Trust-based search engine for finding workers, experts and partners

IPIX

Trust-based search

Short title: Trust-based search

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1 Excellence

2 Impact

3 Implementation

Colophon. This proposal was written collaboratively with Google Docs by the Conaissance core team. Figures were made with Adobe Illustrator and Mathematica.

1 Excellence

1.1 Challenge and solution

1.1.a Problem to overcome

Trust is becoming a keystone for industry and livelihood in modern society. Trust is at the heart of the sharing economy, which encourages access over ownership. In business, trust reduces transaction friction by diminishing the need to insure against deception. According to PwC, "Trust has become essential in the digital age. It must underpin how you organise and run your business so that you can be successful". Selecting on the basis of trust is key to recruitment in firms, credibility in professional services and even collaboration in research.

Category-based search engines, like Google, Yahoo and Bing, have transformed our lives by providing fast and targeted access to information. But these search engines are strikingly ineffective at finding individuals for trust-based relationships: employees, experts, business partners and collaborators.

1.1.b Our solution

Our solution is Irix, a new trust-based search platform for finding workers, experts and partners by recursively harnessing the trusted contacts between individuals.

Power of trust
Humans have a fundamental predisposition towards trust. Trust enables them to make better decisions 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. The advantage of trust corridors is that they can dramatically extend the community of people that a person trusts beyond the contacts that they know directly.

Headhunters of headhunters
The way Irix works is simple. When searching for a worker, expert or partner, every one of our 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, in Irix we don't differentiate between candidates and headhunters, since potential candidates tend to make the most informed headhunters.

An example
For example, suppose a business wants hire a mobile app developer. Using Irix, the business sends the job spec to a select number of its contacts that are most knowledgeable about app development. Each of these contacts can either apply for the job, or they can pass the job spec on to a small number of their most relevant contacts. As this process gets repeated, two things happen: the number of people who learn about the job grows exponentially; and the job spec is sent to precisely those people who are most relevant to the search. Any recipient can apply for the job. Only when the business chooses one of the applicants to hire does the process stop.

Rewarding connectors
Connectors provide a valuable service to society. To encourage people to make connections by passing on a search request to relevant contacts of their own, Irix makes use of a cash bounty system. The size of the bounty is set by the business. Everyone along the path of contacts from the business to the hired worker gets paid, but not everyone gets the same amount. The connector closest to the hired worker gets ½ of the bounty. Next in line gets ¼ of the bounty, and so on, with Irix taking what is left over as a fee. An example of this is shown in Figure 1.2. The further the reach of your search, the more of your money is working for you to give you the best results possible.

What we have done so far

Conaissance conceived, designed and built Irix (irixit.com), a platform for matching businesses with workers using trust corridors. The platform has had 240 users. To date, Conaissance has:

- 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.
- Demonstrated the platform in operational environments to find web developers and academic postdocs.

What we will do in Phase 2

We now need to upgrade our platform and accelerate market penetration. In Phase 2 we will:

- Make our platform more widely available by launching a mobile app for iOS and Android phones.
- Extend the range of ways to add known contacts to include SMS and social media.
- Integrate seamless payments whereby users can pay amd receive bounties directly from their phone.
- Enhance the search process for speed and profit by optimizing the trust tree depth and size.
- Achieve market penetration by targeting film, academia, tradesmen, tutors and developers.
- Harness our built-in viral growth engine whereby users generate new users by inviting their contacts.
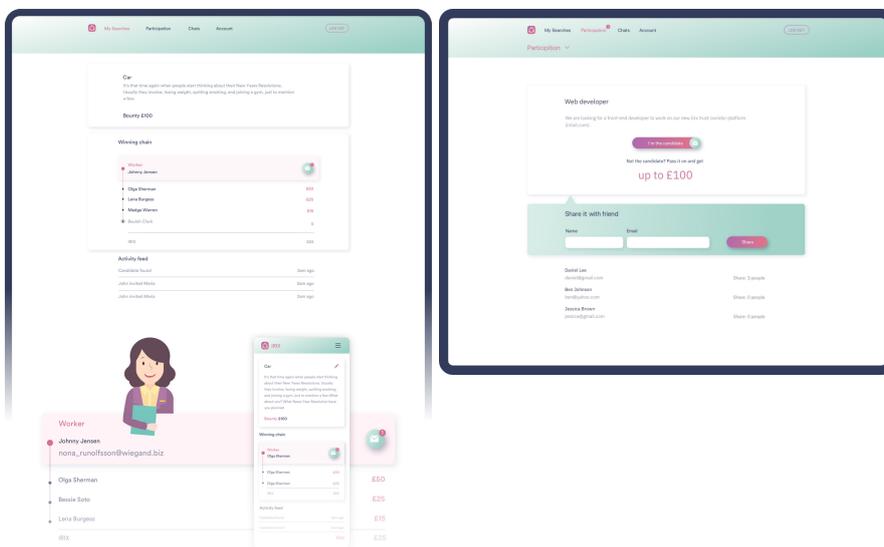- Develop a distributed architecture to manage the large scale search volumes.

Figure 1.1. Screenshots from our Irix web platform.

Recipients is the number of people who are in the trust tree and have seen the job spec.

Candidates is the number of recipients who have applied for the job.

Your connections lists the people that the user has passed the job spec on to. For each invited person, the number of invitations (Shares) downstream from them is also shown.

1.1.c User needs and advantages

Here we outline the different user needs and how we address them. We discuss the state-of-the-art competitors in §1.1.e and compare Irix to competitors across these user needs in §1.1.f.

User need	Problem to overcome	Our solution
Trust	Most workers are selected on the basis of first impressions because the business and worker do not have a prior relationship. This means that many workers are selected who are wrong for the job, and many others are passed over who are right for the job.	Trust allows businesses and workers to make decisions that more accurately reflect the quality of long term success of their match. Our technology builds trust corridors by linking trusted relationships between pairs of persons that are known to each other.

High reach	Reach is the size of the candidate pool that is considered when trying to find a worker, expert, business partner or collaborator. A limited reach has a lower chance of filling a position, or tends to fill the position with a poor match.	Because in Irix the pool of candidates grows exponentially with the number of connection layers, the reach for a search tends to be vast. This allows for the selection of higher quality candidates.
Cost effective	Job matching services charge high fees for their services, typically hundreds to thousands of euros. Recruitment agencies charge a finders fee of 15-25% of a worker's annual salary, or on the order of €10,000. This is a great outlay for businesses, but one that is tolerated for lack of an effective alternative.	Irix lets users choose their own bounty based on their resources and the degree of incentivization they require. Because Irix makes it easy to pass on search requests to trusted contacts, even modest bounties can be effective. And because Irix does not rely on recruitment staff (which it effectively outsources to connectors), its running costs are low.
Fast	The gap between needing a worker and finding that worker makes businesses inefficient. The current state-of-the-art for finding workers tends to take between a few week and a few months, causing businesses to suffer.	Because our technology makes use of parallel processing by many individuals acting simultaneously, it can produce extremely fast results. Successful searches produce results in days.
Reducing deception	Many matching platforms rely on first impressions or ratings systems to secure trust and encourage interaction between parties. But ratings have limitations: they attract extreme views and misleading positive reviews are often solicited.	Our technology does not rely on ratings. We allow users to make connections according to their own evaluation of their trusted contacts. This recursive process leads to higher quality candidates and reduces the risk of deceptive information.

1.1.d Importance of trust

Trust plays an important role in the recruitment industry. Referrals from known contacts are more trusted, meaning that there is stronger belief in ability and reliability. The statistics in support of this are striking. Referrals are five times more likely to get hired than any other form of hiring, and they are hired faster: 55% faster then going through careers sites, according to Jobvite 2017. Nearly half, 46%, of employees hired through referrals stay for over three years, compared to 14% of those hired through job boards.

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

Software developers
"I have had fairly good results from using LinkedIn in the past but my main successes have come from recommendations through other developers I come in contact with 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 are not available but they recommend a friend in their place."

—Richard, Lead developer

Film industry
"[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 and Director

Academic postdocs

"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, Research Scientist, CNRS

Tutors and trainers

"When looking for a language tutor I generally ask friends and colleagues if they know someone to recommend. I think searching online can be confusing and I don't always trust what's written on the sites of [language school]. Reviews are hard to trust in my experience, I prefer…word-of-mouth referrals from people I trust."

—Roman, Expat Designer

Tradesmen

"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. Hiring someone that has a proven track record with a trusted personal connection would…instil 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

Understanding trust

Trust is so important in business and in personal life it is the one value that plays the most vital role in decision making. 'The Trust Equation' gives a sense of how trust works.

$$T = \frac{Credibility + Reliability + Intimacy}{Self\text{-}Orientation}$$

Trustworthiness

Credibility relates to the words we speak. For example, we might say, "I can trust what she says about intellectual property; she is very credible on the subject.

Reliability relates to actions. We might say, "If he says he'll deliver the product tomorrow, I trust him, because he's dependable."

Intimacy refers to the safety or security that we feel when entrusting someone with something. We might say, "I can trust her with that information; she's never violated my confidentiality before, and she would never embarrass me."

Self-orientation refers to the focus of the person in question. In particular, whether the person's focus is primarily on himself or herself or on the other person. We might say, "I can't trust him on this deal—I don't think he cares enough about me, he's focused on what he gets out of the deal."

Increasing the value of the factors in the numerator increases the value of trust. Increasing the value of the denominator—that is, self-orientation—decreases the value of trust. Since there is only one variable in the denominator and three in the numerator, the most important factor is self-orientation. This is intentional. A seller with low self-orientation is free to really, truly, honestly focus on the customer. Not for his own sake, but for the sake of the customer. Such a focus is rare among salespeople (or people in general, for that matter).

Irix allows us to form and provide connections with people we feel meet these values above.

1.1.e State-of-the-art

Here we outline general competing search technologies, and specific recruitment search technologies. Our commercialization will be centered around recruitment. Our product does not compete directly with these technologies, but rather creates new demand in an uncontested market space.

General search technologies

Category-based search engines   ● Low threat
Search engines, like Google (§2.1.f), tend to be ineffective for finding workers, partners and experts. Search engines use filters and taxonomically structured metadata to identify relevant information. But not all data lends itself to these processes, because of its complexity or its relative position to the thing being searched. First, people tend to present themselves in the best possible light, and therefore their suitability tends to be subjective or exaggerated. Second, privacy concerns mean that many candidates are not willing to make their full details available to automated search engines.

Word-of-mouth   ● Low threat
By word-of-mouth we mean all forms of recommendation between individuals that are known to each other. Recommendations by word-of-mouth is a deeply ingrained human behaviour, but it's effectiveness in searching is limited by the small number of trusted contacts that any one individual has. Multi-layered trust corridors are rarely encouraged and are not digitally tracked, making this primitive "technology" difficult to systematize and scale. That is where our trust-based search engine, Irix, comes in.

Social media   ● Low threat
Social media, like LinkedIn (§2.1.f), is used in two ways to find workers, partners or experts. In the first, jobseekers or employers advertise their needs 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 freiends, but not friends of friends, etc. In the second way, jobseekers or employers join larger, purpose-built groups focused 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 trust relationships.

Recruitment search technologies

Freelance platforms   ● Low threat
Freelance platforms, like Upwork (§2.1.f), help independent professionals (freelancers) and businesses collaborate remotely. Because the freelancers and businesses do not normally meet in person, freelance platforms rely on ratings systems, similar to those used by TripAdvisor and Amazon. 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, ratings tend to come from those who are most motivated to leave them: highly dissatisfied or highly satisfied clients; users in the middle neglect to rate. Third, there is a problem with "grade inflation", since many ratings are solicited from users who are predisposed to rate well. For these reasons ratings-based freelance platforms provide at best a rough indication of suitability.

Job boards   ● Med threat
Job boards, like indeed.com (§2.1.f) 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 demain, but have not managed to intelligently match-make between the two groups. The situation is reminiscent of dating apps, where men and women are single but the matchmaking is based on first impressions and very noisy.

Recruitment agencies   ● Med threat
Recruitment agencies, like Adecco and Randstad (§2.1.f), 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 more skilled at matchmaking than the businesses they represent. While some agencies meet their clients in person, their placements tend to rely on first impressions more than trust. In this sense, agencies can be seen as catalysing the job board process above. Recruitment agencies are expensive, typically charging a finders fee of 15-25% of the worker's annual salary. Digital technology is removing middlemen from other sectors, like travel and estate agents, and we expect a similar change in recruitment.

1.1.f Beyond the state-of-art

The Irix technology enables users to exploit not only their own network of trusted contact but to operate across multiple levels of of trusted networks beyond their own trust horizon.

Digital search meets human intuition

The Irix search engine is unique because it combines human intuition with digital intelligence to achieve complex search of persons. Irix uses a recursive (rule repetition) process for 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.

"Thincasting" beats broadcasting

Irix limits the need for mass broadcasts of information that give rise to the influx of many pieces of information but few relevant ones. Micro-blog platforms like Twitter broadcast to everyone on a person's contact list. Our approach is the opposite: we "thincast" to only the handful of people from our own contacts that we deem especially appropriate. This means that users receive more tailored requests and fewer distractions, making them more likely to engage with our product.

Turning connections into a commodity

Connectors provide a valuable service to society. Irix gives connectors their just recognition by rewarding them when they are part of a winning chain. Connectors at all levels are rewarded, because complex search tends to be the result of multiple persons, not just one. In other words, Irix turns making connections into a commodity: something that can be effectively bought or sold at a repeatable price.

Global insight from local vision

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 our own local patch of the fabric of society. Until now, there was no technology which could harness these local maps to gain insights at a global level. Irix provides a technology to fasten together local connections into trust corridors to link up supply and demand.

Inspired by DARPA

The creators of Irix drew their inspiration from the Defense Advanced Research Projects Agency, which one of the founders worked for. 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 that we have adopted as the basis of Irix. The contest demonstrated the power of incentivized network search as a way of achieving complex tasks.

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

Competing technology	Trusted	Cost effective	Fast	Accurate	Safe	Targeted	High Reach
Word-of-mouth	✓	✓		✓	✓	✓	
Search engines		✓		✓			✓
Recruitment agencies	✓		✓			✓	
Job boards		✓		✓			✓
Social media	✓	✓	✓				✓
Freelance platforms		✓	✓				✓
Irix	✓	✓	✓	✓	✓	✓	✓

1.2. Approach

1.2.a. USP

Our Consortium has developed the automated trust corridor system that uses trusted contacts in our local networks, to recommend their trusted contacts in their own networks, to eventually locate roles and services with confidence. The framework is based on the knowledge of individuals in a chain and the trust they have with the people who recommended them and the people that they recommend.

The concept is best understood visually, as follows.

A recruitment request   Successful trust corridor

Bob wants to hire a developer. Using Irix, he invites some of his contacts to help.

BUSINESS
Bounty ↓ €100

One of Bob's contacts is Kate. Kate doesn't need a job, so she invites people she knows to help.

CONNECTOR
Reward ↑ €12.50

One of Kate's contacts is Mike. He isn't a developer either, so he passes on the offer to others.

CONNECTOR
Reward ↑ €25.00

One of Mike's contacts is Emma, and she passes it on too.

CONNECTOR
Reward ↑ €50.00

But one of Emma's contacts, Joe, is a developer. Joe discusses the job with Bob, and Bob hires him.

WORKER
Reward ↑ Hired

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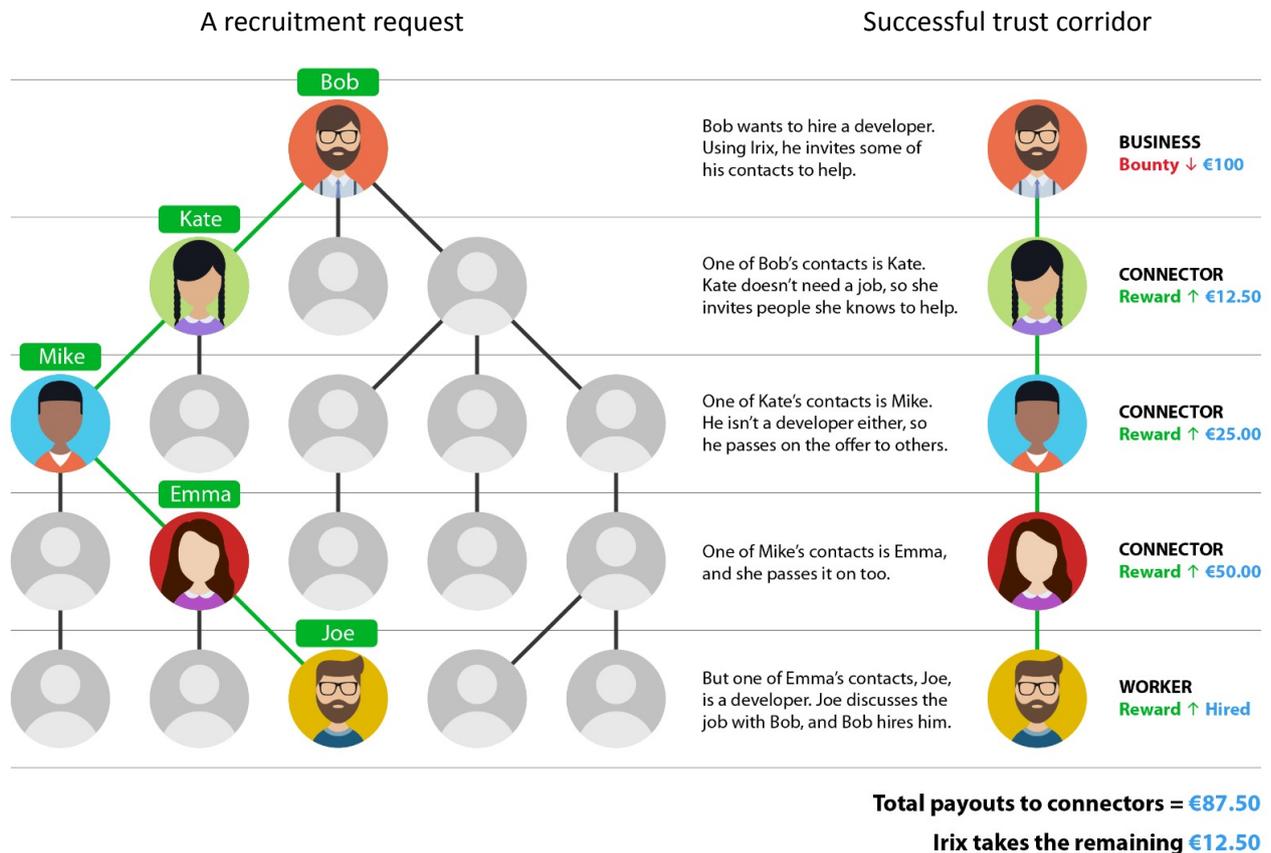**Irix takes the remaining €12.50**

Figure 1.2. How Irix works: Bob initiates a search for a worker, and Joe ends up taking the job. The path from Bob to Katie to Mike to Emma to Joe forms the winning chain, and the three connectors all get a share of the bounty. The portion of the bounty left over goes to Irix as its fee. As we show in §2.2, the fee that Irix gets depends on the depth of the trust tree (shallower trees bring Irix more money), with the average fee estimated at 10%.

Reward. Providing a higher reward to the user closest to the 'target acquisition' is the most efficient way to incentivise the acquisition process. We have built a number of systems that allow us to monitor for fraudulent activity so as to secure the businesses' finances. Fraud prevention plays a vital part within the rewards system.

Why now. There has never been a better time for the recruitment sector to change the way it works. Wasted time, inefficiency and poor technological development are showing the cracks in the sector. The fast adoption of online tools and mobile applications shows that now is the perfect time to fill this gap in the market. 83% of young adults report searching for jobs online, making job sites the most used recruitment method. In conjunction with the fact that the recruitment industry is growing at a high rate each year, this makes now the right time to enter the marketplace.

1.2.b Our product so far

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

Irix 1.0
May 2017 – Jun 2017
The first version of Irix was a pilot version built in WordPress. The purpose of this early verison was to establish proof-of-principle of demand and usability for our technology concept.

Irix 2.0
Jul 2017 – Sep 2017
We built our second platform around the Laravel PHP framework to better cope with the recursive nature of Irix trust corridors. 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.

Irix 3.0
Oct 2017 – Jan 2018
The third version of Irix was a complete rebuild of the web platform to have greater speed, reliability and usability. The tech stack for the new build includes HTML, CSS, Laravel, JavaScript, PHP, Bootstrap 3 and jQuery. As well as the bounty system and secure authentication, Irix 3.0 has secure login, a reliable email client and complete trust tree tracking.

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 solution to the DARPA Network Challenge
		Feb 2017	• Founders developed trust branching and bounty algorithm
2	Technology concept formulated	Mar 2017	• Modeling and simulations of growth model to support development
		Apr 2017	• Recruitment selected as best first 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	May 2017	• Irix 1.0: User flow established and wireframe designed
		Jun 2017	• Irix 1.0: First platform developed in WordPress (subcontracted)
		Jun 2017	• Internal user testing for UX and edge cases
		Jul 2017	• Itrerative feedback cycles between user testing and redesign
4	Technology validated in lab	Jul 2017	• Irix 2.0: Second platform developed in-house around Laravel
		Jul 2017	• Secure authentication system developed and implemented
		Aug 2017	• Tested for technical correctness and ability to track tree layers
		Sep 2017	• Bounty and variable payout system implemented
5	Technology validated in relevant environment	Oct 2017	• Irix 3.0: Redesign of userflow in Adobe XD
		Oct 2017	• Irix 3.0: Third platform redeveloped for speed and reliability
		Nov 2017	• Platform optimised for (web-app) performance on smartphones
		Dec 2017	• Reliable email client incorporated
		Dec 2017	• Trust tree tracking built and checked for consistency
6	Technology demonstrated in relevant environment	Jan 2018	• Platform used to recruit science postdocs placed on jobs.ac.uk
		Feb 2018	• Platform used to match freelancers in the filming industry
		Mar 2018	• Feedback from users lead to improvements in UX and UI
		Apr 2018	• Dedicated account set up for tranactions via PayPal
		Apr 2018	• Usability interviews conducted across target sectors

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	• Enhance current website security and stability for larger volume
		Month 01	• Spec the platform as a mobile phone app in Adobe XD
		Month 06	• Build mobile app in React Native for iOS (iPhone)
		Month 08	• Extend React Native for iOS build to Android, test and refine
		Month 11	• Confirm value hypothesis by collecting feedback from users
8	System complete and qualified		**Product**
		Month 12	• Battery of tests for performance on range of mobile hardware
		Month 12	• Optimise profit incentives and margins on Galton Watson trees
		Month 13	• Extend range of connection channels (SMS, social media)
		Month 13	• Integrate seamless in-app financial transactions for bounties
		Month 15	• Launch mobile app for iOS and Android
		Month 16	• Optimize incentive structure to optimise no. of user connections
			Commercialization: early adopters
		Month 13	• Create digital advertising campaign with small budgets to find users
		Month 13	• Optimise our digital ads to drive maximum traffic per advert
		Month 14	• Use content marketing to drive relevant users to our website.
			PR with subcontractor THRSXTY
		Month 06	• Create proactive (Message House) and reactive (Q&A) vision modules
9	Actual system proven in operational environment		**Product**
		Month 04	• Enhance search for speed profit by optimizing the trust trees
		Month 11	• Seamlessly integrate contacts to include Facebook and LinkedIn
		Month 13	• Early adopter market penetration: film industry, academia.
		Month 13	• Mainstream user market pen.: tradesmen, tutors, developers
		Month 20	• Harness our built-in viral growth engine for expansion, profit
		Month 14	• Targeted marketing campaigns for identified audience segments
		Month 16	• Develop a distributed architecture for large scale search volumes
			Commercialization: final users
		Month 17	• Increase digital marketing budgets from successful campaigns
		Month 18	• Target mass users by large scale advertising. Billboards, print & news.
		Month 16	• Focus on identified target segments and users for advertising spend
		Month 20	• Friend referral program to drive more users.
			PR with subcontractor THRSXTY
		Month 12	• Create PR strategy and launch campaign directed at recruiting
		Month 14	• Identify user segments and target industries for launch
		Month 19	• Drive awareness by featuring Irix in relevant publications
		Month 19	• Interviews, editorial and adverts in recruitment trade press

2 Impact

2.1 Entering the market

Our key market for commercializing Irix is the recruitment industry, valued at €378 billion a year. It is growing fast, thanks to an increase in career changes and more workers opting to work remotely and short-term.

Companies spend significant time and money searching for candidates, interviewing, auditioning and checking references and ratings. This is not surprising, as hiring workers with the right skills is crucial to a firm's success. Matching businesses with suitable workers is big business.

In traditional recruitment methods, businesses advertise a job and workers signal their interest, or workers advertise their skills and business signal their interest. In both cases, the businesses and workers that approach each other do not have a longstanding relationship. Instead, they make quick assessments based on first impressions and the performance ratings of others. The problem is that, in the absence of trust, it is difficult to be sure of making the right match. Trust is a firm belief in the ability and reliability of someone. Without it, businesses and workers frequently mismatch. Businesses that hire the wrong person waste money on unsuitable skills and waste time on training people who don't stick around. Workers that take the wrong job are unhappy at work and have low job security.

Despite the economic and societal importance of matching businesses with the right workers, the recruitment industry has been slow to change. Digital technology has transformed other sectors, like travel, real estate and shopping. Recruitment is ripe for a similar disruption.

2.1.a Targeted user groups

We focus on five recruitment sectors that have a strong need for our product. To accelerate market uptake, we differentiate between early adopters and mainstream users. Early adopters make up a smaller fraction of the market, but they are more accepting of limitations. They also provide validated learning by assessing our minimum viable product. As Irix is user-tested and refined, we will turn to attracting mainstream users.

Film and television   Early adopters
The film and television production industry is an ideal early adopter 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 and technicians are freelancers and there is a no global or even national standard for matching them to industry jobs.

Academic postdocs   Early adopters
Postdoctoral researchers are research apprentices to senior researchers. They have completed their degrees but do not have enough expertise to lead research projects on their own. There are an estimated 300,000 postdocs globally, and nearly half of these are selected by word-of-mouth recommendations or provide a recommendation which is connected to the employer through a trust corridor. Recruitment agencies do not have the expertise to select for postdocs, but job boards are popular, such as jobs.ac.uk (UK) and stepstone.fr (France).

Tutors & trainers   Mainstream users
Tutors and trainers includes any specialist who is employed to help a person get better in a specific skill, such as music teachers, private tutors, sports coaches and personal trainers. In many cases, the skill level required is not high and an amateur is sufficient. Personality compatibility is then the main determinant for success, which is hard to infer through job boards, recruitment agencies or freelance platforms.

Tradesmen   Mainstream users
Builders, plumbers and other tradesmen are often selected because of a referral from a trusted contact. This is because it is hard to judge their work up front or even while they do it; only long after they have finished the job does low quality work become apparent. Websites such as Rated People, Task Rabbit and

Houzz's Professionals section already have a built-in reviewing system, however word-of-mouth would still be more efficient in earning users' trust.

Software developers   Mainstream users

As more and more products go digital, the number of software developers continues to rise. Skills can vary from developer to developer and often developers are specialists in specific languages or frameworks. Developers often get grouped together regardless of what language they write, but their skill sets can vary heavily. Peer recommendation serves as a filtration system to ensure the right skills are matched with the right talent.

2.1.b Sustainable development

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:

Trust is the fundamental basis for industry in modern society, because it alleviates the need for transaction frictions associated with insuring against deception. Our platform accelerates industry by helping citizens identify trusted workers, business partners and experts.

Trust is at the heart of the sharing economy, which has contributed to sustainability by encouraging access over ownership. By extending the boundaries of the trusted community via trust corridors, our technology provides a basis for creating new kinds of sharing economies.

Irix helps turns employment into a commodity by enabling firms and individuals to quickly find the work skills and job opportunities that they seek. By reducing the time it takes to change jobs, our technology helps workers find work commensurate with their ability.
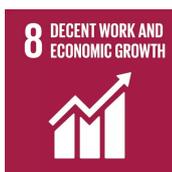
The opportunity to quickly find work appropriate to one's skills helps everyone share in progress. By reducing the barriers to matching workers with jobs, our technology creates a more efficient and fair employment market. This in turn promotes economic growth, particularly in underdeveloped nations, where it is most needed.

2.1.c Market

Global recruitment

The global recruitment industry is vast. The global market for 2016 is valued at €378 billion, and this is predicted to grow by 3% a year in 2017 and 2018 to over €400 billion, according to the Recruitment Industry Analysis. The size of the market, combined with high prices for services which have not kept pace with technology, provides a great opportunity for Irix.

EU recruitment

Recruitment in the European Union is alone is valued at €132 billion in 2016, with 226 million jobs being recruited. Of these, 188 million were for permanent jobs, 33 million were for freelance jobs and 5 million were for temporary jobs.

Recruitment methods

The three most used forms of recruitment are recruitment agencies, job boards and freelance sites.

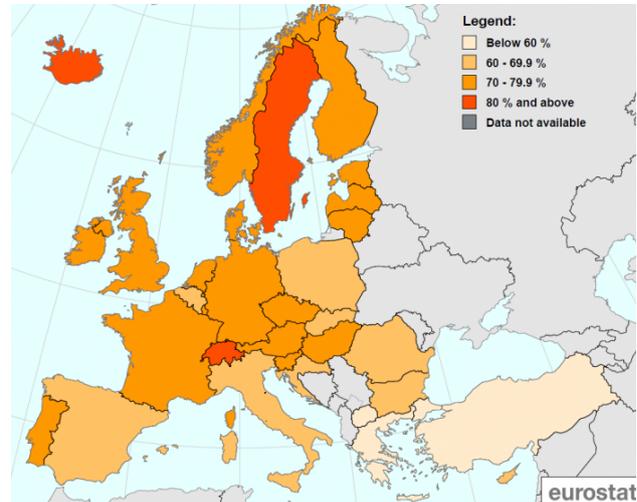| Recruitment method [4]	Sources of applicants [4]
27% Career sites	52% Job boards
19% Job boards	34% Career sites
16% Referrals	03% Referrals
15% Internal hire	02% Internal hire
04% Agency	02% Agency

Figure 2.1. In 2016 the average EU employment rate (fraction of adults working) was 71%, the highest average recorded for the EU. The breakdown across countries is shown here. Source: EU Labour Force Survey.

Recruitment fees

Recruitment agencies typically charge fees of 15–25% of the annual salary they are recruiting for. This is very expensive: on the order of €5,000 to €15,000 per hire. Job boards such as Indeed.com and Monster.com typically charge between €100–600 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 development project would be €880–€1,250.

As the numbers above suggest, business are willing to pay significant amounts of money to find the right workers. And speed matters: 64% of recruiters report awarding monetary bonuses as incentive to find employees faster [3].

[3] Jobvite Recruiter Nation Report 2016
[4] Jobvite 2017 Recruiting Funnel Benchmark Report

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.

LinkedIn (job board)   ● Med threat

64% of **job** seekers get hired through a referral. This is why **LinkedIn** created job boards to boost the chances of getting hired through people you may know. There are 11 million active job listings on LinkedIn at any one time. 94% of recruiters also use LinkedIn to vet candidates online as this is seen as a trusted network of people. Your skills are shown and othjers can verify your skill level and ability using LinkedIn's tools. 20,000 US companies use LinkedIn to recruit from.
Value: €22.1 Billion

Indeed (job board)   ● Low threat

Indeed is an American worldwide employment-related search engine for job listings launched in 2004. Indeed is currently available in over 60 countries and 28 languages. In 2010, Indeed.com passed Monster.com to become the highest-traffic job website in the United States. In 2005, Indeed launched their beta version of what they refer to as "pay-per-click job advertising network".
Value: €812m

Upwork (freelancer site)   ● Med threat

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.
Value: €700m (estimated)

Fiverr (freelancer site)   ● Low threat

Fiverr is the world's largest online marketplace for freelance services, beginning at a cost of $5 per job performed, from which it gets its name. Based in Israel and headquartered at Tel Aviv, the site is primarily used by freelancers to offer services to customers worldwide. As of 2012, over three million services were listed on Fiverr.
Value: €519m

Adecco (recruitment agency)   ● Low threat

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.
Value: €724m

Randstad (recruitment agency)   ● Low threat

Randstad is the world's second-largest HR service provider after Adecco with 29,750 employees worldwide. The Dutch company achieved a turnover of €19.2 billion in 2015.
Value: €420m

2.2. Business model

2.2.a Revenue

Each time a new search is created, the creator chooses how much bounty to offer and pays it to Irix. Irix distributes some of this bounty to connectors along the winning chain, and keeps some as revenue. Just how much of the bounty is kept as revenue depends on how many layers are in the winning chain.

The final connector (the one that finds the right person) gets ½ of the bounty. The connector that finds the final connector gets ¼ of the bounty; the connector that finds the connector that finds the final connector gets ⅛ of the bounty; and so on. Whatever is left over goes to Irix.

Example

For example, if a search creator offers a bounty of €100, the table below shows the payout connectors and the profit kept by Irix, depending on how many connectors there are in the winning chain.

	Instigator (searcher)→	Connector →	Connector →	Connector →	Connector →	Connector →	Provider (right person)	Irix revenue
0 connectors								€100
1 connector						€50		€50
2 connectors					€25	€50		€25
3 connectors				€12.50	€25	€50		€12.50
4 connectors			€6.25	€12.50	€25	€50		€6.25
5 connectors		€3.12	€6.25	€12.50	€25	€50		€3.12

Average income

Based on data from users so far and modelling, we estimate the number of connectors in a winning chain to be binomially, or bell curve, distributed, with a mean of 4 (see the table to the right).

With this distribution for the number of connectors, we calculated mathematically that the average Irix revenue is $(\tfrac{3}{4})^{2\mu}$ of the bounty, where μ is the mean number of connectors. For a mean of $\mu = 4$, the typical Irix revenue is $(\tfrac{3}{4})^8 = 10.0\%$ of the bounty.

For example, for a €100 bounty, Irix would most often have revenue of €6.25, sometimes €12.50 or €3.12, occasionally €25 or €1.56, and so on. Overall the average revenue would be €10, or 10%. We use 10% in our estimates of revenue throughout this proposal.

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%

2.2.b Scalability

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 the system is to users. This is because Irix invites users to pass on searches to a selection of their trusted contacts, regardless of whether those contacts have used Irix before; in general, will not have. If any recipient wishes to accept the search or pass it on, he must do so through the Irix platform (in order to secure any payout).

Gauranteed revenue

Irix makes money, no matter how many layers there are in the winning chain. This is combined payout is always less than the bounty: ½ + ¼ + ⅛ + ... < 1.

Exponential growth

For every business/ employer that makes a request using the solution they will on average reach out to 4 people and those 4 people will reach out to their networks as seen below. This has a built in promotional tool as anytime it is used it is also promoted as they see our brand. This model was used by Hotmail and was one of the fundamental ways they achieved rapid growth.

2.3. Financing

Connaissance, the company which makes the Irix technology, is owned by its employees, apart from a small proportion which is owned by external investors.

Projected income

On average Irix takes 10% fee from the reward/ bounty when using our own platform.

	Film	Postdocs	Tradesmen	Tutors	Developers
Average bounty	€150	€300	€100	€50	€1000
Average Irix revenue	€15	€30	€10	€5	€100
Year 3 searches	8,000	2,250	3,000	2,500	3,750
Year 4 searches	16,000	4,500	6,000	5,000	7,500
Year 5 searches	24,000	9,000	12,000	10,000	15,000
Total Irix revenue	€720,000	€472,500	€210,000	€87,500	€2,625,000

€4,115,000

The table below outlines the income and costs for the three years after the end of phase 2. The company is still expanding over this period under its own resource. We would expect to raise additional capital in this period but we feel its is clearer to illustrate the company without this additional investment. Thus as the sales expand in this period the costs / internal investment pretty much keep track leaving a small profit.

SME Inst. Post Phase 2 period: 36 months

		2021 - Yr 3	2022 - Yr 4	2022 - Yr 5
	Employees	15	18	20
	Total Stand Alone Searches	**19,500**	**39,000**	**70,000**
Costs	OPEX	€450K	€540K	€600K
	CAPEX	€50K	€50K	€50K
	Commercial development	€75K	€100K	€120K
	Total costs	**€1150K**	**€1,380K**	**€1,540K**
Income	Film searches @ €15	€120K	€240K	€360K
	Post doc searches @ €30	€67,5K	€135K	€270K
	Tradesmen searches @ €10	€30K	€60K	€120K
	Tutor searches @ €5	€12,5K	€25K	€50K
	Developer searches @ €100	€375K	€750K	€1,500K
	Total income	**€605K**	**€1,210K**	**€2,300K**

2.3.a Impact and funding

The Phase 2 SME Instrument will enable Irix to employ 12 new employees (including interns) by the end of Phase 2. We anticipate that this would rise to 40 employees at the end of another three years.

The total funding required for Phase 2 is €1,830,879. We are requesting 70% of this, or €1,281,615, as the EU contribution, and will raise the remainder of €549,264 ourselves.

	Source	Amount
EU contribution (70%)	H2020 SME Instrument	€1,281,615
Conaissance contribution	External and founder investment	€318,585
Commercialization	Commercialization during the first 24 months	€230,678
Total		€1,830,879

As we commercialise our product across Europe and beyond, we will continue to seek further financing. We are already in contact with a number of business angels and venture capital organisations to ensure we can finance our project now and in the future. We will pitch to investors, such as UK-based Balderton Capital; we would like to use the SME mentoring programme to hone our skills in this area.

We would expect to raise an additional €2M to accelerate expansion and the global commercialisation of Irix beyond Phase 2.

2.4 Knowledge protection and freedom to operate

Conaissance 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.

IP and potential IP	Status of protection
Irix 1.0, 2.0 and 3.0 web platforms	Conaissance owns copyright
Irix mobile app platforms	Conaissance owns copyright
Trust trees and relational data	Copyright is protected for 15 years by Database Directive (96/9/EC of European Parliament)
"Irix" name	Conaissance is seeking trademark protection in the UK.
Global trademark protection	Conaissance will extend trademark as and when we enter new territories (activity in a territory is a prerequisite for trademark protection).
IRIX	Conaissance owns the copyright to the logo and logotype.
Patent on trust-based search	Conaissance will file appropriate patents of its own by Dec 2018 on "complex network search using recursively generated trust corridors".

Freedom to operate

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

Data compliance

We have developed our software to comply with current data protection regulations. Any personal data generated by the system is owned and controlled by the owner of the individual profile and therefore complies with the standard data protection regulations and the European General Data Protection Regulation.

2.5 Dissemination and communication

Effective dissemination of our project results and communication of our project activities are core activities involving our whole team. Our activities take a variety of forms, focusing on four audiences:

(i) the recruitment community;
(ii) the wider technology community;
(iii) society beyond the technology world; and
(iv) industry and other stakeholders.

This project will foster wide technological awareness and industrial uptake, stimulating innovation in allied fields that go far beyond our current work plan. In this sense, this project will contribute to the Horizon 2020 portfolio of new, innovative companies at the forefront of technology across Europe.

Recruitment community

Social media advertising
We are already using social sites to build our audience ready for growth. We are focusing our efforts with the leading sites, such as Twitter and Facebook as this is where we see potential. We have target audience segments we feel will be our early adopters on mass launch.

Interns and student recruitment
We will host three-month internships for media graduates in social network technology. This will attract bright minds to work for our company without having to spend a lot of money. Interns will be mentored by a member of the core team.

Paid advertising
We will be advertising our system through a number of channels. Namely search engines such as Google Adwords and Bing as well as job related sites - these can be in the form of editorials, adverts and product reviews.

Wider technology community

Project website
The project will have a stand-alone, dedicated website which will evolve with the project. 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.

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.

Seminar streaming

Society beyond the technology world

Social networks
Social networks offer real-time exchange of information with unprecedented flexibility and reach. We will create an Irix Facebook group and promote discussion on it (e.g., trust) and disseminate results and events on a dedicated Twitter account. We will work with pre-existing Facebook groups that we have reached out to.

Popular press
We will utilise our subcontractor's PR connections at various media outlets to engage with editors for reviews, interviews and advertorial content in print based media like The Metro, Financial Times and Time Out.

Public engagement
Some members of our team have a record of public engagement with commitments to schools and public speaking events. These offer good channels to inform and excite interest in our new technology across a wide audience.

Industry and other stakeholders

Search
We will work closely with search experts to link the untapped legacy data held outside the digital systems with standard search results allowing organisations to access both types of results using single systems.

Consortium members are invited to present at
international trade shows. When possible we will
make ad hoc recordings of these to be streamed
from the project website described above.

2.5 PR - THRSXTY

Our PR subcontractor THRSXTY is one of the leading UK PR firms and has a global presence. They represent some of the largest brands in the UK including Jumeirah, Herschal, Sailor Jerry, Penguin, Lacoste, Polaroid and Jack Wills to name a few. We feel that with their extensive reach, THRSXTY will help us strengthen our presence in the EU and replicate our market in other countries. They specialise in public relations, digital and influencer marketing, as well as event production. Their amazing campaigns for Evian, Patron and Clash magazine all appeal to a similar key demographic that we are targeting for IRIX.

Our team within THRSXTY have specialist skills we feel can drive our business forwards. We aim to work in parallel with our agency as if they are an extension of our own team rather than a subcontractor. We have a previous relationship working with THRSXTY and the 3 key people managing our communication, PR and brand reputation these 3 areas are overseen by our PR client manager Sarah Belizaire-Butler. Oliver Wheeler (CEO) Wheeler spent seventeen years at freud communications, the UK's largest independent PR agency advising global brands including PepsiCo, Nike, Nestle, Unilever and Disney, as well as CEOs and high profile individuals. Rob Lester (Head of Reputation) leads THRSXTY's Reputation division, working to protect and promote the reputations of clients. Rob has 16 years' media experience in PR and journalism. He is also an experienced media trainer and has developed and run programmes for companies such as Shell, Intel, Paddy Power, Bombay Sapphire and Visa.
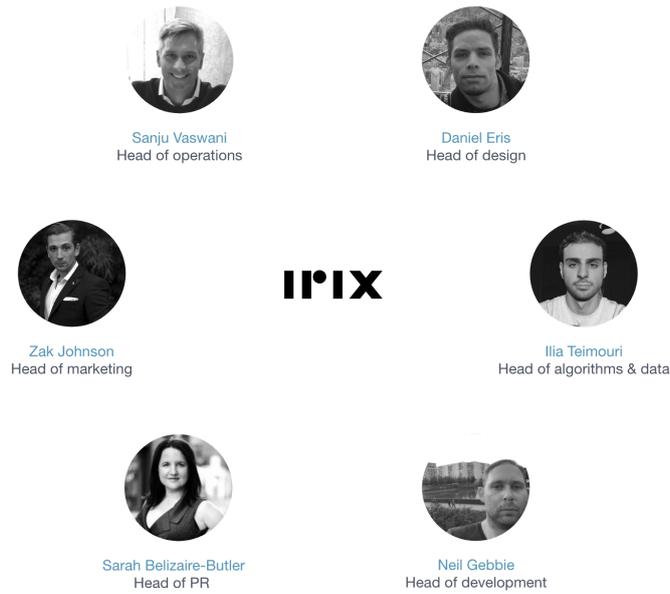
3 Implementation

3.1 Team

3.1.a Core team

Product development

Neil Gebbie	Head of development
Ilia Teimouri	Head of technology & data
Daniel Eris	Head of design

Commercialization and growth

Sanju Vaswani	Head of operations
Zak Johnson	Head of marketing
Sarah Belizaire-Butler	Head of PR

Sanju Vaswani
Head of operations

Daniel Eris
Head of design

Zak Johnson
Head of marketing

Ilia Teimouri
Head of algorithms & data

Sarah Belizaire-Butler
Head of PR

Neil Gebbie
Head of development

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 core team of six people has the skills to further develop and commercialize our product and generate profit, as shown below.

Product development experience	Neil	Ilia	Daniel	Sanju	Zak	Sarah
Web development	✓					
Mobile app development	✓					
React and React Native	✓					
Complex networks		✓				
Statistical physics		✓				
Galton-Watson processes		✓				
User interface (UI) design			✓			
User experience (UX) design			✓			
Digital and print marketing assets			✓			

Commercialization and management experience

Project management				✓		
Finance and accounts				✓		
International expansion				✓		
Mobile app marketing					✓	
Sales and acquisitions					✓	
Customer relations					✓	
Digital and AI PR						✓
Print and digital media						✓
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 WPs; marketing campaign logistics; ensuring budgets are correctly allocated; assisting with the H2020 annual reports.

Decision-making mechanisms

The project Board will be made up of the six core team members, led by Sanju. The Board will align the tasks within the work packages. Final decision making will rest with the chair of the Board, Sanju.

Appropriateness of mechanisms

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

WP	Work package title	WP leader
1	Platform upgrade and expansion to mobile app	Neil/Daniel
2	Local uptake and search optimization	Ilia
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 (global PR). Subcontracting costs are 10% of the total budget.

PR Firm, UK

What are they?	THRSXTY is one of the leading UK PR firms and has a global presence. They specialise in consumer focused products and services.
What will they do?	With their large in house team THRSXTY will allow us to build a national presence in the UK to launch IRIX, then we will begin to roll our global awareness to other EU countries we feel need a product like IRIX. This will all be overseen by Sarah Belizaire-Butler our client account manager. (bio in team in section 4)
Why did we choose them?	They specialise in public relations, digital and influencer marketing, as well as event production. Their amazing campaigns for Evian, Patron and Clash magazine all appeal to a similar key demographic that we are appealing to with IRIX.
Is it best value for money?	We have approached other PR firms with international experience, and none provided comparative value for money, nor matched THRSXTY's enthusiasm for our concept and its global potential. Their UK head office has a bright digital team that have worked on some fantastic global campaigns that we feel fits perfectly.
Relevant tasks	WP3.1: Strategy for EU WP4.2: Plug-in Marketing

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	Platform upgrade and expansion to mobile app	Neil, Daniel	55	1	15
2	Local uptake and search optimization	Ilia	40	7	12
3	Growth market replication	Sarah	50	13	24
4	Commercialisation of trust-based search	Zak	62	13	24
5	Management and communication activities	Sanju	43	1	24

3.2.b Deliverables

WP	No.	Deliverable	Dissem. type	Deliv. month	Deliv. month
1	D1	Upgraded web based platform	Other	Public	6
	D2	Mobile app (iOS and Android) ready and tested for launch	Other	Public	15
2	D3	Report on optimisation gains in speed and successful search rate	R	Public	8
	D4	First fully in-app users using in-app connection channels	R	Public	12
3	D5	Market report of awareness & penetration into target segments	R	Public	15
	D6	First 3000 platform users	R	Public	18
4	D7	Total bounty value over €100,000	R	Public	21
	D8	First international users	R	Public	15
5	D9	Overall coordination of the core team and liaising with THRSXTY.	R	Public	24
	D10	Recruitment of key technical and commercial employees and interns.	R	Public	9

R = document, report   Other = software, etc.

3.2.c Milestones

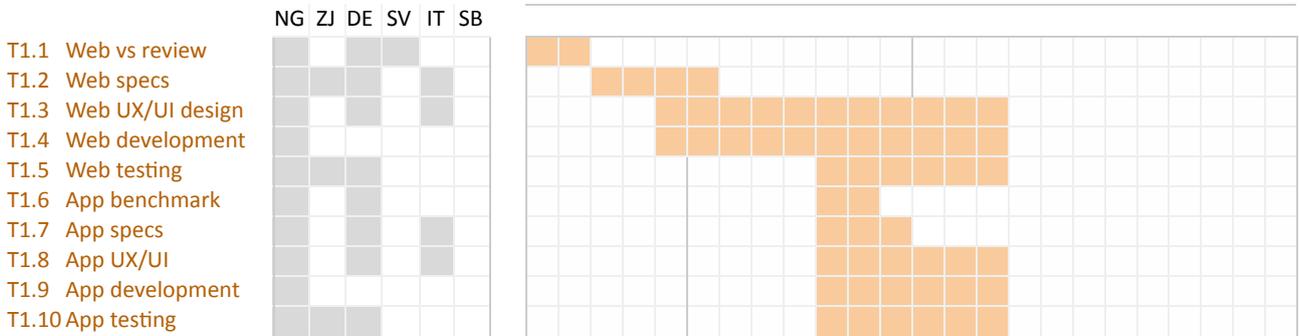| WP	Milestone		Means of verification	Month
1	M1.1	React Native app done	iOS app is uploaded and approved on App Store	15
	M1.2	Distributed architecture	Test software running over multiple servers	8
2	M2.1	Fully in-app connections	Entire search can be done without going off-mobile	12
3	M3.1	3000 platform users	System report showing 3000 platform users	18
4	M4.1	International users	IP address of 'business root' is outside UK	15
	M4.2	Gross bounty over €100K	Total bounty committed surpasses €100K	21

3.2.d Timeline (Gantt chart)
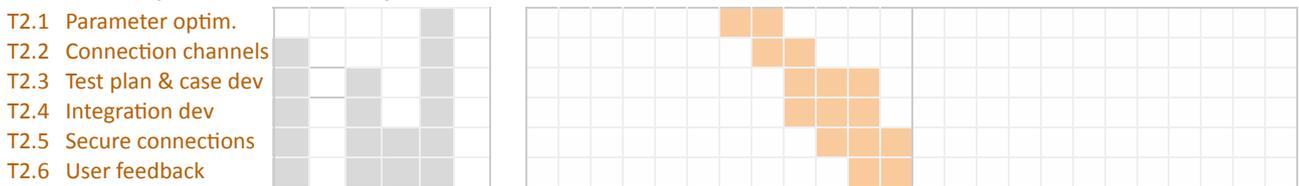
▨ = Lead person　　　▨ = Task month

SV = Sanju Vaswani　　NG = Neil Gebbie　　ZJ = Zak Johnson　　DE = Daniel Eris　　SB = Sarah Belizaire-Butler　　IT = Ilia Teimouri
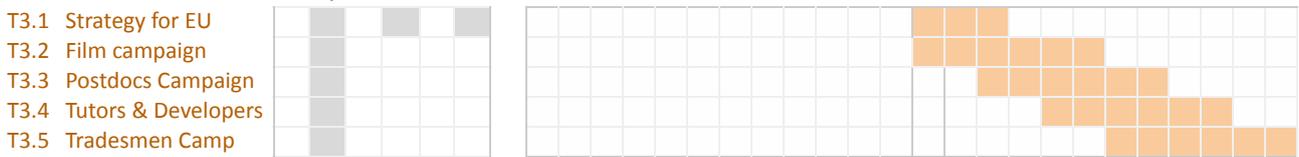
Tasks (T) & milestones (M)

WP1 Web upgrade & expansion to mobile app

T1.1　Web vs review
T1.2　Web specs
T1.3　Web UX/UI design
T1.4　Web development
T1.5　Web testing
T1.6　App benchmark
T1.7　App specs
T1.8　App UX/UI
T1.9　App development
T1.10　App testing

WP2 Local uptake and search optimisation

T2.1　Parameter optim.
T2.2　Connection channels
T2.3　Test plan & case dev
T2.4　Integration dev
T2.5　Secure connections
T2.6　User feedback

WP3 Growth and market replication

T3.1　Strategy for EU
T3.2　Film campaign
T3.3　Postdocs Campaign
T3.4　Tutors & Developers
T3.5　Tradesmen Camp

WP4 Commercialisation of trust-based search

T4.1　Incentive structure
T4.2　Payment systems
T4.3　Fraud & Security
T4.4　GDPR
T4.5　Expansion into EU

WP5 Management and communication activities

T5.1　Coordination
T5.2　Recruitment
T5.3　Product interns
T5.4　Commercial interns
T5.5　Subcon. meetings
T5.6　Comms and Diss
T5.7　IPR
T5.8　Mentoring
T5.9　Reporting

3.2.e Detailed work plan

WP1 Platform upgrade and expansion to mobile app   Months 1-15

<div align="right">Lead: Neil Gebbie, Daniel Eris</div>

Obj. 1 Web based platform upgrade
Obj. 2 Mobile apps development

Task	Name	Description
1.1	Current web version review	We will review the current website and develop list of recommended changes from architectural, software, UX and UI views.
1.2	Web Spec	Take the change candidate list and turn it in to detailed development specifications for the software and interface changes required for this project. The website part work package project plan will also be developed in this task.
1.3	Web UI/UX Design	Based on specifications developed in 1.2 the user experience and user interface will be updated to match functional changes required in the specification. Using prototyping tools (adobe XD, sketch, Invision) within real life environment will help us remove possible flows before actual implementation.
1.4	Web dev and implementation	Based on specs developed in 1.2 and the UX/UI work developed in 1.3 the team will implement the code changes and integrations required to deliver the functional changes outlined in the specifications.
1.5	Web system testing	Based on spec defined i 1.2 automated and manual tests will be developed including, SIT and CAT type tests. This tests will be implemented during the development tasks 1.4 and run after each sub phase of development work and system delivery. Using continuous integration tests and tools we validate our logic and code quality to ensure that our iteration times are shorter.
1.6	App benchmark	Review a range of similar type apps and in addition review top rated apps to develop a benchmark report on usability and functionality recommendations that are state of the art.
1.7	App spec	Take the benchmark report developed in 1.6 and turn it in to detailed development specifications for the software and interface changes required for this project. The website part work package project plan will also be developed in this task.
1.8	App UI/UX Design	Utilizing iOS, Android and react native standards. Based on specifications developed in 1.7 the UX and UI will be updated to match functional changes required in the specification. Using prototyping tools (adobe XD, sketch, Invision) within real environment.
1.9	App dev and implementation	Based on specs developed in 1.7 and the UX/UI work developed in 1.8 the team will implement the code changes and integrations required to deliver the functional changes outlined in the specifications.
1.10	App testing	Based on spec defined i 1.7 automated and manual tests will be developed including, SIT and CAT type tests. This tests will be implemented during the development tasks 1.9 and run after each sub phase of development work and system delivery. Using continuous integration tests and tools we validate our logic and code quality to ensure that our iteration times are shorter.

WP2 Local uptake and search optimisation   Months 7-12

<div align="right">Lead: Ilia Teimouri</div>

Obj. 3   Optimize trust-based search for speed and specificity
Obj. 4   Expand user base for mobile app

Task	Name	Description
2.1	Parameter optimization	Using a predetermined sample sizes we will evaluate search speed and specificty. At this stage we determine how our implementation can be improved, simplified or extended to better suit the user base. Depending on the outcome of these tests we may to modify our current implementation in WP1. Parameters include limit to connections and response time constraints.
2.2	Connection channels	We will extend range of connection channels, currently limited to email, to other forms of digital communication. Candidates forms include SMS, WhatsApp and social media.
2.3	Test planning and case development	Once the requirements have been reviewed, we plan the testing of our project at a high level. Test plan documentation is created during this phase. This phase ensures the testing team is adhering to the same logic and requirements of our plan. The goal of this phase is to determine in detail how to test our product. Test cases should be written to guide the tester through each test. The test cases should be updated if new features are introduced. During this phase we will be using placeholder data. Prepare any placeholder data required to run tests during this phase so our testing team can implement normalized data. Implement a bug tracking system for future use.
2.4	Integration development	Move from web-based users to fully mobile-based by building and optimising seamless in-app connections across the user channels above.
2.5	Secure connections	Incorporate in the mobile app 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 chain
2.6	User feedback for optimization	Once the pilot testing is completed, confirm value hypothesis by collecting user feedback. This task also involves an analysis of defects found and other metrics such as how many passed/failed/skipped test cases. This final phase of this work package might also include a retrospective of our process. This allows the team to learn and improve for future projects.

WP3 Growth and market replication

Months 13-24

Lead: Sarah Belizare-Butler

Obj. 5   Generate awareness of Irix
Obj. 6   Generate users

Task	Name	Description
3.1	Strategy for market replication	Working with THRSXTY PR to create EU marketing strategy. This will help us identify the key advertising partners and avenues needed to scale up our marketing efforts for penetration into other EU markets. We will target current job searching methods in this industry such as word-of-mouth via social media by contacting Facebook group owners and partnering with them. This way we can use their pre-existing user pool to our advantage, and with their seal of approval people within that database will trust our service more. Look at ways to integrate contacts using SMS, email & social media.
3.2	Film industry campaign	We will be targeting specific skills within this industry such as producers and camera operators. We will be marketing in various industry publications and

		digital outlets. We are also utilising ZJ's contact to run a pilot in WeCrew an industry freelance platform.
3.3	Postdocs campaign	We have a plan to approach our contacts within academic institutions at Oxford (UK), Karlsruhe Institute of Technology (Germany) and Paris-Sud (France). We will be launching a campaign to market within the institutions via email, advertising and digital media.
3.4	Software developers & tutors campaign	We have grouped these two sectors together since they tend to work on a per project basis. We will target small business owners who are looking to find tutors/developers to improve their business via adverts on business related sites and blogs.
3.5	Tradesmen campaign	We will approach homeowners to use Irix to find builders, and interior design related sites to find people looking for workers to assist their home projects.

WP4 Commercialisation of trust-based search

Months 13–24

Lead: Zak Johnson

Obj. 7 Integration of finalised incentive structure
Obj. 8 Expansion into additional EU territories

Task	Name	Description
4.1	Incentive Structure	In this phase we will explore the incentive structure based upon the Galton Watson Trees. Using Ilias research and analysis we will be able to determine the best reward structure/ incentive per branch.
4.2	Payment Systems	Payment gateways play a vital role in the distribution of incentives to the people in the successful branch. We are working with Mango payments who are a leading global provider of online payments. In this phase we will need to establish how the incentive payments are distributed to each person.
4.3	Fraud & Security	Fraud and security preventions are one of the key areas we need to focus on. As we are a financial incentivised business, payments play a crucial role in the product. Ensuring these payments arrive securely and safely is imperative for customer loyalty and our own trust building. Working with our payment processor will also enable us to successfully achieve this goal.
4.4	Global Data Protection Regulations (GDPR)	The GDPR is a huge topic right now and data protection now faces huge implications and fines to businesses not taking data seriously. We will be working on our internal GDPR processes and ensuring all data is securely stored at the highest industry standard.
4.5	Expansion into additional EU territories	After we have launched the Irix application in our local market we are then going to launch into other European countries we feel will adopt the platform. We have identified these as being France, Germany and Belgium for the initial EU roll out. Marketing and PR will need to be rolled out during this phase.

WP5 Management and communication activities

Months 1–24

Lead: Sanju

Obj. 9 Overall coordination of the core team and liaising with subcontractor THRSXTY.
Obj10 Recruitment of key technical and commercial employees and interns.

Task	Name	Description

5.1	Coordinate app development	Sanju and Neil will coordinate extending the web platform into a mobile app, including management UI and UX. Daniel will oversee consistency between the app and web platform.
5.2	Recruitment	For a rapidly growing company, recruitment is one of the most challenging tasks. Sanju and Neil will oversee recruitment for product development and design, and Sanju and Zak will oversee recruitment for marketing, security and operational support. Conaissance will use a combination of recruitment agencies, job boards, and Irix itself to secure talented employees.
5.3	Product interns	Neil will lead advertising for and interviewing technical interns, to assist with aspects of web and mobile app modifications.
5.4	Commercial interns	Zak will lead advertising for and interviewing marketing interns, to assist with operations and market replication.
5.5	Subcontractor meetings	We will meet monthly with our PR subcontractor THRSXTY. This will be led by Zak and will be attended by Daniel when design consistency is relevant.
5.6	Communication & dissemination	Communication and dissemination, outlined in detail in §2.5, will be led by Zak and Sarah; Sarah will ensure that subcontractor THRSXTY dovetails into these efforts.
5.7	IPR	Sanju will oversee general IPR management, including any trademark and patent applications and copyright protection. Sanju will also, if necessary, liaise with outside bodies such as WIPO and patent agents.
5.8	Mentoring	We intend to use the SME Instrument mentoring service to support WP4 Commercialization to ensure we understand local territories and varying perceptions of trust within them.
5.9	Reporting	Sanju will collect periodic technical progress reports from Neil, Daniel and Ilia, and marketing and commercialization reports from Zak and Sarah, and consolidate them for submission to the H2020 portal.

3.2.f 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 job specs 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). This score will be seen by others, and on this basis they may refrain from passing on to unscrupulous users.
1	🟠 Med	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 speed	Search times are too long because individual users may take a day or more to pass on the listing to further contacts.	We only need some users to be fast, not all, since the fast ones will make connections to the next level, and so on. If needed, we will prompt users to act within hours by tracking their response times (e.g., like Airbnb does).
2	🟠 Med	Confusion	Users find the recursive nature underlying Irix confusing	We will add 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.

WP	Level	Name	Risk	Mitigation
3	🟢 Low	Insufficient incentive	Recipients are not sufficiently incentivised to pass on a search and make further connections.	We will model a range of incentive structures, in addition to the exponential increase down the winning chain that we currently use.
3	🟠 Med	Revenue but little growth	We are making enough money per user, but users are not generating 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 chain and link the instigator and provider more directly.	We ensure that loops in the trust tree are forbidden by blocking any second connection to a user already in the tree.
5	🔴 High	Slow recruitment	We cannot recruit qualified new team members 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..

3.3   Resources

3.3.a Personnel by job

This project will have a total of 220 person-months (pms) over the two years of Phase 2. Conaissance will have 200 pms and the PR subcontractor THRSXTY will have 20 pms (10% of the Conaissance pms).

Product development	Person-months
Core team	
Neil Gebbie, head of development	24
Ilia Teimouri, head of algorithmics	12
Daniel Eris, head of design	18
To hire	
Assistant developer for Neil (web & app)	18
Security and financial transactions	18
Interns (3 x 3 months)	9
Total	96

Commercialization and marketing	Person-months
Core team	
Sanju Vaswani	15
Zak Johnson, head of marketing	24
Sarah Belizaire , head of PR (THRSXTY)	20
To hire	
Intl marketing manager for Zak	24
Operations support for Sanju (marketing)	24
Database and outreach	8
Interns (3 x 3 months)	9
Total	124

3.3.b Personnel by work package

The 200 person-months are distributed over the work packages as follows:

Participant	WP1	WP2	WP3	WP4	WP5	Total
Conaissance	42	34	40	50	34	200
THRSXTY	-	4	10	6	-	20
Total	42	38	50	56	34	220

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 either of the two participants.

4 Members of the consortium

4.1 Participant 1: Conaissance Ltd

4.1.a Description of the legal entity

Conaissance Ltd is a UK SME dedicated to human-facilitated search. The premiere product of Conaissance is the Irix, a web platform which enables individuals to easily and quickly identify trust corridors through the complex ecosystem networks which connect them to others. Conaissance has offices in London and combines expertise in software design with computational methods for navigating complex networks to establish optimal trust corridors to quickly bring people solutions which they can be confident about.

4.1.b Key persons

Neil Gebbie

Background
Neil has worked for over 8+ years as a full stack web developer applying his knowledge, skill set and problem-solving abilities in a digital environment. Neil has a background in web development and now, with the use of future thinking frameworks he is applying his skills to native app development. Neil was Born in Australia with Scottish heritage, and joined the Conaissance Ltd to develop their application and extend their web presence.

Experience
Application architecture, source control, web development, database management, technical documentation

Zak Johnson

Background
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 start-ups. His knowledge of early adopters and launch marketing strategies make him the ideal Head of Marketing for IRIX.

Experience
Software marketing, e-commerce, digital marketing, ATL advertising, social media and marketing strategy

Ilia Teimouri

Background
Ilia has carried out his PhD in theoretical physics at Lancaster university. He worked on modified theories of gravity and string theory. He worked on a class of theories known as non-local gravity, where in particular a sub-class of such theories known as infinite derivative gravity can weakens gravity at short distances and thus address the cosmological and black hole singularities. He also worked on, various aspects of financial modelling in the context of sentiment market.

Experience
String theory, Quantum Gravity, Machine Learning, Evolutionary Computations, Economics Complexity.
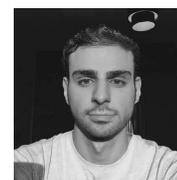
Sarah Belizaire-Butler (THRSXTY PR)

Background
With over 10 years' experience in PR & events production, Sarah started at a consumer lifestyle and tech agency in Brighton before deciding to join the team at THRSXTY. Her knowledge of mainstream media mixed with well executed awareness campaigns makes her an ideal team member to help us with IRIX. She has an extensive knowledge of the technology world and the press who write about it gaining us valuable leverage into a competitive market.

Experience
PR, customer activation, marketing and events

Sanju Vaswani

Background

Mr. Vaswani spent 20 years executing landmark transactions in capital markets and mergers and acquisitions at Citigroup, ING Barings & HSBC before launching Verny Capital, a private equity fund, in 2007. Verny had $2.2 billion under management which was invested in telecoms, telecom infrastructure, and mining. The fund had several of the most highly successful exits in the sector and region over a five year period. In 2013 Mr. Vaswani left Verny to join the World Bank Group's private sector investment arm, the International Finance Corporation (IFC) in Moscow, Washington DC and London. At the IFC he ran the group's private equity investment strategy in Europe & Central Asia, in the telecoms, media and technology sectors.

Experience

Finance, IPO, Investing, Investment strategy

Daniel Eris

Background

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 are evident in his UX/UI design, that is both elegant and functional.

Experience

Graphic Design, Typography, Interaction Design, UX/UI

4.1.c Relevant products, services projects or activities

Name	Led by	Description
Peer-to-peer mobile app	Neil Gebbie	Neil lead a team that developed multiple versions of a mobile app in React Native for iOS and Android devices.
Marketing of Gigaset gmbh consumer arm	Zak Johnson	Zak was Head of marketing for Siemens Gigaset and was responsible for the allocation of the €25 million budget. He build and developed a marketing strategy that rolled out to 17 territories around the globe that drove huge consumer traffic and interest in Gigaset's consumer products.
Equity capital markets and IPO's	Sanju Vaswani	Sanju became Vice President for ING Barings in Equity Capital Markets responsible for the coverage of financial sponsors. In this role, he 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. Investee companies floated included PCU, DigiBros, and Finmeccanica. Sanju was a director of HSBC between 2004-2007 in which capacity he ran the debt capital markets team, and subsequently, the investment banking division for Russia, Kazakhstan and Ukraine.

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

WP	Task to be subcontracted	Justification of 'best value for money'	Sub-contractor
WP2	T3.1 Strategy for market replication (substantial)	THRSXTY will be helping to implement our 12 month PR and marketing strategy for awareness and action. They specialise in public relations, digital and influencer marketing, as well as event production.	THRSXTY
WP4	T3.3 Expansion into additional EU territories (substantial)	After we have launched the Irix application in our local market we are then going to launch into other European countries we feel will adopt the platform. We have identified these as being France, Germany and Belgium for the initial EU roll out. Marketing and PR will need to be rolled out during this phase.	THRSXTY
WP5	T4.1 Subcontractor meetings (substantial) T5.9 Reporting (partial)	THRSXTY need to participate in this task as they are the only subcontractors. We will meet monthly with our PR subcontractor THRSXTY. Sarah will collate THRSXTY PR reports for us to analyse and consolidate them for submission to the H2020 portal.	THRSXTY

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 related to the search task. This data can be accessed by parties involved, and will be removed after a successful match or if there is no math after a time limit of 30 days.

Third Countries

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

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.

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

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.

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