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<i>Project Title</i>	<i>SoBigData Research Infrastructure Social Mining & Big Data Ecosystem</i>
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DISCLAIMER

SoBigData (654024) is a Research and Innovation Action (RIA) funded by the European Commission under the Horizon 2020 research and innovation programme.

SoBigData proposes to create the Social Mining & Big Data Ecosystem: a research infrastructure (RI) providing an integrated ecosystem for ethic-sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life, as recorded by “big data”. Building on several established national infrastructures, SoBigData will open up new research avenues in multiple research fields, including mathematics, ICT, and human, social and economic sciences, by enabling easy comparison, re-use and integration of state-of-the-art big social data, methods, and services, into new research.

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GLOSSARY

ABBREVIATION	DEFINITION
MIUR	Italian Ministry of Education
Clab	Contamination Lab Pisa
SME	Small Medium Enterprises
TT office	Tech Transfer office
TC	Tennis Commander

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DELIVERABLE SUMMARY

This deliverable reports the set of activities that have been undertaken by SoBigData partners towards the spreading of entrepreneurial skills and spirit among PhD students, postdocs, researchers and professors. Some attention has been also devoted to Master students which constitute a larger basin of potential entrepreneurs.

We will group activities in three main actions. The first one, actually the most challenging one, is devoted to training potential entrepreneurs with specific programs which have been tailored to different backgrounds of participants (not only computer scientists or engineers). The second one is devoted to accompanying the scientists, via mentorship and coaching activities, to develop their entrepreneurial ideas by building corresponding PoC (Proof of Concepts) and Business Plan. The third and final action has been concerned with the support to the initial industrial activities of academic startups thanks to the work done by the Liaison Offices of the Universities of the SoBigData partners.

EXECUTIVE SUMMARY

This deliverable reports the work done within the Task 5.3 “Entrepreneurial Skills for Big Data Entrepreneurs” which fits within the Work package 5 “Accelerating Innovation”.

At the time of submission of the SoBigData project, it was foreseen the launching of many start-ups and businesses based on the storage, processing and analysis of Big Data. This prediction happened, and the partners actually contributed to it by leveraging well-structured and known entrepreneurial training courses and materials which supported this in their Universities and Organizations. In this deliverable, we detail the training activities, actions and events that have been undertaken in order to spread the entrepreneurial spirit among the young (and not only) scientists of the Universities and Organizations that constitute the SoBigData partners, and the subsequent actions that have been paved to support and develop the potentially interesting entrepreneurial ideas that spurred from those training activities. These are described qualitatively and quantitatively in order to appreciate the impact they had within the SoBigData partners and outside the specific goals of the SoBigData project.

1 RELEVANCE TO SOBIGDATA

One of the aims of the SoBigData project was to engage with and widen the starting community of industrial stakeholders which base their business on the storage, processing, analysis and searching of big data. In order to achieve this goal, we have set up and run a set of training activities, events and actions which have involved students (at Master, PhD and postdoc levels), researchers and professors of the SoBigData partners and more, by deploying the contribution of professionals, entrepreneurs and innovation leaders as teachers, coaches and mentors of those activities. This allowed to widen the impact of Task 5.3 much beyond the SoBigData project and partners, thus reaching also other scientific areas, researchers and students of the partner Universities.

1.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to describe the training activities, actions and events that have been undertaken in order to spread the entrepreneurial spirit and mindset among young (and not only) scientists of the Universities and Organizations that constitute the SoBigData partners, and the subsequent actions that have been paved to support and develop the potentially interesting entrepreneurial ideas that spurred from those training activities. Our description will be qualitative and quantitative in order to appreciate the impact they had within the SoBigData partners and outside the specific goals of the SoBigData project.

As far as the goals of SoBigData project are concerned, this Task has contributed to the following ones:

- To undertake a wide range of innovation activities aimed at students and researchers, also outside Computer Science and Engineering;
- To train data scientists in entrepreneurial skills, and make available training material;
- To create innovative startups that base their business on big data;
- To build partnerships with industrial stakeholders through knowledge transfer;
- To spread the entrepreneurial mindset among a large set of students and researchers, which possibly will be never entrepreneurs but need an entrepreneurial spirit to pursue an innovative research that will have an impact (as requested by the next EU calls).

1.2 RELEVANCE TO PROJECT OBJECTIVES

Innovation spirit and acceleration is a key learning and practicing activity within the project objectives. The focus of SoBigData is on development of a research infrastructure (RI) providing an integrated ecosystem for ethic-sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life, as recorded by “big data”. The SoBigData infrastructure and tools open significant innovation opportunities aimed at diverse stakeholders. Therefore, a careful planning of the innovation actions to be taken is of the highest importance.

1.3 SOBIGDATA PROJECT DESCRIPTION

SoBigData serves the wide cross-disciplinary community of data scientists, i.e., researchers studying all aspects of societal complexity from a data- and model-driven perspective, including data and text miners, visual analytics researchers, socio-economic scientists, network scientists, political scientists, humanities researchers, and more.

The SoBigData RI has been based on three pillars:

- An ever-growing, distributed data ecosystem for procurement, access and curation of big social data, to underpin social data mining research within an ethic-sensitive context.
- An ever-growing, distributed platform of interoperable, social data mining methods and associated skills: tools, methodologies and services for mining, analysing, and visualising complex and massive datasets, harnessing the techno-legal barriers to the ethically safe deployment of big data for social mining.
- A starting community of scientific, industrial, and other stakeholders (e.g. policy makers), supported by transnational and virtual access activities, and brought together by extensive dissemination, networking and innovation actions (in particular workshops, summer schools, datathons, training resources in social data mining, knowledge transfer, industrial partnerships).

1.4 RELATION TO OTHER WORKPACKAGES

Dissemination and learning activities are horizontal activities that last for the entire duration of the project. Therefore, there was a clear interaction with all other work packages.

In particular, the present Task 5.3 had interactions with the other two tasks of WP5, namely T5.2 “Knowledge Transfer and Consulting Services” and T5.4 “Innovation Accelerator”, and with two tasks of the WP4 “Training”, namely T4.2 “Training Modules for stakeholders” and, in some way, also T4.4 “Addressing gender and diversity issues in data science through training” because we tried, and succeeded, in making the participation to the training activities open to male and female students.

1.5 STRUCTURE OF THE DOCUMENT

The document is categorised into four different sections:

Section 1 gives a brief introduction, outlines the major purpose of the document and explains the relevance to SoBigData.

Section 2 introduces the entrepreneurial skills: the PhD+, the SoBigdata Master, some other courses, events, and describes with detail some startups that were created as a result of the research pursued in the project.

Section 3 is an update on incubators and acceleration sites.

Section 4 concludes the document.

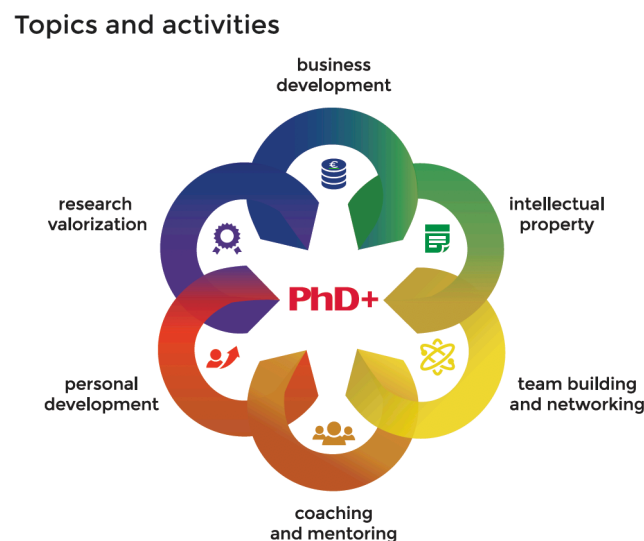
2 ENTREPRENEURIAL SKILLS

2.1 THE PHD+

PhD+ is the University of Pisa program started in 2011 and aimed at promoting and encouraging entrepreneurship and innovation among master students, PhD students, Postdocs, Researchers and Professors. It consists of a series of interactive and engaging lectures, training activities, coaching and mentoring sessions given by experts in innovation and technology transfer over topics concerning with IP protection and exploitation, business modeling and development, innovation management, team building, communication and personal branding, etc.

Unlike most, if not all, entrepreneurial programs available in European universities (and probably worldwide), the PhD+ was shaped to address not only the promotion of startups and patents but to sustain a much broader activity nowadays known as Research Valorization. In fact, it has been designed in order to offer skills that could help researchers to define and manage projects, promote and create value from their scientific results, deal with a team, develop and sustain innovative ideas which can possibly generate startups and patents, but also just research projects or collaborations with industries. These skills pertain to the so called “entrepreneurial spirit” that the PhD+ tried to nurture in researchers and students at the highest learning standards via more than 100 speakers coming from all around the world and a properly structured learning program, which now reached the 9th edition.

The following picture details the six main learning axes which are at the backbone of the PhD+ activities.



We can identify six main objectives of the PhD+ program:

- Provide the skills that allow academics to protect and exploit their research results;
- Increase career opportunities for graduates and PhDs;
- Develop intrapreneurship and entrepreneurship;
- Promote technology transfer services provided by the University and other partner institutions;
- Enhance the internationalization of students, startups and spinoffs.

The programme culminates in a final event, in the presence of a panel of experts and investors, in which participants will pitch their startup or innovation proposals. In nine editions, the PhD+ has trained more than 800 PhDs, Master students and researchers, and has supported the launch of 53 entrepreneurial projects, of which 24 became academic start-ups, which have won a total of 41 awards or recognitions worldwide and have generated 14 patents. Moreover, 6 such startups have been financed by the Phase 1 SME Instrument of Horizon2020. In the light of these results, the PhD+ is considered a best practice for Research Valorization, recognized by the Network of Design for Resilient Entrepreneurship, within the EU project ENDURE, and for this reason it has been shortlisted in the QS Reimagine Education Award 2016 (Philadelphia, USA).

In the last years, the initiative has been opened to the participation of researchers coming also from the Scuola Normale Superiore of Pisa, the Sant'Anna School of Advanced Studies of Pisa, and the IMT School of Advanced Studies of Lucca. Moreover, during the SoBigData project, the participation to the PhD+ has been opened to the SoBigData partners by video streaming its lectures.

Details about the PhD+ can be found at the following links:

- <https://www.unipi.it/index.php/phd-plus/itemlist/category/1286-phd-plus>
- For a short promotional video of PhD+ (2016), see <http://shorturl.at/gBH89>
- There is a large presence of the PhD+ on various Social Networks, such as LinkedIn: [UniPI Phd-plus](#), Facebook: [@CLabPhDplusUnipi](#), Instagram: [@clab_phdplus](#), Twitter: [@PhDPlus#PhDplus19](#)

The 2019 edition of the PhD+ has been an integral part of the project Contamination Lab Pisa (CLab). CLab is a project co-funded by Italian Ministry of Education (MIUR, <https://clab.cineca.it/>, 2017) and developed by the Technology Transfer Services Unit of the University of Pisa, in collaboration with the IMT School of Advanced Studies of Lucca, Scuola Normale Superiore and Scuola Superiore Sant'Anna of Pisa. The activities of the CLab are carried out in collaboration with also other local authorities: such as Chambers of Commerce, acceleration innovation centers, SME and large companies. The CLab is a physical and virtual space for meeting and contamination, with the aim of training students and researchers in the entrepreneurial culture (self-entrepreneurship) and making it known to startups and candidate entrepreneurs, in possession of creative and innovative ideas, the possibilities of financing to support the creation of a business; The promoters of innovative ideas come Accompanied step by step to the creation of a business thanks to the support of experts.

Details about the CLab can be found at the following links:

- contaminationlab.unipi.it/ (IT)
- <https://www.unipi.it/index.php/research/item/14306-contamination-lab-project> (EN)

The synergy between PhD+ and the SoBigData project started since 2016, with two specific sessions dedicated to two key assets of any big data project: IoT and visualization tools for big data (for details see the program of that edition: <https://www.unipi.it/index.php/phd-plus/itemlist/category/809-edizione-2016>). Moreover, it is worth mentioning that the participation of researchers and PhD students of SoBigData partners (other than UniPI's ones) occurred through the video streaming of lectures via the Mediateca platform of the University of Pisa. The collaboration is currently continuing both on the learning

activities offered by the program every year, and on the support to the writing of the Business Plan and the definition of the PoC by the TT office of the University of Pisa which is supporting the Italian researchers of the SoBigData project.

2.1.1 THE TRAINING MATERIAL

The PhD+ releases all the learning material via its web site, since its first edition of 2011:

- <https://www.unipi.it/index.php/phd-plus/itemlist/category/580-materiale-edizioni-precedenti>

The video of all lectures, since 2016, can be found at the Mediateca platform of the University of Pisa:

- <https://mediateca.unipi.it/category/phd-2016/40>
- <https://mediateca.unipi.it/category/phd-2017/104>
- <https://mediateca.unipi.it/category/phd-2018/127>
- <https://mediateca.unipi.it/channel/PHD-2019/14>

2.1.2 THE NEWS

Here we report the news published on the web site of the University of Pisa and on other local and national newspapers and news sites, devoted to the PhD+ training lectures and outcomes: e.g. by announcing its starting dates and calls for participation, or by mentioning its achievements through the final event which shows the best entrepreneurial ideas developed by the participants. (They are all in Italian.)

- Year 2016
 - <https://www.unipi.it/index.php/news/item/7357-al-via-il-phd-il-programma-che-insegna-a-valorizzare-i-risultati-della-ricerca> – UniPI news
 - <https://www.unipi.it/index.php/news/item/7709-il-phd-premia-la-migliore-idea-di-impresa-2016> – UniPI news
- Year 2017
 - <https://www.unipi.it/index.php/news/item/9787-con-un-record-di-iscritti-al-via-il-phd> – UniPI news
 - <https://www.unipi.it/index.php/news/item/10079-il-phd-e-giunto-al-traguardo-quattro-idee-d-impresa-voleranno-nella-silicon-valley> – UniPI news
 - <https://www.gonews.it/2017/05/29/phd-al-traguardo-quattro-idee-dimpresa-alla-silicon-valley/> – Go news
- Year 2018
 - <https://www.unipi.it/index.php/component/k2/item/9466-torna-phd-il-corso-che-insegna-a-trasformare-le-idee-in-impresa-e-a-pensare-innovativo?Itemid=637> – UniPI news
 - <https://www.unipi.it/index.php/component/k2/item/10275-nasce-a-pisa-il-contamination-lab-dell-universita?Itemid=637> – UniPI news

- Year 2019
 - <https://www.unipi.it/index.php/phd-plus/itemlist/category/1300-contamination-lab> – UniPI news
 - <https://www.unipi.it/index.php/component/k2/item/12774-le-idee-innovative-nascono-al-contamination-lab-pisa?Itemid=637> – UniPI news
 - <https://www.unipi.it/index.php/component/k2/item/14453-al-via-phd-il-primo-dei-percorsi-formativi-del-contamination-lab?Itemid=637> – UniPI news
 - <https://www.unipi.it/index.php/component/k2/item/14723-un-biosensore-per-rilevare-danni-cerebrali-e-una-piattaforma-antidiscriminazione-per-la-selezione-del-personale-vincono-il-phd-unipi?Itemid=637> – UniPI news
 - <https://www.unipi.it/index.php/component/k2/item/15572-premate-le-idee-innovative-nate-al-contamination-lab?Itemid=637> – UniPI news
 - [PhD+ Università di Pisa: percorsi formativi del Contamination Lab](#) – ControCampus
 - [DALL'IDEA ALL'IMPRESA: ALL'UNIVERSITÀ DI PISA TORNA IL CORSO PHD+](#) – InToscana.it
 - [Dallo studio alle imprese: premiate le idee migliori del PhD+ dell'Università di Pisa](#) – Pisa Today
 - [CLab, il giro d'Italia dell'innovazione all'Università di Pisa](#) – Go News
 - [PhD+ UniPi, premiate le migliori idee d'impresa degli studenti](#) – Pisa Today
 - [Le idee di impresa vincitrici del PhD+ dell'Università di Pisa](#) – Cascina Notizie
 - [CONTAMINATION LAB: A PISA PREMIATE LE IDEE INNOVATIVE DEGLI STUDENTI - inToscana.it](#)
 - [Da Pisa alla Silicon Valley](#) - Qui News Pisa
 - <https://www.gonews.it/2018/07/02/le-idee-innovative-nascono-al-contamination-lab-delluniversita-pisa/> – Go News

Moreover, several news have been published on local and national newspapers and news sites about the entrepreneurial ideas that participated to the pitching event of the PhD+ and have been awarded by the selection committee formed by entrepreneurs, innovators, policy makers and professors (they are all in Italian). A summary follows for the years 2017-2019:

- Year 2017
 - <https://www.lanazione.it/massa-carrara/cronaca/pago-lire-1.3234917> – La Nazione
- Year 2018
 - <https://www.ambientebio.it/alimentazione-biologica/pane-viola/> – AMBIENTE BIO
 - <http://www.pisatoday.it/cronaca/concorso-phd-universita-pisa-start-up-stepride.html> – PISA TODAY
 - <http://www.pisatoday.it/cronaca/pane-viola-universita-pisa.html> – PISA TODAY
 - <http://www.bergamopost.it/occhi-aperti/presto-mangeremo-pane-viola/> – BERGAMO POST
 - <https://www.unipi.it/index.php/component/k2/item/11955-stepride-l-idea-che-rivoluziona-la-pedalata-vince-il-contest-finale-del-phd?Itemid=637> – UNIPI NEWS
 - <http://www.pisatoday.it/cronaca/concorso-phd-universita-pisa-start-up-stepride.html> – PISA TODAY

- Year 2019
 - Video on the entrepreneurial ideas that have been awarded in Phd +2019 – GRANDUCATO TV TG, [video is at this link](#).
 - [Un biosensore per danni da trauma made in Latina - Un ricercatore pontino premiato a Pisa](#) – Latina Oggi
 - [Esame del sangue per identificare i danni cerebrali, premio a Pisa a uno studente di Latina](#) – Il Messaggero
 - [Primo posto per Blocklock, una serratura smart che sfrutta la tecnologia blockchain per garantire la sicurezza](#) – Cascina Notizie
 - <https://www.unipi.it/index.php/component/k2/item/15452-le-idee-innovative-diventano-impresa-dalla-serratura-smart-ai-software-in-3d-per-i-musei?Itemid=637> – UNIPI NEWS
 - https://www.ilmessaggero.it/latina/esame_del_sangue_per_identificare_i_danni_cerebrali_premio_a_pisa_a_uno_studente_di_latina-4341143.html – Il Messaggero
 - <http://www.pisatoday.it/cronaca/phd-universita-pisa-braiker-tam.html> – Pisa Today
 - <http://www.pisatoday.it/cronaca/contamination-lab-universita-pisa-palpreast-netralmec.html> – Pisa Today

2.1.3 SOME NUMBERS ON THE PARTICIPANTS

In this section we report the number of participants per year, by distinguishing their roles in the University and their scientific area, as well as the gender.

	2016		2017		2018		2019	
	M	F	M	F	M	F	M	F
PhD & Postdocs	2	4	40	32	55	36	19	11
Master students	40	16	71	42	62	30	35	14
Faculty	5	3	0	0	0	0	2	4
Others	25	6	0	0	0	0	2	4
TOTAL	101		185		183		85	

From the table above, we notice that we have a good gender balance and participation of PhDs and Master students. In the years 2016 and 2019, we experienced also some participation by Researchers and Professors. Actually, in the year 2016 we counted 25 researchers of the SoBigData project (21 M and 4 F) which attended the lectures via their video streaming.

As far as the scientific areas of those participants are concerned, we observe the following:

	2016	2017	2018	2019
ICT and Engineering	47	45	65	16
Medicine, Pharma and BioChem	14	40	35	20
Agriculture and Earth Sciences	9	6	2	0
Mathematics and Physics	5	23	20	21
Law, Political Science and Economics	11	45	33	20
Humanities	15	26	28	8
TOTAL	101	185	183	85

It is interesting to note a good distribution among all areas, so that the learning experience spreaded among researchers coming from different backgrounds, which also facilitated the sharing of experiences and, possibly, facilitated the born of new collaborations.

2.1.4 THE STARTUPS

The PhD+ facilitated the creation of several startups, which are reported below.

Company	Sector	Year
<i>SLEEP ACTA</i>	Life	2017
<i>SAFEATY</i>	Agrifood	2017
<i>NExFood</i>	Agrifood	2017
<i>Tennis Commander</i>	ICT	2017
<i>Feel-ing srl</i>	ICT	2018
<i>Planet Bioplastics srl</i>	ICT	2018
<i>PlayeRank srl</i>	ICT	2019

Among those startups, two of them are the result of researches partially done within the SoBigData project: namely, **Tennis Commander** and **PlayeRank**. It is interesting to note that both of them refer to Big Data coming from Sports Analytics: the former related to Tennis (UniPI), the latter related to Soccer (CNR and UniPI).

2.1.4.1 Tennis Commander

Here we report few information about the company. TC uses ad-hoc machine learning techniques to process data sensed by a general purpose smartwatch during play and turn it into meaningful information. For example, one can check intensity of strokes, grip, and more. By way of AI-driven video analysis (with video recorded by a smartphone's camera), TC can track player's position on the court in real-time, thus providing the tennis player with strategic support that is tailored on her playing characteristics, as the system gets to know her game after game. TC turns a smartphone-recorded video of a match into a realm of info on the played game. Search the video by stroke; analyze serve technique, see how a player fared on those tricky forehand volleys, and more! As player statistics are collected, TC can match tennis player's profile against that of other players nearby and help her finding an opponent to test and improve her skills and get the best out of her playing sessions. TC has been developed for both iOS and Android Wear smartwatches with painstaking attention to efficiency so as to run on the most popular devices. Thus, the overall vision of TC is to provide the player with useful data interpretation, to give him/her a higher level view of the situation of the court: from strategic support, to comparison with players's zone of comfort, to physical performances analysis. All in real time. Also, by using general purpose and off-the-shelf hardware, it really "democratises" the access to sports' analytics technologies. In fact, all solutions available on the market that can be considered 'affordable' do not provide any kind of data interpretation, and those that do, require the presence of fixed installed HD cameras and periodic maintenance (hence, quite expensive).

TC got the attention of Italian sports institutions, such as CONI (Italian Olympic Committee) and FIT (Italian Tennis Federation). In particular, after passing a technical check in August 2019, they are discussing with FIT to become their official partners for the TPRA circuit (<http://www.tpratennis.it/ITA/Home.fit>). Finally, they were finalist in the UK edition of the Sport Analytics World Series (Oct. 2018); they were ranked 4th out of 120 startups in the world at the Global Tennis Innovation Summit in London (Nov. 2018); they completed the SPIN acceleration programme in 2019 (<http://spin-accelerator.com/>), and they are just about to complete the WyLab acceleration programme (<https://www.wylab.net/>) that will bring the startup in front to a panel of potential investors next October 2019.

For more details about Tennis Commander (TC) we refer to its web site:

<http://www.tenniscommander.com/>.

2.1.4.2 PlayeRank

Here we report few information about the company. PlayeRank provides innovative Soccer Analytics services and products based on the latest techniques of data science and artificial intelligence. Nowadays the football performances in all main world championships are recorded through different sensors and devices, composing the "Big Data" of football. These Big Data constitute an enormous potential value for the various actors of the football industry since, if they are properly exploited, they can improve various

strategic aspects such as tactical analysis, monitoring and evaluation of athletic performance, the involvement of enthusiasts and forecasts of the players' market value. However, the acquisition and analysis of football's Big Data poses several problems, both technical and analytical, whose inefficient and/or ineffective resolution could be an obstacle for its potential users. PlayeRank intends to successfully provide solutions to these issues through its three innovative software products for the world of football:

- the first product is able to provide, through a purely data-driven algorithm, the first performance evaluation of a soccer player based on multi-dimensional data relating to thousands of events that occur in football matches (passages, crosses, position of the players involved, ...), supplied to PlayeRank by WyScout (world leader in the sector) by means of a signed commercial agreement;
- the second product is able to predict with a high degree of reliability, significantly higher than the currently known methods, the injuries of soccer players through an innovative analysis based on artificial intelligence techniques of data coming from training sessions through wearable GPS devices (of the like STATSports Viper, GPexe, Katapult, and the like);
- the third and last product is an innovative algorithm that extracts the most common situations from the videos of football matches, thus allowing to speed up and facilitate the work of match analysts in discovering the tactically weak and strong points of the opponents.

All three products are in an advanced stage of proof-of-concept and have already been successfully tested by some industrial companies such as Barcellona FC (injuries) and WyScout (search engine). Moreover, the algorithmic techniques underlying the first two products have been published in prestigious journals which have been mentioned in WP9, here reported for completeness: ACM Transactions on Intelligent Systems and Technology (accepted, to appear), Scientific Data – Springer Nature (accepted, to appear), and PLOS One (July 25, 2018). These products got also a lot of visibility in Italian and international newspapers and media: such as, Corriere della Sera, Espresso, Forbes, Il Foglio, Il Sole24ore, PhysicsWorld.com, MIT Technology Review, TuttoSport, Wired, RAI Radio1, RAI Radio3 Scienza; and have originated collaborations with several soccer teams (FC Barcelona, AS Roma, FC Inter e Ferencváros) and other prestigious universities (Fraunhofer Institut in Bonn, Central European University in Budapest, Harvard University, Northeastern University di Boston).

For details about PlayeRank we refer to its web site: <http://www.playerank.it/> (in Italian).

2.2 THE MASTER

In WP4 “Training”, and specifically T4.2 “Training Modules for stakeholders”, we have described the Master program on “Big Data Analytics and Social Mining” offered since several years by the University of Pisa. It is worth mentioning that, recently, this Master is offering also a course on *Data Driven Innovation* and an interesting “product design” experience that involves the master students for about 4 months, during which they are required to identify a “social need” and then propose a solution by combining the knowledge, techniques and competences acquired in some courses:

- Big Data sources, crowdsourcing and crowdsensing
- Information Retrieval
- Data Mining & Machine Learning

- Data Visualization & Visual Analytics
- Social Network Analysis
- Text Analytics and Opinion Mining
- Data Journalism and Story Telling
- Data Driven Innovation

At the end of the four months, students have to present the outcome of their “product design” experience by writing an article or implementing a website which includes the description of their analysis and their solution. Among the products designed in the last two years, two of them started a company:

- **Match the Job** (2016), whose goal is to help people in customizing their resume and cover letter with the right skills that are essentials to stand out. It offers an easy-to-use interface in which the user can copy-and-paste the resume and the job description, and then the platform via proprietary text mining algorithms suggests skills to add or remove based on a very rich library of soft and hard skills, which are the real asset of the proposed solution. Initially the startup was intended for the job-seeker market, but then it has been licensed to a company that is developing a software for HR.
- **Presago** (<https://presago.net/>, 2018), whose goal is to help companies in combining Big Data and Artificial Intelligence to improve their business. They also have a specific product, whose development was started in the Master, which consists of co-advising users in choosing and/or preparing their recipes by offering a vocal assistant that combines find/change ingredients or preferred recipes.

2.3 OTHER COURSES

The list below, compiled from courses that have been active since 2015 onwards, offers an overview of the attention offered by the Department of Digital Humanities at King's College London (KCL) towards entrepreneurship. Courses are constantly updated in order to provide students with the most up-to-date approaches within the relation between the digital and a broad entrepreneurial approach. Among the list, there is also an Internship in Digital Culture which is set up with the goal of providing students with a first-hand look an organisation in the digital culture sector while gaining work experience and developing transferable skills.

2.3.1 DIGITAL ENTREPRENEURSHIP

This course utilises the notion of digital networks to trace their potential to foster powerful relationships as part of entrepreneurial activities. Students critically reflect on concepts of digitally mediated social interaction, social capital, interpersonal trust and affordance theory with the aim to utilise these concepts to devise strategies to build businesses/interventions harnessing affordances of digital platforms.

<https://www.kcl.ac.uk/artshums/depts/ddh/modules/level7/7aavdm23>

2.3.2 INTERNSHIP IN DIGITAL CULTURE

The optional work placement module is seen as an important part of the BA Digital Culture programme, strongly recommended to all students for whom it is relevant. This module complements the theoretical

and methodological approaches taken in the compulsory and other supporting modules. It allows students to observe and analyse first-hand an organisation in the digital culture sector while gaining work experience and developing transferable skills. Where relevant the work placement may also feed into dissertation research, possibly with the host organisation serving as a case study.

<https://www.kcl.ac.uk/artshums/depts/ddh/modules/level6/6aavc400>

2.3.3 COURSES ON DATA SCIENCE

Fraunhofer IGD has launched a series of courses on Visualization, Visual Business Analytics, and Visual Data Analysis, starting in 2015 (together with Fraunhofer IAIS, who are doing complementing courses on machine learning). The courses primarily address professionals in the emerging field of data science, but the materials are also relevant for anyone using visualization in presentations. Often, attendants are trainees from cross-cutting departments doing reporting, data analysis, or data warehousing.

Topics of the courses are:

- Role of visualization across different organizational levels (from executive to analyst level) and its implications for using visualization for communication and analysis
- Requirements analysis, turning visualizations from nice images to nice tools
- Visualization and presentation best practices
- Using visualization in data analysis – beyond visualization visualizing analysis results
- Visualizations tools and toolkits that fit into a big data organizations.

Since 2015, Fraunhofer IGD conducted 20+ seminars with 10-50 attendants (est. 400 attendants in total), including seminars for companies. Part of the course material has been presented during the WWSS18-SogBigData Summer School in Hannover last year. Vice versa, SoBigData results have also influenced the training program as well, especially on topics like infrastructure considerations and tools.

2.4 OTHER EVENTS

Entrepreneurial mindset is acquired also via specific events that connect (young) researchers and various stakeholders (companies, organizations and venture capitalists) over challenging problems in which the issue is not just problem solving, but also evaluating the impacts and the costs of the designed solutions. In this respect, the project has developed a series of initiatives of various flavors, some of which have been mentioned also in WP4 “Training”, but we think they are important to be mentioned here too.

- **Climate City Cup.** The Climate City Cup was a competition for finding the most useful means in fighting climate change and spurring social collaboration on the city level. It aimed to enable citizens to take on fast actions, get engaged and activated without waiting for national or international regulatory pressure. (Links: <http://Climatecitycup.org>)
- **BETH: Blockchain School for Sustainability.** The course provided opportunities to gain fundamental understanding of promising new technologies as well as develop creative decentralized solutions for societal challenges using these technologies. (Link: <https://coss.ethz.ch/education/BETH.html>).

- **ETH policy challenge!** The winning team of this challenge envisioned the re-invention of a new cyber-physical agorà that allows policy makers to interact with citizens and pose questions or voting campaigns to their smart phones and perform a socially responsible data collection. Citizens can witness public happenings in an augmented and gamified way that allows them to provide real-time, privacy-preserving and well-informed feedback back to policy makers. (Link: <https://bit.ly/2ms7Wz2>)
- The **Tuscan Big Data Challenge** was an initiative launched by the Tuscan partners of SiBigData and devoted to Tuscan SMEs interested in exploring the potential of big data for improving the production processes, their market or their interaction with customers and suppliers. The Tuscan Data Challenge gave to Tuscan SMEs the opportunity to enter into the world of Big Data and exploit its potential. The challenge consisted of the free involvement of Italian SoBigData researchers. The first edition was launched in 2016 and then again it occurred in 2017/18. Collaborative projects had a total duration of two months (for a total of 1P/M), during which one or more researchers formed a team providing the knowledge and the required ICT support to develop the activities interesting for the SME proposing that project. In line with the legal and ethical aspects related to data and algorithms use, and in accordance to the aims of the SoBigData Research Infrastructure, the researchers and the companies involved in the challenge signed a confidentiality agreement (NDA) to protect information and data that the companies share with researchers. A total of about 40 projects have been submitted, and just 13 have been supervised by SoBigData researchers with success. Details on the two Challenges can be found in D3.4_Periodic dissemination and impact report and plan for following year 1 and D3.5_Periodic dissemination and impact report and plan for following year 2.
- The **“Data for Society” workshop** (<http://bit.ly/2kx1ypE>), held in conjunction with the International Robotics Festival (2017), presented a set of success stories from the world of Sports industry startups. The workshop has been organized from SoBigData partners (ISTI-CNR and UNIPi), and represented an important moment to foster collaborations between research and industry. In this occasion, the founding team of the startup Playerank met some of the future business partners, and started to design their first business model.
- The **“Future of Soccer, The Soccer of the Future” workshop** (<https://tinyurl.com/y4rplrtw>), held in conjunction with the International Robotics Festival (2018), presented a set of success stories from the world of Sports industry startups. The workshop has been organized from SoBigData partners (ISTI-CNR and UNIPi), is a follow-up of the one organized in 2017, but this time it was concentrated only on SMEs. This workshop was the first event in which the PlayeRank startup presented itself and some of its preliminary products.
- The **Soccer DataChallenge** is an hackathon (<http://soccerchallenge.sobigdata.eu>) dedicated to soccer data. The first edition has been organized in the context of the Internet Festival 2018, a nation-wide event involving the whole city of Pisa and witnessing many contributions from Italy and abroad. The hackathon lasted for 30 hours, with 12 teams of hackers challenging themselves with

an analytic problem designed by professional soccer scouts from the event partner Wyscout. One of the key issues of this event was also to spread the BigData Analytics passion to young researchers and high-school students.

- **Student Startup Camp 2015** @ University of Tartu, Estonia. The Student Startup Camp is an intensive practical entrepreneurship course aimed to arm students with skills and inspiration to launch technology-related ventures. The course combines knowledge-sharing and inspirational talks by entrepreneurs, with team-based project work. The camp is aimed at students with background in IT, engineering, marketing, business and design, who are interested in developing a venture and who wish to gain insights into what it takes to turn ideas into attractive demonstrators and appealing business cases. <https://courses.cs.ut.ee/t/SSC2015>, 94 participants, 62 male + 32 female.
- **AI: The Next 5 Years** has been an invited talk given at the *STARTUp Day AI*, Tartu in December 2018 (Link: <https://www.startupday.ee/news/startup-ai-will-cut-through-the-hype-of-ai>)

2.5 OTHER STARTUPS

Apromore (Link: <http://apromore.org>) is a company that commercializes an open-source platform for business process mining (analysis and visualization of event logs of business processes). Officially launched in September 2019 by Tartu's researchers.

3 INCUBATORS | ACCELERATION SITES

- STACC: The University of Tartu node has maintained an active cooperation with STACC - an Estonian competence centre funded by EU regional development funds, that conducts applied R&D in the field of Data Science in cooperation with private companies. Prof. M.Dumas, from University of Tartu, has served as scientific advisor for that project and provided input to their strategy based on insights gained from SoBigData. STACC launched a spin-off in the field of Big Data (Texta) in 2017, and is currently conducting R&D projects with two Estonian startups in the field of Big Data: eAgronom - <https://eagronom.com/en/> - and Kappazeta - <http://kappazeta.ee/>

4 CONCLUSION

This deliverable reported the set of activities that have been undertaken by SoBigData partners towards the spreading and empowering of Entrepreneurial skills and spirit among Master students, PhD students, postdocs, researchers and professors. Those activities concentrated toward three main axes: training and stimulating the entrepreneurial spirit among (young) researchers, supporting the scientists with mentorship and coaching activities to develop their entrepreneurial ideas, promote the initial industrial activities of startups via events and meetings with investors, thanks also to the help of the Liason Offices of the Universities of the SoBigData partners.

We strongly believe in “procrastination”, meaning with this term the fact that the effort we have put in stimulating, teaching and sustaining “entrepreneurship” among that large audience of scientists that got in touch with T5.3’s activities, will hopefully lead to new businesses and/or effective-impactful R&D projects with SME and large companies in the near future.