak and will be attended by Daniel when aspects of design and brand consistency are relevant.
5.6	Communication & dissemination	Zak will lead communication and dissemination, including activities for the recruitment community, wider technology community, society beyond the technology world and industry and other stakeholders. Sarah will ensure that subcontractor THRSXTY dovetails into these efforts.
5.7	Intellectual property rights	Sanju will oversee general IPR management, including maintaining copyright protection, extending trademarks to other territories, and any patent applications. If needed, Sanju will liaise with outside bodies such as the WIPO and patent agents.
5.8	Reporting	Sanju will collect periodic product progress reports from Andrey, Daniel and Ilia, and periodic marketing and commercialization reports from Zak and Sarah. He will consolidate them for submission to the portal as part of continuous reporting.

### 3.3 Resources

#### 3.3.a Personnel by job

This project has a total of 220 person-months over the two years of Phase 2. Connaissance, the company that created Irix, has 200 person-months and the PR subcontractor THRSXTY has 20 person-months (10% of the Connaissance person-months).

Product development		Person-months	Commercialization & marketing		Person-months
<b>Core team</b>			<b>Core team</b>		
Andrey Fedosyev	Head of development	24	Sanju Vaswani	Head of operations	15
Ilia Teimouri	Head of algorithmics	12	Zak Johnson	Head of marketing	24
Daniel Eris	Head of design	18	Sarah Belizaire	Head of PR (THRSXTY)	14
<b>To hire</b>			<b>To hire</b>		
Assistant developer (React)		21	International marketing manager		15
Assistant developer (React Native)		18	Operations and marketing support		17
Financial security and transactions		15	Database, sales and outreach		15
Interns (2 x 3 months)		6	Interns to assist PR (2 x 3 months)		6
<b>Total</b>		<b>114</b>	<b>Total</b>		<b>106</b>

#### 3.3.b Personnel by work package

Core team	WP1	WP2	WP3	WP4	WP5	Tot.
Andrey Fedosyey	18	4	–	–	2	24
Ilia Teimouri	2	9	–	–	1	12
Daniel Eris	–	–	6	6	6	18
<b>Core team</b>	<b>WP1</b>	<b>WP2</b>	<b>WP3</b>	<b>WP4</b>	<b>WP5</b>	<b>Tot.</b>
Asst dev. (React)	10	10	1	–	–	21
Asst dev. (R. Nat.)	10	8	–	–	–	18
Security & finance	–	–	5	8	2	15
Interns	2	4	–	–	–	6

Core team	WP1	WP2	WP3	WP4	WP5	Tot.
Sanju Vaswani	–	–	–	3	12	15
Zak Johnson	–	–	6	12	6	24
Sarah Belizaire	–	2	10	2	–	14
<b>Core team</b>	<b>WP1</b>	<b>WP2</b>	<b>WP3</b>	<b>WP4</b>	<b>WP5</b>	<b>Tot.</b>
Intl mark. manager	–	–	6	7	2	15
Operations, mark.	–	–	7	8	2	17
Database, outreach	–	–	7	7	1	15
Interns to assist PR	–	1	2	3	–	6

Participant	WP1	WP2	WP3	WP4	WP5	Total
Connaissance	42	34	40	50	34	200
THRSXTY (subcontractor)	–	3	12	5	–	20
<b>Total</b>	<b>42</b>	<b>38</b>	<b>50</b>	<b>56</b>	<b>34</b>	<b>220</b>

#### 3.3.c Other direct costs

Please complete a table if the sum of the costs for travel, equipment, and goods and services exceeds 15% of the personnel costs for that participant.

The total Other Direct Costs do not exceed 15% of the personnel costs for the participant.

## 4 Members of the consortium

### 4.1 Participant 1: Conaissance Ltd

#### 4.1.a Description of the legal entity

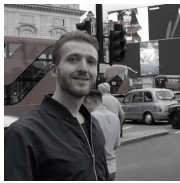


Trust-based search

Company overview	Company team	Company history												
<p>Conaissance Ltd, the company that created Irix, is a UK SME dedicated to trust-based search.</p> <p>The main purpose of Conaissance is to grow and commercialize Irix. Irix is a trust-based search platform for finding the people we need by recursively harnessing the trusted contacts between individuals.</p> <p>Conaissance has its offices in London, where the team work together to combine human intuition with digital efficiency.</p>	<p>The Irix team combines expertise in software development, finance, machine learning, digital marketing and complex networks to create and track trust corridors and help people find others that they can trust.</p> <p>Today, Irix has experts from a range of disciplines:</p> <table border="0"> <tr> <td>Andrey Fedosyev</td> <td>Development</td> </tr> <tr> <td>Ilia Teimouri</td> <td>Algorithms</td> </tr> <tr> <td>Daniel Eris</td> <td>Design</td> </tr> <tr> <td>Sanju Vaswani</td> <td>Finance</td> </tr> <tr> <td>Zak Johnson</td> <td>Marketing</td> </tr> <tr> <td>Sarah Belizaire</td> <td>PR</td> </tr> </table>	Andrey Fedosyev	Development	Ilia Teimouri	Algorithms	Daniel Eris	Design	Sanju Vaswani	Finance	Zak Johnson	Marketing	Sarah Belizaire	PR	<p>Irix was created when its founders needed to solve a problem of their own: how to quickly recruit developers and collaborators that they could trust.</p> <p>Some of the Irix founders worked on projects for DARPA, the Defense Advanced Research Projects Agency. In 2009 DARPA launched the Network Challenge, a prize competition in which teams had to locate ten red weather balloons placed around the U.S. The winning team at MIT made use of a recursive search strategy. The contest demonstrated the power of incentivized network search as a way of achieving complex tasks, and helped inspire the approach behind Irix.</p>
Andrey Fedosyev	Development													
Ilia Teimouri	Algorithms													
Daniel Eris	Design													
Sanju Vaswani	Finance													
Zak Johnson	Marketing													
Sarah Belizaire	PR													

## 4.1.b Key persons

### Andrey Fedosyeyev



- Application architecture
- Web development
- Mobile app development
- React and React Native
- Technical documentation

Andrey is a senior software engineer with many years of experience in full stack web development and augmented reality game development. For the past year Andrey has been developing React based mobile apps so his skill base is particularly relevant for this project. Born in the Ukraine, but raised in Italy. Andrey is an artificial intelligence and machine learning enthusiast. Andrey studied at University of Urbino (Applied Computer Science).

### Zak Johnson



- Software marketing
- Social media campaigns
- Above the line advertising
- Digital marketing strategy
- E-commerce

Zak has worked as a marketing professional for many years in a number of competitive markets including start-up, e-commerce, tech & FMCG. Zak started his career working in cell search, triangulation and monitoring of mobile devices and then went on to work as a technology and marketing consultant for a number of startups. His knowledge of early adopters and launching marketing strategies make him an excellent marketing lead for Irix.

### Daniel Eris



- Graphic design
- Grid systems
- Social media channels
- UX and UI design
- Mobile app development

An integrated designer with a varied background in digital, print, branding, advertising, motion and interactive design across multiple sectors. Drawing on the breadth of this experience, Daniel takes a strategic and holistic problem-solving approach to new projects. His solid technical and usability knowledge combined with his elegant and functional style are evident in his UX/UI design, and make him an ideal design lead for this project.

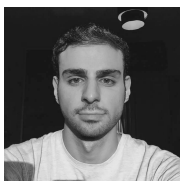
### Sanju Vaswani



- Finance and fundraising
- Investment strategy
- Business development
- Corporate relationships
- IPOs

Sanju executed landmark transactions in capital markets and M&A at Citigroup, ING Barings and HSBC before launching Vervy Capital, a private equity fund. Vervy had \$2.2 bn under management invested in telecoms, infrastructure and mining, with several of the most highly successful exits in the sector. Sanju then joined the World Bank Group's private sector investment arm in Moscow, Washington DC and London, where he ran the group's European private equity strategy in telecoms, media and tech.

### Ilia Teimouri



- Technological innovation
- Machine learning
- Graph and network theory
- Evolutionary computation
- String theory and quantum gravity

Ilia did his PhD in theoretical physics at Lancaster University. During his career he has worked on financial modelling for sentiment based trading, developing complex market-led algorithms. His mathematical expertise in modelling systems are key to this project's success. Ilia has also done research on the mathematics of rapid innovation and on modified theories of gravity and string theory.






### Sarah Belizaire (THRSXTY PR)








- Public relations
- Customer activation
- Consumer marketing
- Event management
- User growth and viral marketing

Sarah has over 10 years' experience in PR and events production. She started at a consumer lifestyle and tech agency in Brighton before joining THRSXTY. Sarah's knowledge of mainstream media mixed with well-executed awareness campaigns makes her an ideal addition to Irix. She has extensive knowledge of the technology market and the press, bring to Irix valuable leverage in a competitive market.

#### 4.1.c Up to five relevant products or services

Product or service	Description	Lead
 Digital trading platform	Nvesto is a digital trading platform that uses news sentiment to reflect the psychological state of investors. It operates a range of complex algorithms to generate sentiment from news feeds.	Ilia
 Mobile app game	CodyDiario3D is an augmented reality mobile game available for iOS and Android. It uses complex algorithms to manage how the game interacts with the user's phone movements.	Andrey
 Corporate info web app	Real Time Intranet is a web app which lets users locate internal corporate information and share it with others via a simple mobile interface. The search functionality enables users to discover information that they would not normally have access to.	Andrey
 Trip itinerary mobile app	The Trippo trip itinerary app was designed and developed to let users search, review, select, save and create an itinerary of excursions. The app uses various APIs from other platforms to provide mapping and trip information.	Daniel
 Travel network website	The TripMill is a social travel network website. It matches users who wish to travel using the same routes and information as previous tourists. Profiles and requirements are matched to present the best options to users' social network members.	Andrey

#### 4.1.d Up to five relevant projects or activities

Project or activity	Description	Lead
 Technology marketing	As head of marketing for Siemens Gigaset, Zak was responsible for allocating a €25 million budget. He developed a marketing strategy used in 17 international territories to increase consumer traffic to and interest in Gigaset's consumer products.	Zak
 IPOs	Sanju led the team that structured and executed IPO's and secondary offerings for private equity groups such as Livolsi & Partners, Kairos, and the Italian Treasury. He also supported companies he had previously invested in through their IPOs - PCU, DigiBros, and Finmeccanica (now Leonardo Aerospace).	Sanju
 Fundraising	Sanju was a director of HSBC from 2004 to 2007, managing the investment banking division for Russia, Kazakhstan and Ukraine. Here he specialised in raising funding for telecommunication projects.	Sanju
 PR account director	Sarah was account director for Patrón Tequila. She helped create the Art of Patrón brand platform and brought it to London, Paris and Munich. Sarah worked with over 1300 trade and media influencers both online and offline to launch this new campaign hitting all the launch targets and KPIs required by the client.	Sarah
 Startup founder	Zak was co-founder and Head of Technology and Digital Marketing for Skatta TV. He built the business from scratch with one other founder before selling in 2013. Zak ran the in-house production company, producing over 600 pieces of content.	Zak

## 4.2 Third parties involved in the project

Does the participant plan to subcontract certain tasks?	Yes
Does the participant envisage that part of its work is performed by linked third parties?	No
Does the participant envisage the use of contributions in kind provided by third parties?	No

### 4.2.a Tasks subcontracted to THRSXTY

WP	Task	Justification of best value for money'
2	2.4 and 2.5	THRSXTY will advise on Business early adopter and Citizen early adopters to ensure they align with the key work they will be managing for WP3.
3	All tasks in WP3 - Growth and market replication	THRSXTY specialise in public relations, digital and influencer marketing and have experience in a number of national and international markets. They possess the skill set to develop the market replication strategy required for this task. They understand how to market and draw in earlier adopters to a new technology.
4	4.1 and 4.3	THRSXTY will provide valuable insight for the incentive program in task 4.1. THRSXTY's experience from managing WP 3 will be invaluable for supporting the EU expansion task 4.3.
5	5.5 and 5.6	THRSXTY have excellent managerial and coordination skills that fit well with task 5.6. As they are a subcontractor they need to be part of task 5.5.
		For all the project tasks the Irix team have negotiated a preferential rate below market rate and feel justified that THRSXTY are the best value for money.

## 5 Ethics and security

### 5.1 Ethics

#### Personal data

Does your research involve personal data collection and or processing?

Yes. Limited data is collected in the form of email addresses and potentially social media IDs and phone numbers for messaging. This data can be accessed by the parties involved, and will be removed after a successful match or if there is no match after a time limit of 14 days.

#### Third countries

Do you plan to import any material including personal data from non-EU countries into the EU?

Yes. If a user accesses the system from outside of the EU then their data will be accessed by our system As above limited data is collected in the form of email addresses and potentially social media IDs and phone numbers for messaging. This data can be accessed by the parties involved, and will be removed after a successful match or if there is no match after a time limit of 14 days.

Do you plan to export any material including personal data from the EU to non-EU countries?

There is a possibility that users of our system will be outside the EU, and in some cases some of their information may be processed within the EU. Depending on where our system is used, e.g., Russia, there may be local laws which may force us to process some data in those territories. If a user in the EU interacts with a user in Russia then some of this data may be processed in Russia by the local authorities.

### 5.2. Security

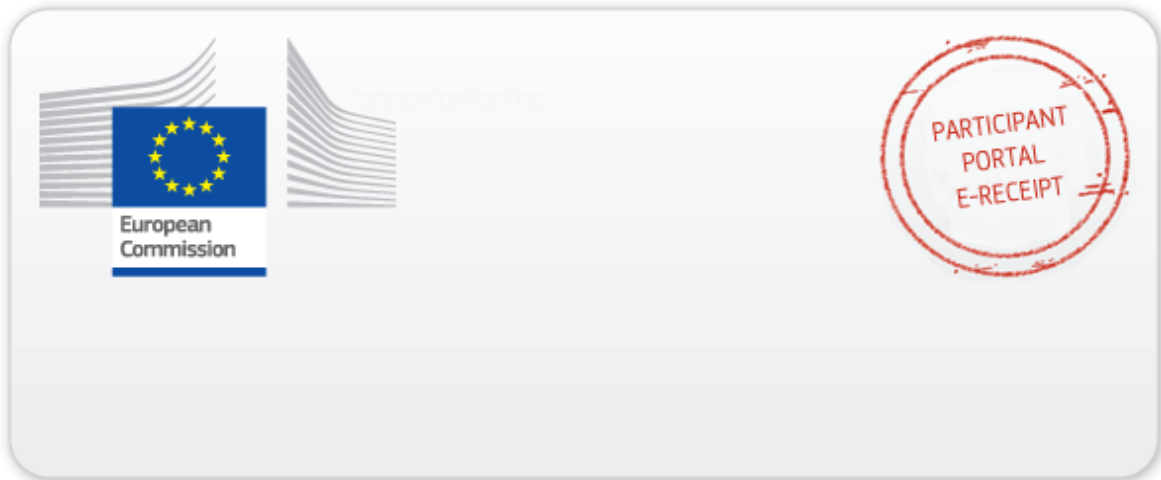
Indicate if your project will involve activities or results raising security issues.

No

Indicate if your project will involve 'EU-classified information' as background or results.

No





This electronic receipt is a digitally signed version of the document submitted by your organisation. Both the content of the document and a set of metadata have been digitally sealed.

This digital signature mechanism, using a public-private key pair mechanism, uniquely binds this eReceipt to the modules of the Participant Portal of the European Commission, to the transaction for which it was generated and ensures its full integrity. Therefore a complete digitally signed trail of the transaction is available both for your organisation and for the issuer of the eReceipt.

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