

Occupations Observatory - Methodological Note

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Abstract

As a result of technological progress and economic change, new occupations have emerged in the labour market while other occupations have become redundant and disappeared. Along with these new and emerging occupations, new skills have been introduced that can be developed through formal education, on-the-job training or learning-by-doing (or in some other way). This paper presents the Occupations Observatory, which we have created with the aim of providing up-to-date information on these changes in the labour market - reflected in the rise of new occupations and their corresponding skill changes - to policy-makers, researchers, educational institutes, job seekers and many other stakeholders (and how occupational dynamics feed into the occupational classification schemes). We focus not only on new occupations that did not exist before but also on new occupations in terms of recognition, awareness and importance.



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integrate and innovate existing, but distributed European social sciences research infrastructures on 'Poverty and Living Conditions' and 'Working Conditions and Vulnerability' by providing transnational data access, organising mutual knowledge exchange activities and improving methods and tools for comparative research.

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What is the Occupations Observatory and why do we introduce it?

For many years, technological progress and economic change have been associated with changes on the demand and supply sides of the labour market. As a result, **new occupations have emerged while other occupations have become redundant and disappeared**. Along with these new and emerging occupations, **new skills** have been introduced that can be developed through formal education, on-the-job training or learning-by-doing (or in some other way). Many policy-makers and researchers have therefore devoted attention to the rise of new occupations and skills and their implications for the economy as a whole, e.g. how does the education sector respond to these developments.

Nevertheless, the identification of new occupations and new skills is not a straightforward task. In fact, the identification of a new occupation often depends on an examination of whether it is already included in the latest occupational classification issued by the national government or an international institution, e.g. the UN's ISCO classification. However, as these occupational classifications generally are not updated very regularly (in some cases, updates are done every 10 or even 20 years), one may wonder whether this approach is suitable. Other sources that are used are surveys, employer interviews, trade publications and job postings (see Crosby (2002) for more examples). Overall, the identification of new occupations seems to be based on data that are lagging behind real labour market dynamics. Nevertheless, having up-to-date information on new occupations is important for many economic agents. Educational institutes, for example, need current information on the occupations that are on the rise, in order to develop educational programmes of high quality and relevance.

We therefore propose the Occupations Observatory, with the objective of providing up-to-date information on what is happening in the labour market – reflected in the rise of new occupations and their corresponding skill changes – to policy-makers, researchers, educational institutes, job seekers and many other stakeholders (and how occupational dynamics feed into the occupational classification schemes). We do not only focus on new occupations that did not exist before but also on new occupations in terms of recognition, awareness and importance. As will be explained in more detail below, many occupations develop out of existing ones (as a result of specialisation, a recombination of existing occupations, and so on). To reach these objectives, we need **recent data and a methodology that allows for quick and easy identification**.

In terms of **data**, we rely on the Internet. In recent years, the Internet has become more prominent as a research platform and data source (Benfield & Szlemko, 2006). The use of web-based data for labour market analysis has been advocated in a number of recent papers, notably Askitas & Zimmermann (2009; 2015) and D'Amuri & Marcucci (2010). One of the reasons is that job search, recruitment and matching have been transformed dramatically with

the growth of the Internet (European Commission & ECORYS, 2012). This is confirmed by Kuhn (2014) and Kuhn & Mansour (2014), who report that online tools are gaining importance in the matching process. Carnevale et al. (2014) find that labour market matching has become more efficient because search and matching frictions are reduced. The advantages and limitations of web data have been discussed in several recent contributions (for more information, we refer to Shapiro (2014) and Kureková et al. (2015), in addition to the papers listed above). In terms of online data sources, one can consider job portals, social network sites, Google Trends and other sources. We are especially interested in job portals, given their role in labour market matching.

As for the **methodology**, we experiment with a new identification method, which is explained in more detail in the following section of this note. In short, we propose to exploit the occupational classifications that job portals use to organise their job advertisements and explore whether new occupations can be identified on the basis of changes in these occupational structures.

The Occupations Observatory will comprise an overview of the new occupations that we can identify on the basis of this methodology and data from online job portals. More precisely, the Observatory will be supplied with **occupation cards**, one for each new occupation found, that provide details on the identification process, tasks and requirements of the occupation, prevalence of the occupation in other markets, link with occupational classifications and so on. The creation of these cards is explained in more depth below.

How do we identify new occupations on the basis of web data?

Vacancies or meta-data?

One way to assemble a dataset of new occupations is to use online job portals. Online job boards can be exploited for the identification of new occupations in several ways.

A first approach is to rely on the **occupational classification** that the job portals use to organise the tens of thousands of vacancies that they contain. Online job boards are typically structured in a way that allows job seekers to easily find positions similar to the one they are interested in. The reason for this is that job seekers are usually not looking for a single job opportunity, but instead want to find a range of opportunities to compare. In order to organise the high number of vacancies, job advertisements are typically assigned a variety of tags. These include, but are not limited to: the region where the job is offered, sector of employment, company name, required educational attainment, wage bracket, and so on. On some, but not all, job portals each vacancy is also assigned one or more occupation tags.

An occupational classification can be thus established in several ways. First, individual vacancies can be assigned to a specific job category (**tagged**) by the advertiser. A few job boards, such as the Slovak portal profesia.sk, publish their list of tags online. In this case, job portal users can choose their occupation of interest from the list. More often, tags are stored in a **library** accessed by an application program interface (API) search when job seekers use the search box to type in the name of the position (see Figure 1 for an example). More specifically, the tag system is commonly used to generate options for automatic completion of search terms. In general, job portals tend to regularly update their list of tags, in order to account for new occupations (and the disappearance of redundant ones). The Slovak job board profesia.sk has provided us with a list of newly added tags between 2011 and 2014. In this period, about 10

new occupations were added annually. About five of these new occupations appeared in the IT sector, while the remaining five were related to the commerce and finance sectors. This job board actually is an interesting example, as it shows the tags associated with specific vacancies (see Figure 2, which presents an example of a “real estate agent” vacancy offered through profesia.sk. The vacancy carries four occupation tags: “dealer”, “sales manager”, “sales representative” and “real estate broker”).

Figure 1. Example of autocomplete functionality from job board reed.co.uk. The offered job tags are relevant for the searched string “res”

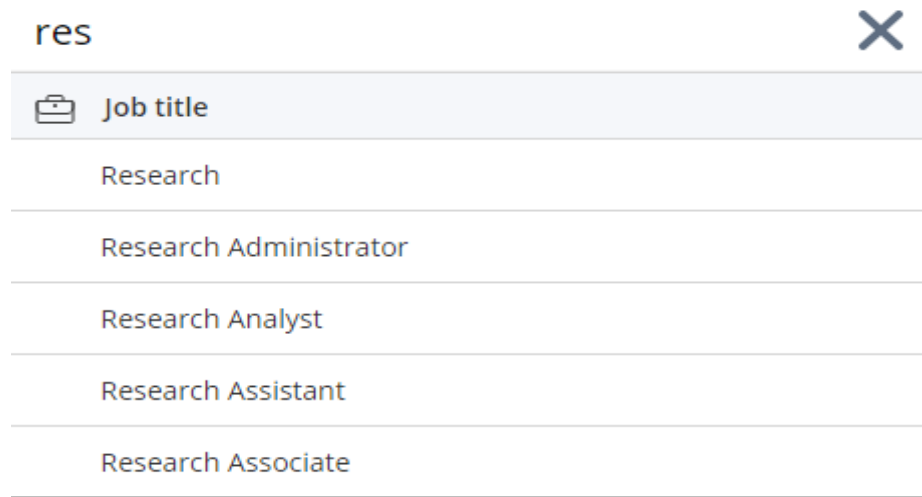


Figure 2. Tags associated with a real estate agent vacancy on the profesia.sk website. Tags were translated automatically via Google Translate

ID: 2177872 Publication Date: 02/26/2016 Location: Bratislava region , Bratislava Position: Sales Manager , Sales Representative , dealer , Real Estate Broker Company: TOP Realitka

Other job portals do not use a tag system but rather associate occupations purely on the basis of **keywords** that are used in the text, i.e. the job description, of the actual job advertisements. This approach, however, appears to be less reliable. For example, it could occur that a social worker position is offered to a job seeker looking for the keyword “finance”, because the word “finance” is mentioned in the job advertisement.

For the identification of new jobs and skills, the tag system that the job portals use therefore is preferable. In this case, the idea is to **search for new tags that are added and for redundant tags that are removed from the occupational classification**. This results in a list of tags that can be compared across countries and time. However, in order to understand whether the occupations are truly new, the skill dimension of the job has to be considered as well. This allows researchers to verify how different these newly identified occupations are in comparison with existing ones. Nonetheless, we needed to proceed with care, as job portals typically do not assign a single occupation tag to a vacancy but rather a number of related occupation tags. Figure 2 is a good example of this issue. Consequently, when conducting a survey of advertisements associated with an occupation, we need to carefully consider their relevance.

A second approach for the identification of new occupations and new skills is based on the **job advertisements** posted on these online boards. Job advertisements generally are fairly detailed and have a clear structure. Vacancies commonly contain a job title, description (detailing the tasks and responsibilities), and structured requirements such as formal education, experience and skills (cognitive and non-cognitive). In many cases, other information is provided as well. For example, the salary, employer name and description, and offered benefits, e.g. company car or health insurance. Job advertisements can be assembled via a web crawling or ‘spidering’ technique (see Capiluppi & Baravalle, 2010; Kuhn & Shen, 2013; Carnevale et al., 2014). With a ‘spider’ or web bot that crawls the Internet, a large sample of advertisements can be obtained. In many cases, a set of carefully selected websites is crawled to ensure the representativeness and completeness of the dataset. This approach thus has the advantage of enabling researchers to gather a large and diverse sample of vacancies in a relatively fast and easy way. However, a clear limitation is that the next steps in the procedure, i.e. the data cleaning, processing, management, and so on, are relatively complicated. In their paper, Carnevale et al. (2014) explain that once the database of vacancies is assembled, data are extracted and parsed into smaller fragments which can be coded. The complexity of the parsing and coding are highly dependent on the structure and content of the job advertisement. A detailed taxonomy of variables and words is an extremely important tool in this process. Moreover, semantic analysis and text mining are often required to further support the coding process. Although making use of the actual job advertisements published on a portal could result in a very rich dataset, the issues indicated by Carnevale et al. (2014) are not so easy to address. Still, by gathering a sample of vacancies over a period of time and across countries, one can identify new job titles as they arise. Furthermore, the job description and requirements provide valuable information too, for instance on changes in the education and skill requirements, and on differences in the importance of skills across occupations, sectors and regions. Tijdens et al. (2012), however, do point out that linking job titles to an occupational structure is not straightforward, especially when they cover multiple countries and languages. There is some literature that uses vacancy data (obtained from vacancies published online or in newspapers) to study economic and social phenomena (see Kureková et al. (2015) for an overview of this literature; only a few studies focus on the identification of new occupations with vacancies).

With these considerations in mind, we piloted an innovative approach based on the **occupational classifications** used in many online job boards, i.e. on the meta-data available on the job portals. Our objective is to discover whether this approach could be adopted to identify new occupations, and to further our understanding of the education, skills and other requirements that these new occupations bring with them. Compared to an approach based on a sample of advertisements obtained via web crawling, this approach has the advantage of being faster and simpler. It also results in smaller samples that are more manageable (in analytical work, database management, infrastructure) but that could nonetheless capture the same dynamics. Given the relatively small samples, results are available almost immediately and comparisons across countries and time are relatively straightforward.

Data collection and data cleaning

We started by selecting **11 pilot countries**, for which we were able to find job portals that are **representative**, i.e. that cover a substantial part of the labour market, and that have the **tag system** (which we can verify by testing whether or not the search box has automatic completion or a publicly available list of tags). Other criteria were that the job board had to be regularly updated and contain at least 3,000 job advertisements.

This resulted in the list of countries and portals presented in Figure 3 and **Error! Reference source not found.** Given that this effort is a pilot, we did not try to gather a sample of tags from vacancy websites from all EU countries. Instead, we focused on exploring the feasibility of identifying new occupations across Europe. For that reason, we identified job boards in a subset of countries, covering different regions. The countries represent about 75% of the EU population.

Figure 3. Countries covered



Figure 4. Example of a job tags repository from the Danish jobs site jobnet.dk

arbejde", "astronom", "biokemiker", "biolog", "mikrobiolog", "botaniker", "ferskvandsbiolog", "fysiker", "geofysiker", "geolog", "geotekniker", "havbiolog", "hospitalsfysiker", "kemiker", "klimatolog", "levnedsmiddelkandidat", "bromatolog", "levnedsmiddelinspektør", "matematiker", "meteorolog", "miljøtekniker", "molekylærbiolog", "naturgeograf", "statistiker", "zoolog", "organisation, udvikling og rådgivning", "HR-konsulent", "uddannelseskonsulent", "HR-medarbejder", "personalemedarbejder", "personalekonsulent", "researcher, rekruttering", "headhunter", "rådgivende konsulent", "psykologarbejde", "psykolog", "teologisk arbejde", "præst", "sognepræst", "teolog", "undervisning på gymnasier og højskoler", "gymnasielærer, humaniora og kreative fag", "gymnasielærer, naturvidenskab og idræt", "gymnasielærer, samfundsvidenskab", "handelsskolelærer", "højskolelærer", "pædagogisk kandidat", "undervisning på professionshøjskoler", "adjunkt, professionshøjskole", "lektor, professionshøjskole", "underviser, erhvervsakademi", "underviser, professionshøjskole", "seminarielærer", "økonomi og revision", "aktuar", "businesscontroller", "civiløkonom", "erhvervsanalytiker", "erhvervsøkonom", "nationaløkonom /

In most of the cases, the tags are not listed anywhere on the site, so we needed to find a repository, from which they are fetched. The example shown in Figure 4 illustrates how an exempt from such a repository looks like.

Table 1. List of pilot countries and job boards

Country	Job portal
Belgium	vacature.com (Dutch-speaking part) (www.vacature.com/vacature/bladeren/functienaam/), references.be (French-speaking part) (www.references.be/job/parcourir/fonction/)
Czech Republic	jobs.cz (www.jobs.cz/)
Denmark	jobsnet.dk (https://job.jobnet.dk/CV)
France	keljob.com (www.keljob.com/emploi/metiers)
Germany	jobs.de (www.jobs.de/regional/taetigkeitssuche)
Hungary	profession.hu (www.profession.hu/)
Italy ¹	lavoro.corriere.it (http://lavoro.corriere.it/)
Poland	jobs.pl (www.jobs.pl/stanowiska-pracy)
Slovakia	profesia.sk (www.profesia.sk/)
Spain	careerbuilder.es (www.careerbuilder.es/)
United Kingdom	jobsite.co.uk (www.jobsite.co.uk/jobs/all/job-titles/)

As a first step, on 30 June 2015, we extracted – either through *querying the website’s autocomplete API* or through *web crawling the list of tags* – the full occupational classification from the 11 online job portals (more precisely, we made a script to automatically extract the list of tags, which coincides with the list of occupations used by the portal). The occupational classification that we get is our **benchmark**. This occupational classification is further cleaned for errors such as faulty text encoding or duplicates. This is an important step, because not all tags are occupations, e.g. in some cases they can be keywords that refer to a specific sector, firm, etc. Nevertheless, as the cleaning process is fully automated some errors will not be caught. We are aware of this issue and therefore manually check the occupations that end up in the list. Because we focus on 11 countries, we decided to translate all occupational titles into English using Google Translate, as this facilitates cross-country comparisons and is easier for non-native speakers.

For example, for the case of Slovakia we obtained the list of tags from the job portal profesia.sk on the 30 June 2015. This list comprises 468 tags and constitutes our benchmark. The occupations or tags in the list were translated into English, to aid the non-native speakers in our research team. A visual inspection of the benchmark revealed that (i) not all occupations were translated into English properly, i.e. some words simply were not translated at all or their translations contained errors, thus these words/tags were translated by the native speaker of the team, and that (ii) all tags actually referred to occupations. No further cleaning was needed in that regard. For Slovakia, the list of tags simply is published online. We did not have to query the API or crawl the job portal to obtain the list of tags in this case.

The next step in the procedure then is **to extract the occupational classification again from the portal at the beginning of every month** (being early August, early September, and so on),

¹ Note that for Italy, the portal provided a public list of tags, but this list did not show all jobs listed in the autocomplete function. For this reason, the smaller crawled list of jobs was replaced with a more detailed one from autocomplete API.

over a six month period.² The classifications extracted at the beginning of each month are organised in an array, which is compared with a benchmark array of occupations already present in the dataset: occupations that have no match in the benchmark classification are regarded as potentially new and saved in a database (by country and date). The remaining occupations, for which we do find a match, are dropped from the data, i.e. they are not included in the shortlist of potential new occupations. As for the benchmark, this process is automated and may not capture all errors that are present in the data. For this reason, we perform a manual data check at a later stage (for details, see below). Note that we are only concerned with potentially new occupations and not with occupations that disappear from the tag system. As before, the list of potentially new occupations is cleaned and translated into English. Some early results from the first two months of piloting reveal that for some countries no new occupations are found. This could be because no new occupations emerged during this time, because new occupations emerged but they were not picked up by the portal or because the job board is no longer active (this happened to the Dutch portal that we were experimenting with, so we removed the Netherlands from the pilot). With this procedure, we end up with two outputs: the benchmark and the list of new occupations on a specific date (by country). Before the data collection process is started again (in the next month), the list of new occupations is added to the benchmark. This prevents these occupations from being detected as 'new' on more than one occasion.

For the case of Slovakia, a new list of tags was obtained on 30 July (this step was done to test our code), 6 August, 2 September and 4 October (all in 2015). If new tags are found on any of these dates, this means that they are not yet included in our benchmark and hence potentially are new occupations. Alternatively, these tags may refer to occupations that have been around for a very long time but for which simply no vacancies were listed on the portal or for which no separate tag was used. Data collection on 30 July resulted in 21 new tags. These tags were translated into English and checked for whether they actually referred to new occupations. The list of tags was also checked for errors, but none were found. In the list of 21 tags, we find several that potentially refer to new occupations (examples are drug safety specialist, sound engineer, spa therapist, radio network planning specialist, development specialist health programmes, and development specialist switching network). We also find many tags for occupations that have been around for decades (such as soldier, wig-maker and police officer). Then, all 21 tags were added to the benchmark before new data were collected on 6 August, when three new tags were found (warder, forest engineer and photographer, of which especially the second could refer to a new occupation). The three new tags again were added to the benchmark and a new list of tags was extracted on 2 September. This again resulted in three new tags: geologist, revision pharmacist and specialist OSS/BSS. Particularly the last tag has the potential to be a new occupation. The data cleaning and processing were repeated and a new list of tags was obtained on 4 October. In this case, we identified three new tags: forester, forest technician and head of post. We used our list of candidates that potentially capture new occupations – such as spa therapist, drug safety specialist or OSS/BSS specialist in the above example – for a more in-depth analysis which is explained in further detail below.

As we are aware that Google Translate is unlikely to provide correct translations in all incidences, the **translations** are checked by native speakers and corrected when necessary. The importance of this step should not be underestimated. In fact, our first results suggest that there were some systematic errors in some of the translations. Moreover, several of the native

² At the end of July, we ran a first test to see if our coding was operational. For some countries, this results in an additional list of new occupations for this period.

speakers pointed out that occupations have their own terminology, which may not be fully captured in the translation process. These issues are not so problematic for individual country analyses, but could impede cross-country analyses. This is therefore definitely something to keep in mind for future research and it certainly is an area in which there is room for improvement in our work.

Data analysis

In the second part of the analysis, we continue by checking the list of potentially new occupations generated for each country. Not every occupation that appears on the list of candidates, is likely to be a new occupation. In fact, in some cases occupations that have already existed for many years and that are relatively common in the economy end up on the list because there were no vacancies available for this occupation when the benchmark was established (one could thus regard these occupations as missing from the benchmark). An example of this could be soldier, wig-maker or policeman (as the example for Slovakia shows), or, as the case of Belgium showed, the tag “furniture” (as touched on before, this results from the fact that not all tags refer to actual occupations, but most do). Occupations that obviously are not new but simply were missing are dropped from the shortlist of new occupations (our list of potential candidates), but they are still added to the benchmark for future reference. Furthermore, any mistakes that are due to the data collection or matching procedures are taken care of as well.

We then end up with a **shortlist of potentially new occupations** by country, for which a more in-depth study is done. The objective is to establish whether these occupations actually are new and, if so, whether they are new in the sector or in the full economy, in the country or globally, and so on. To this end, we create an **occupation card** for each potentially new occupation, which is then added to the Occupations Observatory. When an occupation is selected as a candidate, we refer to the job portal where the occupation was found. On the top of each occupational card, we mention the title of the occupation and the date.

Table 2 contains a quantitative indicator of our results. We see a very strong heterogeneity in the sample both in terms of the number (N) of detected initial tags, i.e. the benchmark, which ranges from 233 in Spain to 2,163 in Denmark, and the number of detected new occupations, ranging from zero in the Czech Republic, Germany, Denmark, Italy, the Netherlands and the United Kingdom to 714 in Belgium. Nonetheless, these numbers cannot be simply compared. Specifically, the Belgian portal often defines new occupation tags, which do not necessarily refer to actual occupations but rather are keywords to group vacancies according to some common trait. For example, one identified occupation tag is “hout” – the Dutch word for wood. On 9 March 2016, 42 job advertisements were assigned this task, covering different occupations such as “CNC machine operator in the wood processing industry” and “salesperson of wood products”. Consequently, we found that careful manual inspections of potential new occupation tags are crucial to preventing false positives.

We found that only a small portion of the tags refer to new occupations; many appeared to refer to traditional occupations, which are simply not often advertised online or for which no vacancies were available when the benchmark was created. Another reason might be that some tags are associated with seasonal jobs, which are only advertised during a specific time of the year.

Table 2. Benchmark and number of new tags identified per website

Country	N of initial tags	N of new tags	Valid new tags	False positives
Belgium	415	714		
Czech Republic	424	0	0	0
Germany	1,507	0	0	0
Denmark	2,163	0	0	0
Spain	233	2	1	1
France	1,087	32	11	21
Hungary	369	91	11	80
Italy	962	0	0	0
Netherlands	812	0	0	0
Poland	795	15	7	8
Slovakia	468	30	16	14
United Kingdom	6,063	0	0	0

Table 3 presents the full list of identified potentially new occupations. Altogether, we identified 57 potential new occupations, but for six countries only: Belgium, France, Hungary, Poland, Slovakia and Spain.

Table 3. List of identified potential new occupations

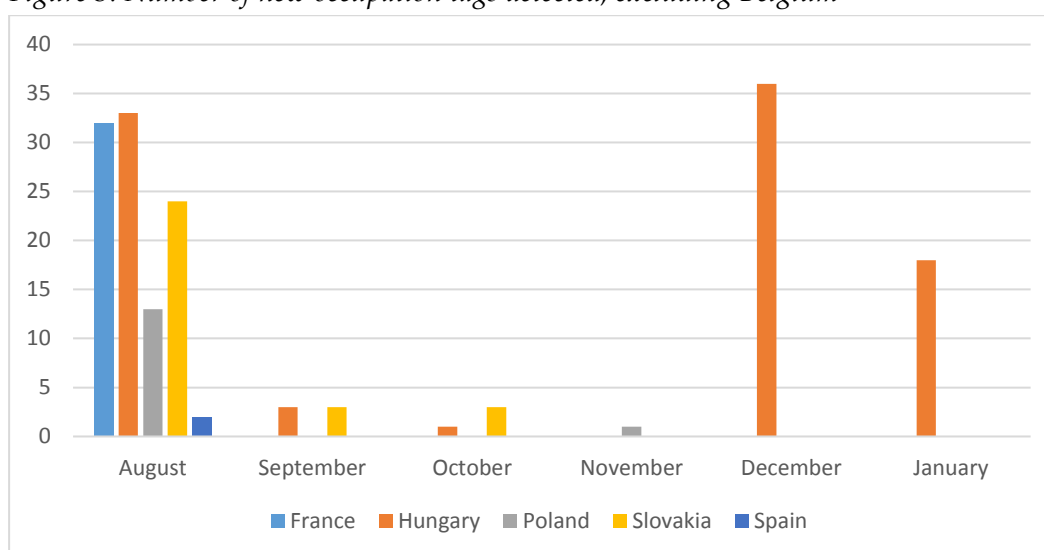
Country	Occupation	Translation
France	Agent de sécurité incendie	Fire safety officer
France	Formateur logiciel	Software trainer
France	Ingénieur commercial aéronautique	Aviation sales engineer
France	Ingénieur traitement image	Image processing engineer
France	Technico commercial informatique	IT technical sales
France	Agent technico commercial	Technical sales agent
France	Technicien acoustique	Sound technician
France	Technicien support système	System support technician
France	Ingénieur commercial assurance	Insurance sales engineer
France	Agent de sûreté	Security officer
France	Ingénieur acoustique	Sound engineer
Belgium	software ontwikkelaar	Software developer
Belgium	commercieel technisch adviseur (b3182)	Commercial technical advisor (b3182)
Belgium	product manager	Product manager
Belgium	storingstechnieker (m/v)	Failure technician (m/f)
Belgium	technicus beveiliging regio antwerpen	Security technician region Antwerp
Belgium	business development manager (m/v)	Business development manager (m/f)

Belgium	customer technical support & quality specialist	Customer technical support & quality specialist
Belgium	chemical sales	Chemical sales
Belgium	technical designer	Technical designer
Belgium	Ultrasound	Ultrasound
Belgium	automation engineer - vaste job	Automation engineer – fixed position
Belgium	Embedded	Embedded
Belgium	software engineer	Software engineer
Slovakia	Choreograf	Choreographer
Slovakia	Ortopedický technik	Orthopedic technician
Slovakia	Zvukár	Sound engineer
Slovakia	Drug Safety Specialist	Drug safety specialist
Slovakia	Špecialista optimalizácie rádiovkej siete	Specialist radio network optimisation
Slovakia	Špecialista vývoja programov zdravia	Development specialist health programmes
Slovakia	Špecialista plánovania rádiovkej siete	Radio network planning specialist
Slovakia	Špecialista rozvoja spojovacej siete	Development specialist switching network
Slovakia	Klinický psychológ	Clinical psychology
Slovakia	Spa terapeuta	Spa therapist
Slovakia	Lesný inžinier	Forest engineer
Slovakia	Geológ	Geologist
Slovakia	Revízný farmaceut	Revision pharmacist
Slovakia	Špecialista OSS/BSS	Specialist OSS/BSS
Slovakia	Lesný technik	Forest technician
Spain	Refractory engineer	Refractory engineer
Poland	Animator Kultury	Cultural animator
Poland	Kierownik ds. Operacji Dokumentowych	Manager. Documentary operations
Poland	Inżynier ds. Testów	Engineer. Testing
Poland	Inżynier Biomedyczny	Biomedical engineer
Poland	Inżynier ds. Ciągłego Doskonalenia	Engineer. Continuous improvement
Poland	Inżynier Procesu	Process engineer
Poland	Opiekunka Środowiskowa	Environmental supervisor
Poland	Inżynier Biomedyczny	Biomedical engineer
Hungary	Nyomdász	Typographer
Hungary	Terméktervező	Product designer
Hungary	Gyógyypedagógus	Special education teacher
Hungary	Telemarketinges	Telemarketing
Hungary	Gyártómérnök	Manufacturing engineer
Hungary	Dekorátor	Decorator
Hungary	telekommunikációs szakértő	Telecommunications expert

Hungary	Webdesigner	Web designer
Hungary	szoftver tesztmérnök	Software test engineer
Hungary	data analyst	Data analyst
Hungary	Kertészmérnök	Horticulturist

Furthermore, these occupations were not distributed equally across the months. Figure 5 displays the number of tags detected over time in all countries, where new occupation tags were detected except for Belgium, which was left out due to a huge number of occupation tags detected every month. Most vacancies were detected in the first month. The reason is that the lists of tags often contain only those tags, which are currently used for at least one vacancy.

Figure 5. Number of new occupation tags detected, excluding Belgium



Occupation cards

All this information is then used to produce an occupation card for each candidate. An occupation card has six main sections. **Section A** covers the **identification of the occupation** and consists of two parts that each have a dedicated table. The first table presents details on the job advertisement that is linked to the occupation/tag: when was the advertisement posted, on which portal/for which country, etc. The second table of Section A provides more information on the content of the vacancy. It includes the job description, profile and any tags that are attached to the vacancy on the job board. The goal of this section is to outline how we discovered the new occupation. This section is important, because the literature suggests that occupations have clear space and time dimensions. The rise of new occupations should thus be regarded within this context.

*For example, for the case of Slovakia, **Section A** would mention that the tag for OSS/BSS specialist was found on profesia.sk on 2 September 2015. We would also go back to the advertisement that triggered the new tag and look at some of the information available in the vacancy (type of employer, industry). Section A would further provide details on the content of the vacancy (job description, profile, portal tags).*

Section B continues with the **definition** and the **responsibilities and tasks** of the occupation. It defines the occupation (what is it), relates it to existing occupations and evaluates its prevalence in the country where it was found. The section also discusses the tasks and responsibilities that the occupation entails. Importantly, the analysis in **Section B** is not only based on the original job advertisement; multiple job advertisements are also consulted (found via web search on other job boards covering the country). These vacancies only refer to the country for which the occupation was detected.

*For example, for the case of Slovakia we would provide a definition of OSS/BSS (what is it – operations or business support system), explain whether this occupation is related to any existing occupations, and consider its prevalence in Slovakia (can we find similar vacancies on the same/other job portals or via a web search). **Section B** further comprises an overview of the tasks and responsibilities that an OSS/BSS specialist has, e.g. validate and write code, collaborate with other teams. Another example is the case of Belgium, for which we find an online marketing coordinator position, which is relatively new but strongly related to the more traditional marketing positions and connected with IT jobs as well.*

Section C is based on the same sample of advertisements but looks at the **requirements** that are demanded. More specifically, it considers formal education, skills and experience. On the basis of these first three sections, we can already get an idea of the occupation and its novelty in the country where it was detected. These three sections can give some first answers to the questions of whether the occupation is completely new or emerging, new in a certain sector or in the economy as a whole, and so on.

For example, in Slovakia, an OSS/BSS specialist is expected to have certain skills such as a specific education level (tertiary education), previous experience with IT, JAVA, SQL, C++ and other programs, knowledge of telecommunications, communication skills, and so on. Many vacancies also list non-cognitive skills, such as detail-oriented, self-motivated, ambitious and other skills.

In **Section D**, the analysis is extended to **other countries**. First, we take the **European** perspective and try to find job advertisements for similar occupations on job portals in a variety of European countries. We also compare these vacancies in terms of tasks and requirements with those found in the country for which the analysis started. Second, we take a global perspective (concentrated mainly on the United States in this pilot, this is something we plan to expand in future work), for which the same analyses are performed. Finally, we use **Google Trends** to assess whether the term (occupation) is on the rise, and if so, in which countries.

For example, we would aim to discover whether the position of an OSS/BSS specialist is only new in Slovakia or also exists in other countries. For Belgium, on the basis of a search on Google and job portals, we find occupations similar to that of the online marketing coordinator in Europe and the US. We also consider whether the tasks and requirements are similar in these countries. For Belgium, we find that overall there are a lot of similarities in both areas. The Google Trends patterns across the countries are relatively similar as well.

In **Section E**, we focus on **occupational classifications**. The reason for this is that in the literature a new occupation is identified as an occupation that has not yet been included in the latest version of the occupational classification (see Crosby, 2002). We first discuss

international occupational classifications (ISCO and ESCO) and then continue with the national occupational classifications (for each of the countries discussed in Section D).

For example, for Belgium, we aimed to find the occupation of an online marketing coordinator in different occupational classifications. We could not find it in ISCO and ESCO, nor in the classification of many European countries. However, a similar occupation was found in the national classification of Italy, Poland and Germany, and the United States.

The last section of the occupational card, **Section F, summarises our main conclusions**. It aims to provide an answer to the questions whether the occupation is in fact new or emerging (does it have a future) and what its impact on training and skills will be. Again, this analysis is performed for the country where the occupation was found, the European level and the global level.

For Belgium, we conclude that online marketing coordinator is a new and emerging occupation that clearly has a bright future, and we illustrate the implications for the education sector and skill training (we find that universities and colleges should devote more attention to marketing online in their current marketing training programmes). We then extend this to other countries in Europe and the world.

Lessons from our pilot

Overall, our pilot is a successful proof-of-concept; it shows that it is feasible to identify potentially new occupations on the basis of the occupational structure or meta-data available on online job boards. Nonetheless, on the basis of the prototype, it does seem that monthly periodicity, as we had now, is too frequent, as the occupation tags are not updated so regularly. Better results could likely be obtained by crawling the websites in longer time intervals for a longer period of time. Additionally, we could scrape text from vacancies for occupations associated with the new tags to identify skills and tasks associated with them, i.e. to combine the two approaches. This can be achieved by applying standard machine learning and text mining techniques (Grus, 2015).

Other approaches to identify new occupations

To the best of our knowledge, we **are not aware of other research that uses a similar approach to identify new occupations**. As indicated above, there is some academic work that analyses the growth of new occupations. A key reference in this regard is Crosby (2002), who distinguishes between **new, emerging and evolving occupations**. Crosby thinks of evolving occupations as existing occupations with tasks that are changing drastically. New occupations, in contrast, have only recently materialised. According to Crosby, the concept of “recently”, however, depends on the study. In most studies, it implies that the occupation is not included in the most current occupational classification system. Finally, emerging occupations have small employment numbers but are expected to grow larger in the future (and easier to identify than completely new occupations, because some occupations are only noticed when they have grown sufficiently). From this work, one can see how existing occupations are changing (or evolving) into new occupations that could develop and become more widely spread throughout the economy.

The distinction between new, emerging and evolving occupations is also present in other studies (see Crosby (2002) for an overview). In some cases, these concepts are defined on the basis of the most recent occupational classification. In other cases, other measures are used. To identify new occupations, most papers rely on **surveys, employer interviews, trade publications, job postings** (and the corresponding job titles), in addition to **the current occupational classification**. Some examples are given below. The U.S. Bureau of Labor conducts a **survey** among employers to find new occupations. Employers are provided with a list of common occupations, and asked to add missing occupations to this list. Much attention is devoted to occupations that are absent but show high employment numbers, or that emerge because of technological progress. In addition, the U.S. Bureau of Labor also has a **census**, to which new job titles are added when detected in the coding process or at the request of experts. However, not all new job titles are added and not for every new title is a new occupation created in the census. In fact, job titles are organised into the existing occupations to a maximum extent possible. The Texas Career Development Resources office collects information via **job postings, employer interviews, trade publications**, among other sources. In their approach, traditional occupations included in the 1980 Standard Occupational Classification System (SOC) that have seen substantial changes in terms of knowledge or skills are labelled “evolving occupations”. “Emerging occupations”, on the other hand, are defined as occupations that are not identified in the 1980 SOC but are “new” (with new titles and new skill sets). The Minnesota Workforce Center also relies on **employer surveys** and on the **1980 SOC**. It regards occupations as “new” when they are characterised by work activities, skills and knowledge that are so new that they cannot be classified under the existing system. Evolving occupations, on the other hand, are existing occupations with rapidly changing skill sets, requiring new knowledge. The Department of Labor of the State of New York regularly issues a newsletter in which new and emerging occupations are discussed.³ Recent examples of such occupations are bioinformatics technicians, energy brokers, and digital forensics investigators and analysts. Other related work covers occupational and skill change in the past and is mainly based on case studies (see for example Chin, Juhn & Thompson (2006), who discuss the introduction of steam power in the merchant marine industry and the rise of the occupation of engineer). More recent studies have centred on skill-based technological change and job polarisation and a range of other potential explanations for why new occupations emerge. Few studies, however, really seem to tackle the question of what a new occupation is and how it can be identified.

Another interesting idea that has been put forward by Kea Tijdens and her research team is to identify new occupations using the WageIndicator online survey. In the WageIndicator survey, respondents are asked to enter their occupation. They can select their occupation from a list or find it via a search tree (respondents can start entering their occupation in a search box, the search term is then autocompleted). These occupations are linked to the most recent ISCO classification (at a fairly detailed level). However, when respondents are unable to find their occupation, they can indicate this and are asked to enter their occupation in a separate text box. The occupations that are not yet included in the databases used by WageIndicator potentially are new occupations and are interesting candidates for further investigation.

In summary, new occupations develop out of existing occupations, or combinations thereof (at least to some extent), and their identification is largely dependent on the introduction of new tasks (with a matching skill set) and the most recent occupational classification. However,

³ Available at www.labor.ny.gov/stats/enys_index.shtm.

even with an up-to-date list of occupations it remains difficult to predict which and how fast occupations will grow. Moreover, to identify a “new” occupation, one needs to have a benchmark to weigh it against, i.e. to understand what “new” really means. This raises the question whether the most recent occupational classification (from ISCO, ESCO or other institutions) actually is the most suitable benchmark.

The academic debate on new jobs and new skills has a policy counterpart, composed of many contributions from international organisations, the European Commission and national policy-makers. Overall, the focus of this work seems to be more on the **skill dimension**. For instance, the **European Commission** has done a lot of work on skill matching (to labour market needs) and skill upgrading (which is based on a careful assessment and anticipation of skill needs of employers and workers). The **OECD’s** strategy is based on three pillars: developing relevant skills, activating the skills supply and putting skills to effective use. The **ILO** focuses on qualitative education, a smooth transition from school to work, skill matching, life-long learning, the anticipation of the skills of the future, among other things. Starting from a global perspective, **UNESCO** proposes a 10-step approach towards a better future for young people, while the **World Bank** developed a STEP approach that consists of five interlinked steps. Many programmes of these international organisations also emphasise the importance of labour mobility, e.g. ERASMUS+. National policy-makers have stressed the role of skills in the new occupations debate as well.

Some examples of our occupation cards

In the remainder of this document, we present seven occupation cards. Our aim is to illustrate how we summarise the information gathered on the basis of our methodology. We present two cards for Belgium (online marketing coordinator, technical commercial planner), three cards for Slovakia (drug safety specialist, spa therapist, OSS/BSS specialist), one card for France (graphic designer) and one card for Poland (biomedical engineer).

Online Marketing Coordinator

Date: 30 September 2015

A. Identification

The identification of new occupations, such as the Online Marketing Coordinator presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regularly intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In the beginning of **August 2015**, a new tag was added to the **Belgian** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for an **online marketing coordinator** on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	July 2015
On which online job board was the tag/vacancy published?	vacature.com
Which country is covered by this job portal?	Belgium (Flanders)
In which industry is the employer active?	broad (no specific industry listed)
What type of employer has posted the vacancy?	private company

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • responsible for (co-)planning, implementation, monitoring and online publication of online digital marketing communication • responsible for various online tools such as websites, e-mail, apps and social pages • detect the needs of sales force, come up with inspiring new ideas, present company's message in a simple and attractive way • work smoothly together with colleagues and external partners • report to the senior marketing coordinator
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • at least a bachelor's/master's degree or equivalent by experience • digital native bitten by the online microbe; always following the latest trends • can use CMS systems and WordPress, understands the basics of HTML and has good knowledge of SEO, SEA, Google Analytics • has good writing skills (NL/EN) and communicates fluently • stress-resistant, result-oriented, enjoys working on many projects at once
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • function group: web application developer, e- & database marketing • function: online marketing coordinator; marketing; online marketing; e-marketing; emarketing; marketer; emarketeer; digital marketing; digital marketer; online marketer; social media; social • sector: general industry • employment type: fixed position, working time 36-40 hours per week • education level: Professional Bachelor • experience: 1-2 years of experience

B. Definition, responsibilities and tasks

1. Definition

What is "Online Marketing"?

Online marketing is a form of marketing and advertising that relies on the Internet to deliver promotional marketing messages to consumers. The concept includes email marketing, search engine marketing (SEM), social media marketing, mobile advertising and display advertising, e.g. web banner advertising. The concept of online marketing is also known as *Internet advertising* or *online advertising*. Online advertising is widely used across virtually all sectors.

Similarly to other forms of marketing, online marketing commonly involves a *publisher* (who integrates ads into its online content) and an *advertiser* (who provides ads to be displayed with the publisher's content). Other agents that could be involved are *advertising agencies* (who generate and place the ad copy), an *ad server* (who technologically delivers the ad and tracks statistics), and *advertising affiliates* (who are responsible for independent promotional work for the advertiser).

Some examples of related job titles: “online marketing experts/assistants”, “online marketers”, “e-marketing specialist”, “online marketing and sales support”

More information on the occupation can be found on the Wikipedia pages:

- covering *online advertising* (https://en.wikipedia.org/wiki/Online_advertising)
- covering *digital marketing* (https://en.wikipedia.org/wiki/Digital_marketing)

Is this position related to any existing occupations?

At first sight, the position of an online marketing coordinator appears to **combine** some of the tasks and responsibilities of other *marketing, advertising, sales or communication occupations* and those of occupations in the field of *information and communication technologies*.

Note that the concept of online marketing is closely related to that of *digital marketing*. Digital marketing is the “targeted, measureable and interactive marketing of products or services using digital technologies to reach and convert leads into customers. Its objective is to promote brands, build preference and increase sales through various digital marketing techniques, mainly using the Internet as a core promotional medium.” The term emerged in the 1990s, but the concept only started to grow in 2000-10. Digital marketing includes, but is not limited to, e-mail direct marketing, social media marketing, search engine optimisation or marketing, e-commerce marketing, content marketing/automation, influencer marketing, and mobile marketing. Online and digital marketing seem to overlap to some extent.

How prevalent is the occupation of an Online Marketing Coordinator in Belgium?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise:

Job portals

- vacature.com: offers 11 vacancies for “online marketing” and nine for “digital marketing”
- jobat.be: offers about 30 job ads for “online marketing” and “digital marketing”
- bloovi.be: offers about 35 related job advertisements
- monster.be: offers about 16 job advertisements for “online marketer”
- creativeskills.be: about five job advertisements published during the summer
- careerjet.be: about 67 job advertisements for “digital marketing”

Google Search (limited to .be websites):

- “online marketing vacature”: about 110,000 results
- “online marketing job”: about 165,000 results
- “internet marketing vacature”: about 63,700 results
- “internet marketing job”: about 189,000 results
- “digital marketing vacature”: about 23,300 results
- “digital marketing job”: about 81,200 results

2. What are the responsibilities and tasks of an online marketing coordinator?

This information is obtained from a sample of job vacancies, extracted from job portals (for Belgium)

- responsibilities and tasks are generally *closely related to those of other marketing occupations*, i.e. other marketing, advertising, sales or communication occupations, such as initiation and implementation of offline and online campaigns and initiatives, but there is a lot more emphasis on the “online” dimension here
- some vacancies focus on “*online marketing*” and only include tasks and responsibilities related to marketing; other vacancies are looking for a *broader profile* and list tasks and responsibilities that are related to offline marketing, sales, web design, and other tasks
- development of an *online marketing, advertising and sales strategy*, which involves online branding, marketing activities and campaigns, generate traffic to websites, sending out newsletters
- implementation of *applications* (mobile, SMS), attract new followers, generate traffic to applications
- development of a *social media strategy*, which involves online branding, advertising activities, attracting new followers, organic search optimisation (via creating content, communication strategy), running a blog

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Belgium)

Formal education required

Is formal education required?	Yes
Level of education	tertiary education: bachelor’s or master’s degree
Field of education	some vacancies require training in marketing, new media communications; other vacancies do not specify a field of education

Skills required

Communication skills	writing and communication skills, language skills (e.g. Dutch, French, English, German), copywriting
Computer skills	SEM, SEO, SEA, HTML, MS Office, Google Analytics, social media, web design, Web2.0, Photoshop, Dreamweaver, InDesign
Non-cognitive skills	analytical thinking, self-motivated, takes initiative, entrepreneurial mind-set, problem-solving, result-oriented, team player, organised, customer friendly, flexible, dynamic

Occupation-specific skills	understanding online marketing (content, campaigns), knowledge of online customer behaviour, planning, conception and optimisation of campaigns, e-marketing techniques, communication strategy, interest in what is happening online
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Experience required

Is experience required?	this depends on the level of the position in the firm (executive, assistant, ...): e.g. 1-2 years, 3-5 years, 5+ years
Is job-related experience required?	yes, in some vacancies: <ul style="list-style-type: none"> - experience in online marketing activities and campaigns, sales-driven organisations, e-commerce - experience in the sector, e.g. tourism

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:

Some of the job portals consulted: Indeed, Monster, Stepstone...

Similar vacancies in Western Europe

France	<i>Chargé de mission commercial et marketing, Un Chargé de Marketing Digital, Responsable Web-Marketing, E-marketeur</i>
Germany	<i>Onlinemarketing-Manager/in, Mitarbeiter (m/w) im Onlinemarketing (SEA) für den Webshop, Junior Marketing Manager im Online-Bereich, Trainee Kreation Onlinemarketing (m/w, Vollzeit, E-Commerce)</i>
The Netherlands	<i>Online Marketeer, Marketing Assistant, Digital Marketing & e-Commerce Consultant, Marketeer/SEO specialist</i>
UK	<i>Digital Marketing Manager, Digital Marketing Analyst, Online Marketing Executive, Web and Digital Marketing Apprentice, Online Marketing Coordinator</i>
Do these vacancies involve similar tasks and have similar requirements as the	Tasks/Responsibilities: developing and implementing a marketing or sales strategy, branding, web design, online promotion, e-mail marketing, content creation and management for website, social media platforms, newsletters, create statistics

<p>vacancies for Belgium? YES</p>	<p>and reports, keeping up-to-date with technological advancements, proofreading, target group identification, budget planning, graphic design</p> <p>Requirements:</p> <ul style="list-style-type: none"> - bachelor's degree, previous experience in similar roles - knowledge of digital marketing, SEO, SEM, HTML, CSS, PHP, Adobe Photoshop or Illustrator, OM tools (Google Analytics, Adwords certificates required, Facebook), reporting results, able to develop a strategy, community management, written, verbal communication and presentation skills, English and other languages, data analysis, affinity with Internet/technology/IT - independent, dynamic, responsible, interested in the field, timeliness, creativity, enthusiastic, open-minded, focused, well-organised, commercial awareness, eager to learn, goal-oriented
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Similar vacancies in Southern Europe

Italy	<p><i>Responsabile Marketing e Web Marketing, Web Marketing Specialist, Online marketing manager, Impiegato web marketing, Addetto web marketing, Web Marketing Assistant</i></p>
Spain	<p><i>Especialista en Marketing Digital / E-commerce, Digital Marketing & SEM Executive, e-Commerce Marketing Manager, Responsable de Marketing Digital, Digital Marketing & Communication Support</i></p>
<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? YES</p>	<p>Tasks/Responsibilities: development and execution of marketing strategies, creation of advertising campaigns, branding, e-mail marketing, management of and content creation for website, social media, newsletters, creation of all business graphics and materials (also offline), attract traffic to platforms, data analysis and reporting, copywriting, coordinate communication/sales strategy,</p> <p>Requirements:</p> <ul style="list-style-type: none"> - bachelor's degree, experience in related field or position - knowledge of marketing, social media, database management and CRM, marketing tools, analytical skills, computer skills (including programming, SEO/SEM, PHP, HTML, Facebook, MS Office, Adobe Photoshop or Illustrator, GIMP, Adwords, Retargeting, Premiere, Dreamweaver, Google Analytics), language skills, written and verbal communication skills, project management, a driving license is needed - organised, independent, results-oriented, stress-resistant, dynamic, business-minded, energetic, detail-oriented, proactive, team work, interest in company activities and sector, problem-solving

Similar vacancies in Northern Europe

Denmark	<i>Online marketingspecialist, Social Media Marketing Manager, Online marketingkonsulent, Web og marketingkoordinator</i>
Sweden	<i>Online Marketing Coordinator Global Media, Online marketing manager, Juniorkonsult Digital Markadsföring, Digital Marketing Specialist</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? YES	<p>Tasks/Responsibilities: development and implementation of online marketing strategy, e-mail marketing, branding, report preparation, data analysis, management and optimisation of campaigns, budget planning, set up a digital marketing toolbox, launch new campaigns via social media, monitoring, measurement and analysis of marketing plans</p> <p>Requirements:</p> <ul style="list-style-type: none"> - tertiary education in a related field (bachelor's, master's), experience in a related position, field or company - knowledge of online marketing, market analysis, web experience, experience with SEO, InDesign, Illustrator, Adobe Photoshop, Salesforce, Hubspot, Google Adwords, DoubleClick, social media (Facebook, LinkedIn, YouTube), a good understanding of online marketing and the web, web design skills, language skills, written and verbal communication skills - committed, passionate, creativity, independent, responsible, team-working skills, interested, proactive, ambitious, well-organised, adaptable, analytical mindset

Similar vacancies in Central and Eastern Europe

Czech Republic	<i>E-Commerce Marketing Manager, Online Marketing Expert, Online marketing specialist, Online marketing manager</i>
Hungary	<i>Online Marketing munkatárs, Értékesítési/Marketing asszisztens, Online marketing specialist, Online marketing manager, Online marketing és kommunikációs specialista</i>
Poland	<i>Online Marketing Manager, Specjalista ds. marketingu online, E-Commerce Marketing Manager - branża sportowa</i>
Do these vacancies involve similar tasks and have similar requirements as the	<p>Tasks/Responsibilities: preparation and implementation of online marketing campaigns or strategies, market research, copywriting, e-mail marketing, drawing traffic to website, overseeing social media strategy, keeping track of emerging technologies, set up web, mobile or digital campaigns, measure and report performance of</p>

vacancies for Belgium? YES	strategies, newsletter, content creation, branding, web design, search engine marketing Requirements: - high school education, vocational training, graduate professional degree, university degree, experience in similar role, firm, sector - knowledge of digital marketing, reporting, copywriting skills, MS Office, SEO/SEM, internet analytics and tools (Google Adwords, Display Ads, Mixpanel, Colibri, Crazy Egg, Brand24, Facebook-Ads), Photoshop, PPC, language skills, written and verbal communication skills, graphic skills, data analysis and reporting skills, market knowledge - customer-oriented, creative, loyal, independent, proactive, team player, positive, self-motivated, passion for marketing, flexibility
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2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *Online Marketing Specialist*, *Online Marketing Consultant*, *Integrated Digital Marketing Manager*, *Web Marketing Manager*.

Some of the job portals consulted: Indeed, Monster, Stepstone...

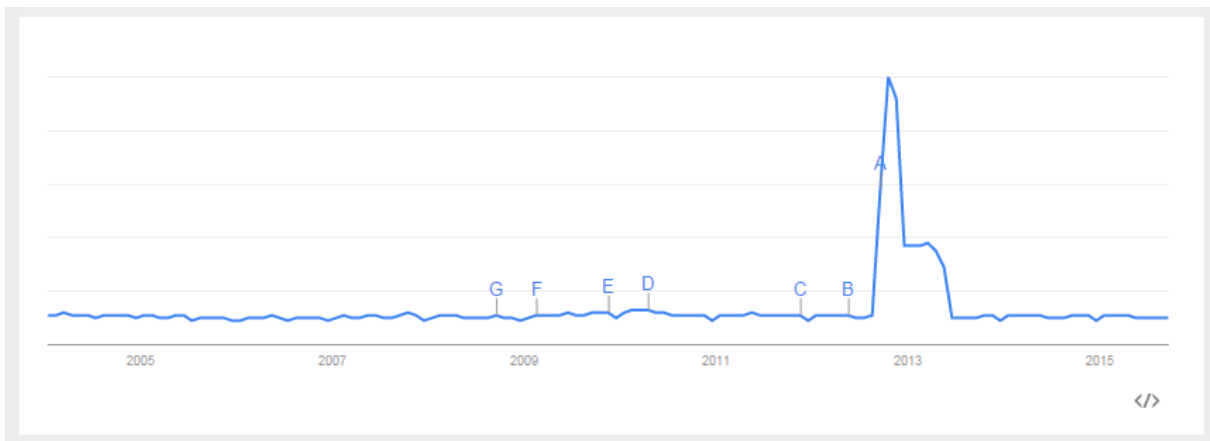
Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Belgium? **YES**

- **Tasks/Responsibilities:** are relatively similar to those for Belgium. Again, tasks commonly involve marketing (e.g. e-commerce, implementation of campaigns and strategies, promotions, content creation for websites, social media, e-mail marketing, paid advertising, branding, budget planning), sales and communications. In addition, some vacancies also refer to web design, copywriting and editing, as was the case for Belgium. Other tasks involve data analysis and database management, reporting on performance indicators, search for new technologies to use in daily tasks, continuous training and participation in workshops, conferences and industry events. These tasks seem to appear less in the Belgian vacancies (either not needed for position or assumed implicitly).
- **Requirements:** are rather similar as well. Almost all vacancies require experience in a similar role and sector. **Education and cognitive skills:** at least a bachelor's degree in a related field, knowledge of online marketing techniques and strategies, web technology, organic search, search engine spiders and ranking factors, web design, MS Office, Google Analytics, HTML, CSS, written and communication skills, project management. **Non-cognitive skills:** teamwork, leadership skills, creativity, goal-oriented, positive, stress-resistant, problem-solving skills, self-motivated, able to do many tasks at once. Rather similar requirements, again a strong emphasis on the non-cognitive skills. We did find some differences in terms of the platforms and tools that are used, e.g. Google Adwords, SEOMoz, CrazyEg, Movable Ink, HubSpot.

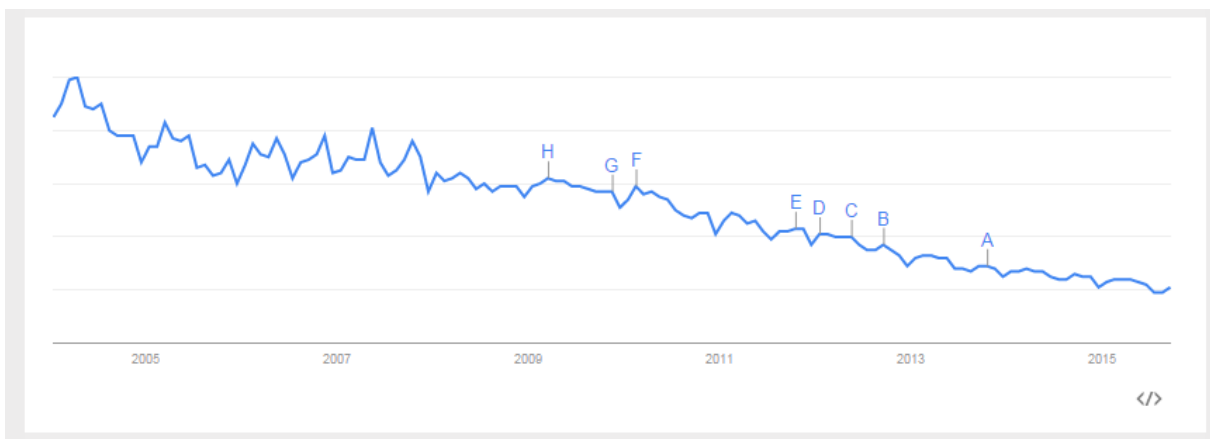
3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global): especially “digital marketing” is on the rise, Internet marketing has declined over time and online marketing has been popular during the last five years (with a peak in 2013). These findings indicate that the Internet has become so widespread that the term and concept are relatively common nowadays. Nevertheless, the interest in occupations related to web-based marketing appears to grow. These patterns are found in Belgium, many European countries (France, Germany, the Netherlands, the UK, Italy, Finland, Sweden, Hungary, and Poland, among others) and the United States. Some differences are detected for online marketing (after the peak in 2013, the interest appears to remain somewhat higher in Denmark and Romania, and there is a slight upward trend for Spain) and internet marketing (high peaks and then a drop to nearly zero for Poland and Sweden).

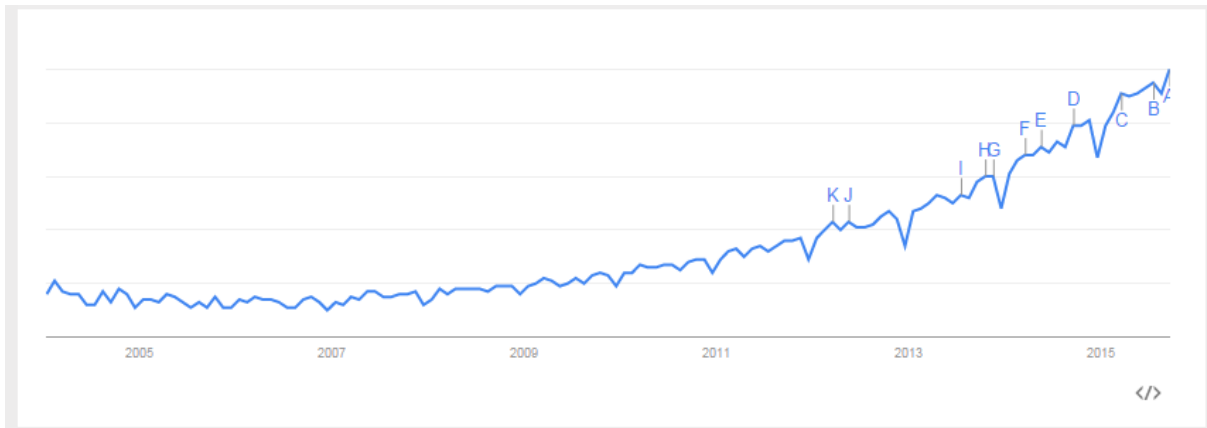
Google Trends: online marketing worldwide (30/09/2015)



Google Trends: internet marketing worldwide (30/09/2015)



Google Trends: digital marketing worldwide (30/09/2015)



E. Occupational classification

1. International classifications

ISCO 08: the term “online” does not appear in combination with “marketing”; nor do “digital” and “internet”; the term “internet” does appear in combination with “salesperson” (occupation 5244: service & sales workers => sales workers => other sales workers => contact centre sales persons).

Where could this occupation fit in the ISCO08 classification?

- 1221 “Sales and marketing managers”
- 1222 “Advertising and public relations managers”
- 2431 “Advertising and marketing professionals”

ESCO: it does not appear to exist at this point (‘marketing’ does exist)

Where could this occupation fit in the ESCO classification?

- 579 “Advertising and marketing professionals”
- 563 “Sales, marketing and development managers”
- 361 “Other sales workers”

2. National classifications

Belgium: based on ISCO (from 2011 onwards)

In Europe:

- **France:** PCS and PCS-ESE, but occupation is not included there (different translations were checked; it might be due to the fact that the last update was in 2003).
- **Germany:** Klassifikation der Berufe (KB) (most recent version is 2010), occupation is included: 92113 *Komplexe Spezialistentätigkeiten* (includes *Online-Marketingmanager/in*) as part of the category *Werbung, Marketing, kaufmännische und redaktionelle Medienberufe*.
- **The Netherlands:** based on ISCO (Central Bureau for Statistics, from 2013 onwards).

- **UK:** SOC (most recent version is 2010), but occupation is not included there.
- **Italy:** has the Classificazione delle professioni (CP, most recent version 2011, an update of CP2001 and adapted to ISCO08), in this classification there is an occupation named *tecnici del marketing* (code 3.3.3.5.0, in which an example job title is *tecnico del web marketing*), that is part of the *professioni tecniche nell'organizzazione, amministrazione e nelle attività finanziarie e commerciali / tecnici dei rapporti con i mercati / tecnici del marketing*.
- **Spain:** has the Clasificación Nacional de Ocupaciones 2011 (CNO-11), includes marketing professionals (Profesionales de la publicidad y la comercialización) but it is not clear whether this covers online marketing professionals.
- **Denmark:** DISCO, Danish national classification based on ISCO, most recent version is DISCO 2008, not found.
- **Sweden:** has the Standard för svensk yrkesklassificering (SSYK) (most recent version is SSYK2012), based on ISCO08. Includes many marketing professions, but it does not seem to include online or web marketing.
- **Czech Republic:** Klasifikace zaměstnání (CZ-ISCO), based on ISCO08. Few marketing occupations, few web-related professions (not found in the list).
- **Hungary:** has HCSO/FEOR (edition 2008), but this does not include the occupation.
- **Poland:** has the Klasyfikacja zawodów i specjalności (KZiS 2014), based on ISCO08 (but it is updated more recently, 2014). In an alphabetical list, a similar occupation was found: *122104 Kierownik do spraw marketingu internetowego* (Director of Marketing online). This is likely the result of the recent update.

In the rest of the world (US):

- **US** has SOC (last version is 2010), occupation is included: 11-2021 Marketing Managers lists "Internet Marketing Managers" as an example job title (part of 11-2000 Advertising, Marketing, Promotions, Public Relations, and Sales Managers).
- **US** also has the O*NET classification: the occupation exists as part of "Online Merchants" (13-1199.06 - Online Merchants www.onetonline.org/link/summary/13-1199.06).

This occupation is labelled as a "**Bright Outlook**" occupation (in the category "new and emerging"), i.e. occupations expected to grow rapidly in the next several years, will have large numbers of job openings, or are new and emerging occupations.

O*NET summary of online merchants: Conduct retail activities of businesses operating exclusively online; may perform duties such as preparing business strategies, buying merchandise, managing inventory, implementing marketing activities, fulfilling and shipping online orders, and balancing financial records. Examples of job titles: Marketing Director; Marketing Specialist; Online Marketing Manager; Online Services Manager; Social Media Director.

Other O*NET occupations that are related to "Online marketing":

Search Marketing Strategists

www.onetonline.org/link/summary/15-1199.10

Marketing Managers

www.onetonline.org/link/summary/11-2021.00

Market Research Analysts and Marketing Specialists

www.onetonline.org/link/summary/13-1161.00

F. Conclusions

Is Online Marketing Coordinator a new or emerging occupation?

In Belgium?

Given its limited prevalence and the relative novelty of some of the tools and technologies that the worker has to use, the occupation is relatively new and emerging in Belgium. The tasks and duties that are involved in the job are highly specialised, but there still is a clear link with other existing jobs (among others, in marketing, sales, communication). The occupation seems to combine different aspects of these jobs (marketing, social media, IT). Its importance is likely to grow in the future, as the Internet is increasingly used in everyday life. In some industries and firms, the occupation is likely to be completely new, while in other industries and companies, it is emerging. Interestingly, one of the vacancies mentioned that the position is new within the organisation. Does this occupation have a future? Undoubtedly yes.

What is the impact on training? What are the skills implications? Educational institutes will have to keep in mind that the marketing professions of the future will also have a strong web-based dimension. This means that students will need to learn how to work with these programs, tools and platforms (Google Analytics, SEO, e-mail marketing, social media) and how to reach their target audience in this way. They also have to acquire some programming skills, web and graphic design skills, etc. Marketing jobs are likely to develop into broader professions, and students will thus have to develop a wider range of skills as well. Another important dimension that should not be overlooked is data and analytics. Strong analytical skills are essential (data collection, result interpretation, reporting, drawing conclusions to adjust strategies and develop new campaigns). Finally, training programmes should focus extensively on communication skills, because these are requested in nearly all vacancies. Moreover, firms that want to remain competitive should make sure that their employees receive on-the-job training or have other training opportunities, to keep up

	<p>with technological changes and changes in the market. Similarly, for the workers that hold a marketing position, it could be interesting to engage in life-long-learning and to keep up to date with current developments (to keep their job or transfer to other positions).</p>
In Europe?	<p>A similar conclusion is reached for Europe. In many countries, the classification is not present in the most recent national occupational classification. In some countries, i.e. Germany, Italy and Poland, the occupation is part of the most recent national occupational classification (there it could be regarded as emerging rather than new). There are a lot of vacancies for similar positions across Europe, especially in the west, north and south, less so in the east.</p> <p>Given that the tasks and responsibilities and the requirements are comparable in other European countries, the conclusions formulated above apply here. Education should focus on new technologies, communication skills and data analysis. Companies can benefit from providing on-the-job training to their staff, to keep up with recent developments. Marketing professionals should be aware of these developments and engage in training activities too.</p>
Worldwide?	<p>For the US, the occupation appears to be relatively new or emerging as well, depending on the industry and firm. The occupation is included in SOC and O*NET. Similar conclusions are reached for the educational institutes, firms and individuals.</p>

Technical-Commercial Advisor / Planner / Collaborator

Date: 14 January 2016

A. Identification

The identification of new occupations, such as the technical-commercial advisor presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regularly intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In the beginning of **August**, a new tag was added to the **Belgian** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. Interestingly, after this new tag appeared, **similar tags were added in the following months**. This, however, **may suggest that the occupation is not entirely new**, but rather had not yet been picked up when we created the benchmark. We will keep this in mind throughout the development of this occupational card and in our final conclusions where we indicate whether we truly are dealing with a new occupation. We then searched for an actual vacancy for a **technical-commercial advisor or collaborator** on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	August 2015
On which online job board was the tag/vacancy published?	www.vacature.com www.references.be
Which country is covered by this job portal?	Belgium (for both regions)
In which industry is the employer active?	Construction, chemicals
What type of employer has posted the vacancy?	Private company

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • Responsible for technical support, providing technical advice, deal with complaints • Assist in technical trials at the customer's premises, visit clients' plants, shipyards, production sites • Produce construction plans, drawings, notes • Purchase equipment, auditing • Maintaining existing relationships with customers, establishing of new relationships with clients, building a network of new or potential customers, commercial responsibilities, first contact point of customers, administrative follow-up • Collaborate closely with other departments within the firm, such as accounting, sales, engineering, R&D, provide inputs to other departments
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • A degree in the field where the support has to be provided (e.g. concrete, construction, chemicals, electronics, mechanics, able to read and interpret plans, HVAC), bachelor's degree • At least a first experience in the sector or a related position, in terms of quality and technical support, administration • Computer skills (common PC applications, Word, Excel, ERP) • Basic knowledge of French, knowledge of English, bilingual, knowledge of Dutch, good communication skills • Excellent commercial skills, customer-oriented, networking skills, service-oriented • Dynamic, results-oriented, quality conscious, stress resistant, responsible, good visual memory • Interested in technological progress
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • Technical-sales, technical-commercial, engineering, metal, construction, customer service

B. Definition, responsibilities and tasks

1. Definition

What does "technical-commercial" mean?

Technical-commercial advisors, planners, collaborators or employees appear to combine two distinct features: **technical expertise** with a **commercial mindset**. In their position, on the one hand they are responsible for technical support, field trials at customers' plants, drawing of plans, proposing new projects, dealing with complaints, solving technical issues and so on. The specific technical tasks that one has to perform depend on the position within the firm and of the sector in which the employer operates. In terms of sector, at first sight the position seems to be relatively widespread, with vacancies in construction, electronics, chemicals, mechanics and so on. On the other hand, there is a clear service and commercial dimension to the position,

which involves both keeping existing clients satisfied and trying to engage new customers. Given that the keywords “technical-commercial” appear with a number of positions, the exact role of the individual performing the work likely depends on how the firm envisions this.

Some examples of job titles: *technical-commercial employee, technical-commercial clerk, technical-commercial planner*

More information on the occupation can be found on the Wikipedia pages:

- https://en.wikipedia.org/wiki/Technical_support
- <https://en.wikipedia.org/wiki/Commerce>
- <https://en.wikipedia.org/wiki/Advertising>

Is this position related to any existing occupations?

Yes, as was already indicated above, this occupation clearly is related to a range of technical blue-collar occupations on the one hand (technical support, manual tasks) as well as a range of white-collar occupations (sales, administration, and commerce, client- or service-oriented). These different dimensions appear as separate occupations on the labour market, but will also appear in other occupations that combine them, e.g. commercial engineers.

How prevalent is the occupation of a Technical-Commercial Advisor in Belgium?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise:

Job portals

- vacature.com: 98 vacancies for “technisch-commercieel”
- jobat.be: 67 vacancies for “technisch-commercieel”
- monster.be: 99 vacancies for “technisch-commercieel”
- careerjet.be: 1,962 vacancies for “technisch-commercieel”
- indeed.be: 516 vacancies for “technisch-commercieel”

Google Search (limited to .be websites):

- technisch-commercieel medewerker: about 75,000 results
- technisch-commercieel adviseur: about 45,100 results
- technisch-commercieel bediende: 51,200 results
- technisch-commercieel planner: 12,200 results
- technisch-commercieel: 215,000 results

2. What are the responsibilities and tasks of a technical-commercial advisor?

This information is obtained from a sample of job vacancies, extracted from job portals (for Belgium)

In this analysis, we consider all vacancies that mention “technical-commercial”, regardless of whether this term is followed by planner, advisor, collaborator or any other word. On the basis of this set of vacancies, we distinguish two groups of tasks and responsibilities. First, technical tasks and responsibilities, which are closely related to the activities of the firm and the sector in which it is active. Secondly, we identify a range of administrative and commercial tasks and responsibilities.

- **Technical** responsibilities and tasks are generally *closely related to those of other technical, blue-collar occupations*. Common tasks involve providing technical advice and support, offering assistance to customers, addressing complaints and malfunctions, executing field trials, drawing and interpreting plans, creating new proposals, and so on. In many cases, workers need to be able to fix technical problems as well, but this also depends on the role of the worker within the company, e.g. does he or she have an advisory, planning or other role. There also is a link with some of the engineering occupations, particularly those that also involve a commercial dimension (such as commercial or business engineers).
- Similarly, **commercial** responsibilities and tasks are *closely related to those of other commercial or sales-related positions*, and involve interacting with existing clients, networking activities, follow-up of existing relationships/orders/problems, as well as identifying new potential customers and establishing relationships with them (generating sales).
- Finally, the occupation also entails clear **administrative** responsibilities and tasks, which include following-up on orders and sales, following-up on technical support activities and so on.

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Belgium)

Formal education required

Is formal education required?	Yes, most vacancies do refer to formal education
Level of education	This ranges from high school education (general or technical training) to the bachelor's level (professional bachelor's mostly)
Field of education	This depends substantially on the firm, its activities and sector. Some examples are construction, chemistry, metal work and electro-mechanics

Skills required

Communication skills	Communication skills are deemed highly important, many vacancies also refer to basic knowledge of specific languages (such as Dutch, French and English)
Computer skills	Basic computer skills are required (MS Office), in some cases also specific computer programs
Non-cognitive skills	Service-skills, client-oriented, stress resistant, reliable, responsible, commercial attitude, dynamic, detail-oriented
Occupation-specific skills	Technical knowledge and skills, depending on sector (e.g. reading, interpreting and drawing plans, knowledge on how to fix technical defects, installation procedures, field trials)

Experience required	
Is experience required?	Not always, we found vacancies requesting none, starter position, 1-2 years, 3-5 years
Is job-related experience required?	Not always, again some vacancies do not require any experience at all, while others explicitly list job- or sector-related experience

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:
Some of the job portals consulted: Indeed, Monster, Stepstone...

Similar vacancies in Western Europe

France	<i>Technico Commercial, Technico-commercial itinerant, Conseiller Technique cour matériaux, Conseiller Technique sanitaire</i>
Germany	<i>Technischer Sachbearbeiter Auftragsbearbeitung, Vertriebsmitarbeiter/in</i>
The Netherlands	<i>Technisch-commercieel medewerker, Commercieel-technisch medewerker</i>
UK	<i>Technical sales staff, Technical sales manager, Technical sales executive</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? Yes	<p>Tasks/Responsibilities: contact point of clients, commercial tasks, customer and product management, technical and sales support, identification of potential customers, commercial and technical customer support and advice, preparation of proposals and offers, providing solutions for complaints and problems, organisation of customer training sessions, administrative follow-up</p> <p>Requirements: previous experience in a related position, formal education, knowledge of sales techniques, technical knowledge of products, their use and their implementation, driving license, dynamic, excellent customer-service skills, independent, team player, ambitious, client-oriented, strong communication and technical skills, language skills, basic PC skills</p>

Similar vacancies in Southern Europe

Italy	TECNICO COMMERCIALE, FUNZIONARIO TECNICO COMMERCIALE, TECNICI COMMERCIALI
Spain	Técnico Comercial, Técnico Comercial Personal Care, Técnico comercial medicina estética, COMERCIAL Técnico INTERNACIONAL
<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? Yes (but stronger emphasis on the sales part in many vacancies)</p>	<p>Tasks/Responsibilities: responsible for sales, finding new clients, commercial support, profile management, improving existing customer relations, increase sales, regular contact with other departments, technical support and commercial centres, regular business trips, advertising</p> <p>Requirements: business degree, science degree, engineering degree, other degree, experience in similar position, international experience, technical sales experience, knowledge of foreign languages, product knowledge, customer-oriented, independent, friendly, assertive, flexibility, problem-solving</p>

Similar vacancies in Northern Europe

Denmark	Related vacancies were found for sales/commercial engineers: Salgsingeniør - Teknisk salg, SALGSINGENIØR
Sweden	Teknisk innesäljare, säljare med tekniskt intresse, Teknisk säljare
<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? Largely yes, given that even the sales engineer vacancies for DK are quite similar</p>	<p>Tasks/Responsibilities: support sales and technical staff, training of sales team and technicians, price calculations, prepare documents and information, project management, customer management, product and portfolio development, technical advice, management tasks</p> <p>Requirements: degree in engineering/technician, have a technical background, technical higher education, (five years of) experience in technical support from a sales-related position or industrial sales, independent, responsible, team player, good at managing many tasks at once, passionate, ambitious, excellent communication skills, service-minded, able to travel, knowledge of MS Office, SAP, MRP, language skills, systemic, analytical, driving license</p>

Similar vacancies in Central and Eastern Europe

Czech Republic	<i>Technický obchodník, Technický referent obchodu, Technický obchodníka</i>
Hungary	<i>Műszaki és értékesítési képviselő, értékesítő munkakör, MŰSZAKI ÉRTÉKESÍTŐ</i>
Poland	<i>Related commercial engineer occupations: Inżynier ds. wsparcia sprzedaży, Inżynier Serwisu specjalista ds. sprzedaży</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Belgium? Yes, but the high demand for language skills is rather striking	<p>Tasks/Responsibilities: generate sales, establish relationships with new and existing clients, preparation of contracts and documents, technical support, customer support, implementation of existing orders, prepare offers, data acquisition and reporting, negotiations, project management, organisation of events, technical advice, market analysis</p> <p>Requirements: engineering degree (high school, university), technical education/proficiency, experience in sales or similar roles, language skills, computer skills, communication skills, customer-oriented, organised, reliable, independent, willing to travel, team player, flexibility, presentation skills, driving license, professional demeanour, interested in technical things/technologies</p>

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, and found many vacancies that either referred to technical sales occupations or to sales engineer occupations. Some examples of job titles are: *Industrial Sales Engineer, Sales Engineer, Technical Sales Consultant, Technical Sales Specialist, Technical Sales Representative*. Especially for the US, the list of requirements often seems substantive and very detailed. *Some of the job portals consulted: Indeed, Monster, Stepstone...*

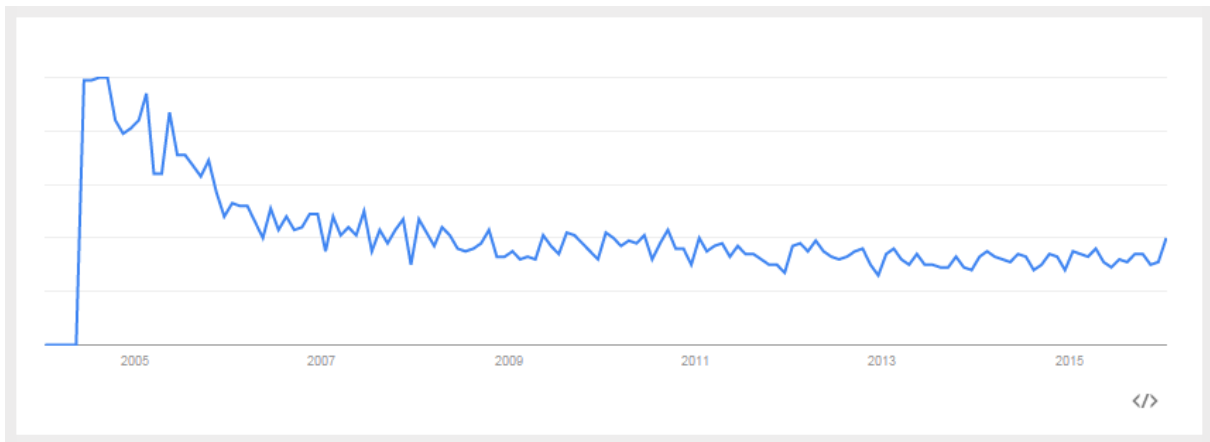
Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Belgium? **YES**

- **Tasks/Responsibilities:** generate sales, develop, grow and maintain relationships with existing and new clients, product quotations, price negotiations, work with factors to solve issues, collaborate with other departments, training, provide sales, technical and customer support, prepare offers, workflows, coordinate product demonstrations and trial installations (field trials), application of sales techniques and preparation, execute sales plans
- **Requirements:** bachelor's degree in related field, experience required (both in terms of sales position and in a technical job, 5+ years), technical knowledge, driving license, service skills, communication skills, presentation skills, computer skills (MS Office, CAD, SAP, databases, SQL), eager to learn, self-motivated, travel required, punctual, team player, customer-oriented, proactive, problem-solving, well organised, results-oriented

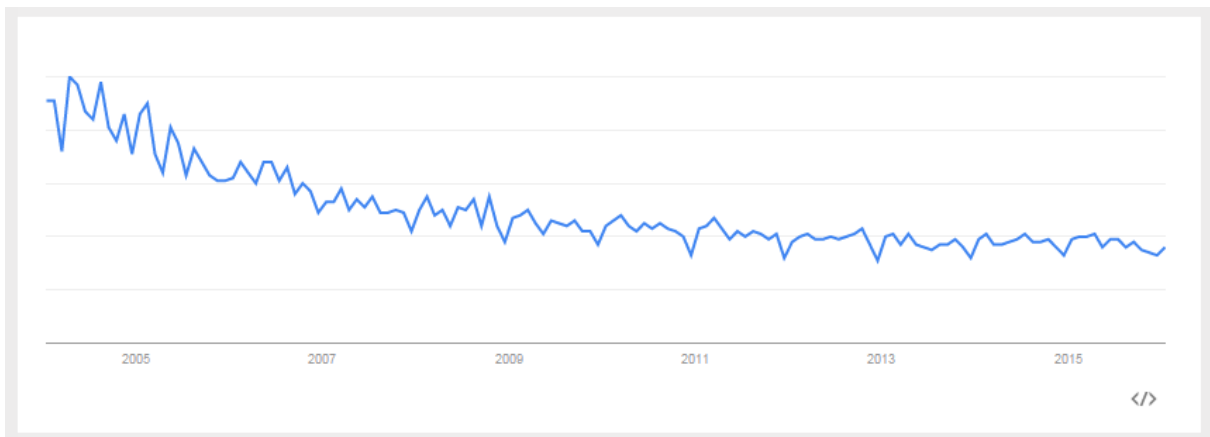
3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global): for both the search terms “technical commercial” and “technical sales” we notice a downward trend (from 2005 onwards), although in the last few years search seems to have stabilised. In the third graph, we present the result for the search term “technical sales jobs”. In this case, we see a sharp rise in 2007, after which the search declines and seems to stabilise – a pattern that we also found in the other figures depicted. Note that for “technical commercial jobs”, an insufficient number of searches was made and Google Trends did not display any results.

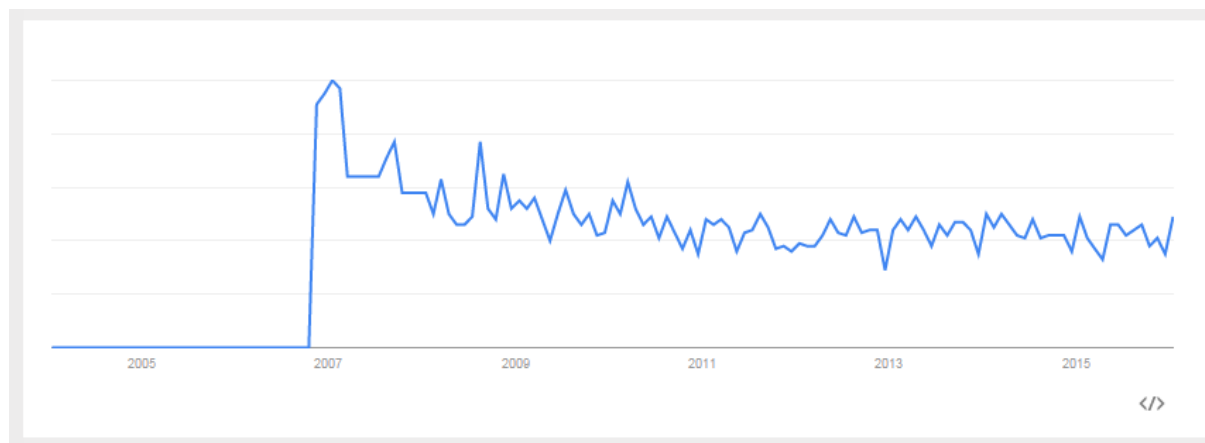
Google Trends 1: “technical commercial” worldwide (15/01/2016)



Google Trends 2: “technical sales” worldwide (15/01/2016)



Google Trends 3: “technical sales jobs” worldwide (15/01/2016)



E. Occupational classification

1. International classifications

ISCO 08: At first sight, we could not find an entry for “technical commercial” or “technical sales” in ISCO08, neither did we find an entry for “sales engineer” or “commercial engineer”. However, after a more in-depth search, we did find category “**243 Sales, marketing and public relations professionals**”, which further includes sub-category “**2433 Technical and medical sales professionals (excluding ICT)**”. The ISCO description of this category of occupations is the following: “*Technical and medical sales professionals (excluding ICT) represent companies in selling a range of industrial, medical and pharmaceutical goods and services to industrial, business, professional and other establishments*”.

The tasks for this category of occupations involve: compiling lists of prospective clients; acquiring and updating knowledge of employers’ and competitors’ goods and services, and market conditions; visiting regular and prospective client businesses to establish and act on selling opportunities; assessing clients’ needs and resources and recommending appropriate goods or services; providing input to product design where goods or services must be tailored to suit clients’ needs; developing reports and proposals; estimating costs of installing and maintaining equipment or service; monitoring customers’ changing needs and competitor activity, and reporting these developments; quoting and negotiating prices and credit terms, preparing and administering sales contracts; arranging delivery of goods, installation of equipment and the provision of services; reporting to sales management on sales made and the marketability of goods and services; consulting with clients after sale to ensure satisfaction resolve any problems and provide ongoing support. Some examples of occupations are: *sales representative (industrial, medical and pharmaceutical products), technical sales representative*. Interestingly, ISCO also refers to the occupation of a “**commercial sales representative – 3322**”. This evidence reveals that the occupation is not a ‘new’ occupation (by definition).

ESCO: We found an occupation entitled “**commercial sales representative**” in the ESCO database (category 3322), which are part of the “Sales and purchasing agents and brokers”, which, in turn, belong to the “Business and administration associate professionals”. This evidence again reveals that the occupation is not a ‘new’ occupation (by definition).

2. National classifications

Belgium: the Belgian occupational classification is based on ISCO08 and therefore it is fully compatible with it.

In Europe:

- **The Netherlands:** based on ISCO (Central Bureau for Statistics, from 2013 onwards).
- **France:** has the PCS and PCS-ESE system, however, the occupation did not seem to be included there (the last update of this national occupational classification was in 2003). The only combinations of technical and sales we could find related specifically to a series of occupations in the insurance industries.
- **Germany:** Klassifikation der Berufe (KB) (most recent version is 2010), we find 61123 *technischer Vertrieb*.
- **UK:** SOC (most recent version is 2010), includes category 3542 *Salesman, technical*. For this category, the job description is “*Business sales executives provide advice to existing and potential customers, and receive orders for specialist machinery, equipment, materials and other products or services that require technical knowledge*”.
- **Italy:** has the Classificazione delle professioni (CP, most recent version 2011, an update of CP2001 and adapted to ISCO08), in which we find 3.3.3.4 - *Tecnici della vendita e della distribuzione*.
- **Spain:** has the Clasificación Nacional de Ocupaciones 2011 (CNO-11). In this CNO-11 classification, we find category 2640 *Technical and medical sales professionals (excluding ICT)*, which seems to be suited to capture the technical sales occupations.
- **Sweden:** has the Standard för svensk yrkesklassificering (SSYK) (most recent version is SSYK2012), based on ISCO08. In this classification, we found a number of related occupations (3322) such as *Försäljningsansvarig, företagsförsäljning produkter och tjänster; Försäljningsingenjör, informations- och kommunikationsteknik; Försäljningsingenjör, teknik och medicin; Teknisk säljare and Teknisk säljare inom IT*.
- **Denmark:** DISCO, the Danish national classification is based on ISCO, the most recent version is DISCO 2008. We found some related occupations, namely 3322 *Salgsarbejde (agenter)* and 332200 *Salgsarbejde (agenter)*. Both, however, are sales agents, but the technical dimension is not mentioned specifically. Another related occupations is 243310 *Arbejde inden for teknisk salg (undtagen informations- og kommunikationsteknologi)*, in which the combination of sales and technical arises.
- **Czech Republic:** Klasifikace zaměstnání (CZ-ISCO), based on ISCO08. We could find two categories under which the occupation could fall: 2433 *Specialisté v oblasti prodeje a nákupu produktů a služeb (kromě informačních a komunikačních technologií)* and 3322 *Obchodní zástupci*. The first category captures specialists in the sale and purchase of products and services, while the second refers to sales representatives.
- **Hungary:** has HCSO/FEOR (edition 2008). The specific occupations are not closely described, however, judging from the occupation names, there are several categories that could cover the occupation. However, these categories are extremely broad, for example 319 other technical occupations or 253 sales or marketing occupations.
- **Poland:** has the Klasyfikacja zawodów i specjalności (KZiS 2014), based on ISCO08 (but it was updated more recently, 2014). In an alphabetical list, we found a number of occupations that were related to some extent, e.g. a sales representative, a sales

agent for technology and ICT, but none that seemed to fit with the occupation of interest.

In the rest of the world (US):

- **US** has SOC (last version is 2010), the occupation *41-4011 Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products* was listed, which does seem related to the occupation of a technical-commercial advisor. Another important category is *41-9000 Other Sales and Related Workers*, which includes *Models, Demonstrators, and Product Promoters* and *Sales Engineers*.
- **US** also has the **O*NET** classification where we found *41-4011.00 - Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products* (a 'green' occupation) and *41-9031.00 - Sales Engineers*. In both cases, the description of the occupation clearly combines the sales/commercial dimension with technical knowledge.

F. Conclusions

Is Technical-
Commercial Advisor
a new or emerging
occupation?

In Belgium?

On the basis of the sample of vacancies that we found, it seems that technical-commercial advisor/planner/staff member, is not a new occupation in Belgium (as it is also included in ISCO), but it certainly is an **emerging one**. The reason for this is that it seems to be particularly widespread across the economy, and there is a clear link with the occupation of commercial or sales engineer. Interestingly, it is an occupation that **combines three types of tasks** which can also be found in other occupations (in some cases, even combinations of these tasks arise): administrative, sales/commercial and technical tasks. In that sense, the occupation of a technical-commercial advisor definitely is an interesting occupation to track, because it seems likely that an increasing set of occupations will combine technical with other types of tasks and responsibilities – due to technological change.

This finding will also have clear repercussions for the **education system** and policy-makers. Educational institutes have to keep in mind that many positions increasingly comprise technical tasks, which require at least some level of understanding and technical knowledge (which knowledge depends on the industry). On the other hand, traditionally 'technical' positions may increasingly demand 'non-technical' skills as well, e.g. non-cognitive skills, a service-oriented mind-set, excellent communication skills; this is another point that could greatly influence how young people are trained for the labour market. The fact that both sets of skills are

	becoming more and more intertwined and demanded should be an important issue that educational institutes address.
In Europe?	In other parts of Europe, similar vacancies and occupations were found, which suggests that in Europe the occupation is not new but emerging. Similar conclusions are reached as for the case of Belgium (again we find the occupation or related occupations in the existing occupational classification), although in some cases interesting differences do arise, e.g. the very strong focus on language skills in certain countries, the fact that in certain countries more emphasis is put on the sales dimension rather than the technical side.
Worldwide?	Similarly, the results for countries outside Europe suggest that the occupation is not new but emerging. In the vacancies for the United States, it is striking how demanding they are. In terms of skills, requirements, tasks and responsibilities, the occupations are rather similar.

Drug Safety Specialist

Date: 3 November 2015

A. Identification

The identification of new occupations, such as the drug safety specialist presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regularly intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In July 2015, a new tag was added to the **Slovakian** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for a **drug safety specialist** on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	October 2015
On which online job board was the tag/vacancy published?	profesia.sk
Which country is covered by this job portal?	Slovakia
In which industry is the employer active?	pharmaceuticals
What type of employer has posted the vacancy?	private company

We found overall three job vacancies on the Slovakian job portal under the searched category of drug safety specialist. Only one of these jobs consisted only of this one category (Safety Manager); the other two consisted of more categories (Quality Manager/Responsible Pharma and Pharmacist). Consequently, we will be primarily referring to the found job vacancy of “Safety Manager” when talking about drug safety specialist since this specific vacancy was the most narrowly defined in terms of chosen categories. Further in the text we will provide more specific elaboration on similarity of the other two mentioned vacancies with the occupation of drug safety specialist.

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • Complex responsibility for managing safety-related activities based on the legislative requirements within the local affiliate • Representing the local safety function on behalf of the country in interactions with regulatory agencies and senior management • Ensuring local compliance with pharmacovigilance requirements in accordance with local regulations and procedures • Active monitoring local/regional operating performance and adverse events reporting • Maintain up-to-date knowledge and compliance with local safety regulations for country • Ensuring the training of local staff regarding the adverse reporting obligations • Ensuring that local processes, strategies and initiatives are aligned with safety defined by the company • Intensive contact with International Safety group • Acting as a contact person for regional safety inspections and audits • Reporting to Regional Safety Lead
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • At least a bachelor’s degree in pharmacology or life science • Fluent English • Minimum five years of previous related experience with safety and pharmacovigilance processes • Deep understanding of local pharmacovigilance requirements and practices • Ability to work with significant autonomy • Ability to understand and communicate scientific information • Ability to build strong business relationships • Demonstrated problem-solving abilities • Excellent organisational and communication skills
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • Safety Manager tags: Drug Safety Specialist • Quality Manager tags: Drug Safety Specialist, Pharmacist, Regulatory Affairs Manager, Regulatory Affairs Specialist • Pharmacist: Drug Safety Specialist, Clinical Data Manager, Pharmacist, Pharmaceutical Laboratorian, Medical Advisor

B. Definition, responsibilities and tasks

1. Definition

What is “Drug Safety Specialist”?

Drug Safety Specialist is mainly concerned with pharmacovigilance. According to the World Health Organization, pharmacovigilance comprises activities related to “detection, assessment, understanding and prevention of adverse effects or any other drug-related problem”. It is possible to perform this occupation at the clinical level which involves primarily scientific activities in drug research and, secondly, on the administrative level where an individual supervises accordance of processes with internal and external regulations. Needless to say, it is common to find the interconnection of these two aspects, especially abroad. However, in case of Slovakia we have not found the clinical aspects of this occupation in the job vacancies such as scientific involvement in clinical trials. As a result, the majority of the workload of the drug safety specialist in Slovakia consists of communicating with and reporting to state regulatory agencies. Moreover, the drug safety specialist might also operate as an *auditor* for supervising internal regulations on behalf of company management or an international institution.

Examples of job titles:

- *abroad*: Drug Safety Specialist, Clinical Drug Safety Specialist, Product Safety Specialist
- *in Slovakia*: Safety Manager, Quality Manager/Responsible Pharma

More information about the specifics of drug safety specialist occupation, i.e. pharmacovigilance may be found on:

- *Wikipedia*: <https://en.wikipedia.org/wiki/Pharmacovigilance>
- *World Health Organization*: www.who.int/medicines/areas/quality_safety/safety_efficacy/pharmvigi/en/

Is this position related to any existing occupations?

Drug safety specialist combines responsibilities of other similar occupations. It is especially related to *regulatory affairs occupations* and *compliance occupations*, such as regulatory affairs manager, regulatory affairs specialist, corporate regulatory affairs specialist, regulatory affairs officer, compliance officer, compliance specialist, etc. The duties of the regulatory affairs and compliance occupations are specified as analysing local regulations, supervising and ensuring that company’s processes are in compliance with local and international law. However, drug safety specialist is closely concerned with the pharmaceutical sector in comparison with other compliance and regulatory affairs occupations which do not have to be necessarily concerned solely with pharmaceuticals. Furthermore, the clear distinction between regulatory affairs/compliance specialist and drug safety specialist in the pharmaceutical industry seems to be the drug safety specialist’s specifically defined interest with processes concerned with pharmacovigilance regulations only.

How prevalent is the occupation of a Drug Safety Specialist in Slovakia?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise:

Job portals

- Profesia.sk: three vacancies for the entry “Drug safety specialist”
- Inzerciapraca.sk: zero vacancies for the entry “Drug safety specialist”
- Kariera.zoznam.sk: zero vacancies for the entry “Drug safety specialist”
- Inzeraty.sme.sk: zero vacancies for the entry “Drug safety specialist”
- Praca.bazos.sk: zero vacancies for the entry “Drug safety specialist”
- Ponuky.sk: zero vacancies for the entry “Drug safety specialist”

Google Search (limited to .sk websites):

- Drug safety specialist: about 4,700 results,
- “Drug safety specialist”: about 2,600 results,
- Compliance specialist: about 3,800 results
- Pharmaceutical compliance specialist: about 4,600 results
- Regulatory affairs: about 10,000 results
- Regulatory affairs specialist: about 4,500 results
- Pharmaceutical regulatory affairs: about 12,000 results

2. What are the responsibilities and tasks of a drug safety specialist?

This information is obtained from a sample of job vacancies, extracted from job portals (for Slovakia)

As was mentioned before, the search mechanism on Slovak job portal profesia.sk is based on tags – categories which we also used. Using the tag “drug safety specialist”, we found three vacancies. Only one of these vacancies, “safety manager”, was solely concerned with pharmacovigilance and consisted of only one category, which was searched. The other two vacancies consisted of more categories and were minimally concerned with pharmacovigilance.

- First, the job advertisement for “pharmacist” was not concerned with pharmacovigilance at all; moreover, this job could be identified as a standard drug dispenser job in public pharmacy. It seems that the advertiser inserted the tag “drug safety specialist” mistakenly into the advertisement.
- Second, the job advertisement for “Quality manager/Responsible pharma” included “drug safety specialist”, too; however, we found no pharmacovigilance aspect in the tasks and responsibilities. The only part of the advertisement explicitly mentioning pharmacovigilance was the requirements section, where the applicants were required to have regulatory/drug safety experience. Other than that, this job vacancy can be identified as a vacancy for a head drug dispenser with management responsibilities.

As a consequence, in the following sections we will be working with the advertisement for “safety manager”, since this ad was almost exclusively concerned with pharmacovigilance, regulatory and compliance tasks.

- In general, tasks and responsibilities are closely related to those of *regulatory affairs* and *compliance occupations*. They include maintaining compliance with local drug safety regulations and regular filing of reports to local regulators.

- Ensuring that processes are aligned with internal regulations. At the same time serving as a contact person for inspections and audits. Consequently, we can see aspects of the *auditor's occupation*.
- The tasks also include intensive cooperation with international safe regulation bodies, such as International Safety Group.
- We also notice the requirement of *training/coaching* skills, which are required to provide trainings for local staff with regard to the adverse reporting obligations.

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Slovakia)

Formal education required

Is formal education required?	yes
Level of education	tertiary education: bachelor's degree
Field of education	pharmaceutical education

Skills required

Communication skills	excellent communication skills, fluent English in written and spoken form
Computer skills	not required/not specified (in Slovakia)
Non-cognitive skills	ability to work with significant autonomy, ability to understand and communicate scientific information, ability to build strong business relationships, demonstrated problem-solving abilities, excellent organisational skills
Occupation-specific skills	deep understanding of local pharmacovigilance requirements and practice

Experience required

Is experience required?	minimum two to five years of previous related experience with safety and pharmacovigilance processes
Is job-related experience required?	yes, previous experience in the sector, experience in communication with local regulators

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:

In case job descriptions (tasks, requirements) differ significantly in the predefined clusters of countries (WE, SE, CEE, NE), we will present them separately.

Similar vacancies in Western Europe

France	<i>Pharmacien(ne) assurance qualité, Responsable assurance qualité, Pharmacien responsable assurance qualité, Responsable de l'assurance qualité</i>
Germany	<i>Apotheker als stellv. Leiter Qualitätskontrolle, Global Quality Auditor, Manager Drug Safety – Pharmacovigilance, Medical Manager Drug Safety, Drug Safety Manager</i>
The Netherlands	<i>Drug Safety Manager, Regulatory affairs officer, Drug Safety and Quality Officer, Pharmacovigilance Liaison Manager</i>
UK	<i>Drug Safety Associate, Drug Safety Manager, Drug Safety Officer, Drug Safety Specialist, Drug Safety Physician</i>
Belgium	<i>Regulatory Affairs Officer/Regulatory Affairs Specialist (with explicit aim at pharmacovigilance and safety, pharmaceutical development and quality, and other regulatory affairs and operations)</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES	<p>Tasks/Responsibilities: ensuring that products and processes comply with national and international regulations, preparing documentation for regulatory bodies, managing and participating in the implementation of the quality system, conducting quality audits, managing quality trainings and staff qualifications</p> <p>Requirements:</p> <ul style="list-style-type: none"> - scientific or medical university degree - in most of the cases experience in the related field is required (could be substituted by a PhD degree in one case) - knowledge of national and international regulations

Similar vacancies in Southern Europe

Italy	<i>Medico Farmacovigilanza, Drug safety officer, Addetto alla farmacovigilanza, Drug Safety Specialist, Drug Safety Physician</i>
Spain	<i>Responsable de Calidad Sector Químico, Especialista en Farmacovigilancia</i>

<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES</p>	<p>Tasks/Responsibilities: identification of adverse effects, following national and international regulations, communication and collaboration with regulators, providing pharmacovigilance reports resulting from clinical trials, providing pharmacovigilance trainings for the staff, ensuring the maintenance of product quality and quality system</p> <p>Requirements:</p> <ul style="list-style-type: none"> - Degree in medicine, biology, pharmacy, biotechnology or other life science - Experience in pharmacovigilance (some jobs had this requirement preferred but not required) - Knowledge of current legislation
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Similar vacancies in Northern Europe

Denmark	<i>-Pharmacovigilance Policy Expert</i>
Sweden	<i>Regulatory Affairs Konsulter</i>
<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? PARTLY</p>	<p>Tasks/Responsibilities:</p> <p>-DK: reviewing new global pharmacovigilance regulatory guidelines, performing the impact assessment on global safety procedures, writing reports for external regulators and relevant internal departments</p> <p>-SWE: to serve as a contact person for regulation affairs with authorities</p> <p>Requirements:</p> <ul style="list-style-type: none"> - master's degree in pharmacy or other relevant life science - previous experience in the pharmaceutical sector

Similar vacancies in Central and Eastern Europe

Czech Republic	<i>Drug Safety Associate</i>
Hungary	<i>Gyógyszerbiztonsági munkatárs - Adatmenedzsment területre (Drug Safety Associate - Data Management area, MinŐségbiztosítási auditor - Gyógyszeripar (Quality Assurance Auditor - Pharmaceuticals),</i>

	Gyógyszerbiztonsági Koordinátor (Pharmaceutical Product Safety Coordinator)
Poland	None found
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? PARTLY	<p>Tasks/Responsibilities:</p> <p>CZ: development project specific reporting procedures, workflows and templates; support project specific safety database set-up, development of data entry guidelines, and user acceptance testing; electronic documentation and quality control of drug safety information; coding of data in the safety database and writing case narratives</p> <p>HU: drug safety data processing, keep track of current regulatory and corporate standards in pharmacovigilance, participation in drug safety audits and inspections, IT support for drug safety database; determination of the completeness of single case reports, confirmation of the accuracy of medical coding</p> <p>Requirements:</p> <ul style="list-style-type: none"> - degree in pharmacy, nursing, life science or other health-related field - appropriate previous experience - ability to interpret and apply global safety regulations - IT skills – database management, MS Office (partly in Hungary)

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *Drug Safety Specialist*, *Clinical Drug Safety Specialist*, *Safety and Pharmacovigilance Specialist*, *Drug Safety Associate* and *Senior Drug Safety Specialist*.

Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Slovakia? **PARTLY**

- **Tasks/Responsibilities:** are relatively similar to those for Slovakia when it comes to interaction with regulators. Processes related to drug safety not only have to be in compliance with national and international regulation standards but also with internal standards. Duties and responsibilities also include training of staff, reviewing and filing drug safety reports. These tasks are congruent with the tasks described in Slovakian ads. On the other side, Slovakian ads do not explicitly mention clinical trial involvement. Especially in the US ads, clinical drug safety specialists are required to provide clinical trial support and actively cooperate on the methodology, coding and inspection of the products even in the clinical trial testing. The main difference between clinical drug safety specialist and drug safety specialist is that the drug safety specialist's work is mainly based on reports and data provided by clinical trials team

while the clinical drug safety specialist is actively involved in the development of the drug during the clinical trials.

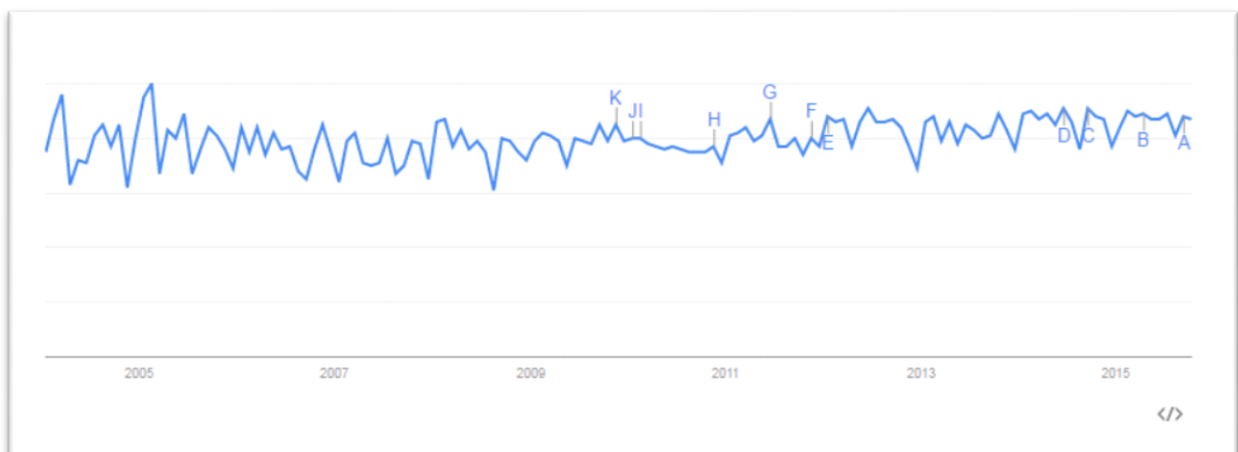
- **Requirements:** are rather similar to Slovakian advertisements. Pharmaceutical, medical or other life science education is required. Almost all vacancies require experience in a similar role and sector. The usual length of required experience in the related field is two to five years. Furthermore, excellent knowledge of local, national and international regulations is necessary. Non-cognitive skills required around the world are often: analytical thinking, organisational skills, ability to work both independently and in a team and strong ability to work with scientific information. Moreover, excellent communication skills are required, as well as fluent English with understanding of medical/pharmaceutical/scientific terminology.

3. A Google Trends Analysis

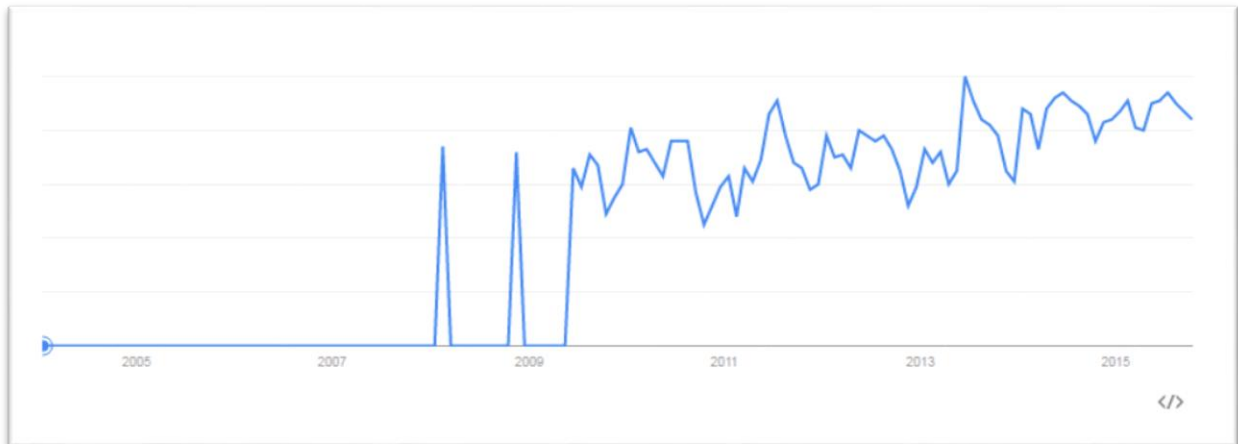
An analysis on the basis of Google Trends reveals the following patterns (see graphs, global):

We can notice that pharmacovigilance, i.e. drug safety, fluctuates around the stable values. Even though a sudden rise in pharmacovigilance in recent years is not apparent, it can be deduced from the graph Google Trends 2 that the term “pharmacovigilance jobs” has been constantly on the rise since 2009. Before this year, there was almost no interest in pharmacovigilance jobs in via Internet browsing. Furthermore, when looking at the graph Google Trends 3, we can see brief, sharp rises in 2014 and 2015 in the worldwide Internet search for the job “Drug Safety Specialist”. As a result, we can assume that this occupation has recently emerged as part of the recent, gradual rise of the pharmacovigilance sector.

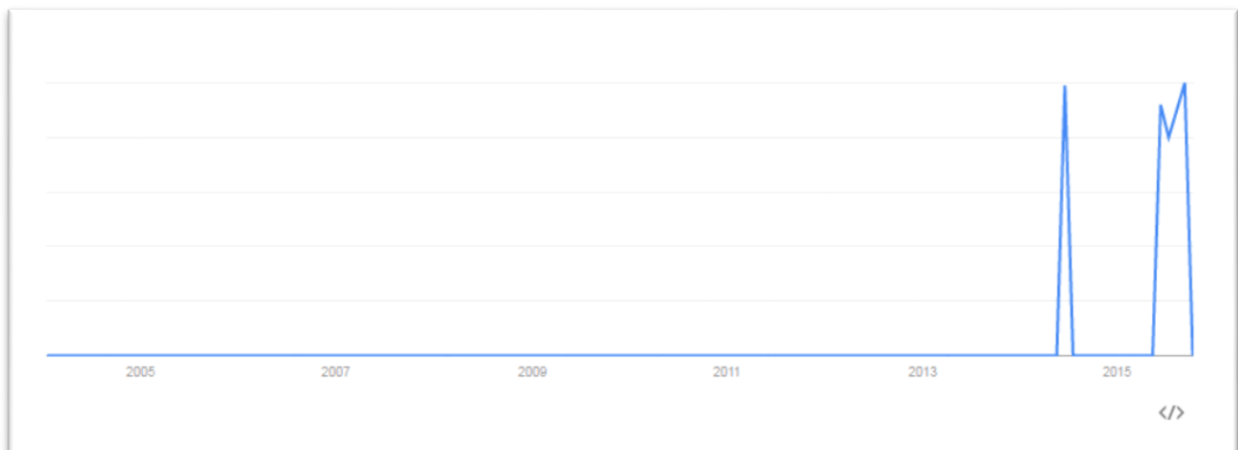
Google Trends 1: “Pharmacovigilance” worldwide (30/10/2015)



Google Trends 2: “Pharmacovigilance jobs” worldwide (30/10/2015)



Google Trends 3: “Drug Safety Specialist” worldwide (30/10/2015)



E. Occupational classification

1. International classifications

ISCO 08: As was mentioned in the Google Trends Analysis above, pharmacovigilance jobs started emerging in 2009; furthermore, specifically “drug safety specialist” started to show up only in 2014. As a result, there is not any separate category for these occupations created in the ISCO classification from 2008. Consequently, we determined which categories at least partly cover the aspects of the drug safety specialist occupation.

Where could this occupation fit in the ISCO08 classification?

- 3141 “Life Science Technicians (excluding Medical)” – this category is especially suitable for more clinically oriented pharmacovigilance jobs, as Life Science Technicians are primarily concerned with aspects of research.

- 2262 “Pharmacists” – this category only partially covers pharmacovigilance occupations since pharmacovigilance jobs are not involved in drug dispensing. On the other side, pharmacists are in this category’s definition also concerned drug safety and drug standards.

ESCO: It does not appear to exist separately in the ESCO classification.

Where could this occupation fit in the ESCO classification?

- “Drug Inspector” – according to ESCO, this classification also has the 2262 ISCO code, which is “pharmacist”. Additionally, skills and competences described in ESCO are related to a drug safety specialist’s tasks and responsibilities. For instance, supervision of medical products, clinical testing and, partly, laboratory analysis.

2. National classifications

Slovakia: the national classification in Slovakia is based on ISCO08 and is fully compatible with it.

In Europe⁴:

- **France:** PCS and PCS-ESE, however, occupation is not included there (the last update of this national occupational classification was in 2003).
- **Germany:** Klassifikation der Berufe (KB) (most recent version is 2010), occupation is not included.
- **Belgium:** based on ISCO (from 2011 onwards).
- **The Netherlands:** based on ISCO (Central Bureau for Statistics, from 2013 onwards).
- **UK:** SOC (most recent version is 2010), drug safety specialist could be included in the category 2642 Quality assurance and Regulatory professionals where these occupations are listed: Compliance manager, Quality assurance manager, Quality manager.
- **Italy:** has the Classificazione delle professioni (CP, most recent version 2011, an update of CP2001 and adapted to ISCO08), however, there is no relevant category for drug safety specialist.
- **Spain:** has the Clasificación Nacional de Ocupaciones 2011 (CNO-11). The closest classification that suits drug safety specialist is category 3204 Chemical and Pharmaceutical Supervisors. However, this category is sorted under 320 Mining, manufacturing and construction supervisors and since the categories in Spanish occupational classification are not defined more specifically we cannot certainly determine whether the mentioned category is suitable for drug safety specialist.
- **Denmark:** DISCO, Danish national classification based on ISCO, most recent version is DISCO 2008. We have not found any appropriate category for drug safety specialist.
- **Sweden:** has the Standard för svensk yrkesklassificering (SSYK) (most recent version is SSYK2012), based on ISCO08. It does not seem to include the drug safety specialist occupation or similar category.

⁴ For countries with the yellow background Google Translate was used, because an English version was not available. We recommend checking the stated facts by the native speaker.

- **Czech Republic:** Klasifikace zaměstnání (CZ-ISCO), based on ISCO08. No relevant category for drug safety specialist was found.
- **Hungary:** has HCSO/FEOR (edition 2008). The specific occupations are not closely described, but judging from the occupation names, 3135 Quality assurance technician could include some of the working aspects of drug safety specialist.
- **Poland:** has the Klasyfikacja zawodów i specjalności (KZiS 2014), based on ISCO08 (but it was updated more recently, 2014). In an alphabetical list, a similar occupation was found: 242208 *Inspektor farmaceutyczny* (Pharmaceutical Inspector). This occupation most likely involves some aspects of the drug safety specialist occupation such as supervising drug safety standards.

In the rest of the world (US):

- **US** has SOC (last version is 2010), however, drug safety is not specifically defined in this classification. Other similar occupation in the US SOC is 13-1040/1 *Compliance officer*.
- **US** also has the O*NET classification where the specifically named occupation “drug safety specialist/manager/etc” cannot be found; however, the agenda of this occupation can be found in the category 13-1041.07 *Regulatory Affairs Specialists* which includes occupations such as *Drug Regulatory Affairs Specialist, Quality Assurance/Regulatory Affairs Specialist*. These occupations fulfil the definition of drug safety specialist to a great extent. Moreover, this occupation is also labelled a “**Bright Outlook**” occupation (in the category “new and emerging”), i.e. occupations expected to grow rapidly in the next several years, will have large numbers of job openings, or are new and emerging occupations.

O*NET summary of regulatory affairs specialists: Coordinate and document internal regulatory processes, such as internal audits, inspections, license renewals, or registrations. May compile and prepare materials for submission to regulatory agencies.

F. Conclusions

Is Drug Safety Specialist a new or emerging occupation?

In Slovakia?

We assess that the occupation drug safety specialist is relatively new and emerging in Slovakia. Even though similar occupations have existed a long time in Slovakia, new pharmacovigilance jobs like drug safety specialist merged tasks and responsibilities from them and narrowed them to a specific objective, which is its dedication to drug safety legislation. Similar occupations are regulatory affairs and compliance jobs aimed at the pharmaceutical sector. Nevertheless, as has been mentioned, the added value of drug safety specialist for the job market in Slovakia is its very narrow specialisation in pharmacovigilance. Moreover, it can be assumed that this sector has extensive growth potential. More specifically, we found only one current

advertisement which was exclusively dedicated to drug safety; however, it lacked a clinical aspect, i.e. active involvement in research – clinical trials. As will be described below, in comparison with Slovakia, drug safety occupations abroad are also focused on the active role of the individual and his supervision of the pharmaceutical research and development, whilst in Slovakia the current advertisement is almost solely focused on communication with regulators, maintaining compliance with drug safety regulations and staff training. As a consequence, it can be expected that more pharmacovigilance will start emerging in Slovakia with active involvement in clinical trials because the current requirements for pharmacovigilance jobs in Slovakia demand only understanding scientific information from clinical trials and further working with it.

What is the impact on training? What are the skills implications?

First of all, promising candidates for pharmacovigilance jobs have to have excellent English language skills, especially regarding pharmaceutical terminology, since all the major employers are supranational pharmaceutical corporations. Additionally, while knowledge of national regulations is required, flawless knowledge of international regulations is requested. Secondly, cross-sectional skills from pharmaceuticals, law, computer, database, and statistics are starting to be demanded abroad; as a result, we can anticipate the same trend in Slovakia. As for now, pharmaceutical or other life sciences education is required with quite extensive previous field experience which we assume ensures knowledge of relevant regulatory legislation. Statistical and database skills should also be developed, as we can notice from the abroad experience that one of the tasks of pharmacovigilance occupations might be data processing. One of the solutions for this growing job market seems to be introduction of new study programmes aimed directly and solely at pharmacovigilance, which we already noticed in other countries.

For instance: www.postgraduatesearch.com/university-of-hertfordshire/52981048/postgraduate-course.htm.

In Europe?

Similar conclusions can be drawn in Southern, Central, Northern, Eastern, and, in part, Western Europe as those in Slovakia. However, we found no separate occupational classification in national classifications for pharmacovigilance jobs across the studied European countries. On the other side, we can still consider drug safety occupations as new and emerging and see them showing up in a lot of variations in terms of specialisation,

	<p>e.g. data management, regulatory affairs, research and development involvement, or a combination thereof. In terms of Europe, most job advertisements for drug safety occupations were in Western Europe. For instance, we found no job offer for drug safety/pharmacovigilance specialists in Poland. Requirements and tasks are similar to those in the Slovakian ad, though we notice explicit mentions of clinical trial involvement and clinical data-processing and management (Hungary and, in part, Czech Republic). On the other hand, the overwhelming majority of tasks and responsibilities across Europe was still dedicated to regulatory affairs and compliance maintenance with external regulations.</p>
Worldwide?	<p>In comparison with all the other studied countries, pharmacovigilance jobs seem to be most on the rise in the US. We found a large number of US advertisements for various forms of pharmacovigilance jobs. We could clearly distinguish orientation, whether toward regulatory affairs or research and development, e.g. clinical trials. Both variations or a combination thereof require pharmaceutical education, but in the case of regulatory affairs the stress is placed on pharmaceutical regulation knowledge while clinical drug safety specialists require a more extensive scientific background. Moreover, the US is the only studied country that included in its national occupational classification, O*NET, <i>Regulatory affairs specialist</i>, which includes <i>Drug Regulatory Affairs Specialist</i>, <i>Quality Assurance/Regulatory Affairs Specialist</i>.</p>

Spa Therapist

Date: 3 November 2015

A. Identification

The identification of new occupations, such as the Spa therapist presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regularly intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In July 2015, a new tag was added to the **Slovakian** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for a **spa therapist** on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	September 2015
On which online job board was the tag/vacancy published?	profesia.sk
Which country is covered by this job portal?	Slovakia
In which industry is the employer active?	Wellness, sport
What type of employer has posted the vacancy?	private company

We found overall five active job vacancies on the Slovakian job portal under the searched category of spa therapist. The first one appeared on 30 September.

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • Providing various forms of massages • Health, beauty and cosmetics consulting • Cosmetics selling • Maintaining smooth running of wellness facility along with keeping it clean
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • At least high school education with school leaving exam (Maturita exam) • Most of the employers require at least one year of previous experience in wellness industry • Language skills (English required, German is welcome) • Sometimes various massaging certificates are required
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • Cosmetician, Masseur, Pedicurist, Manicurist, <u>Spa therapist</u>

B. Definition, responsibilities and tasks

1. Definition

What is "Spa Therapist"?

A spa therapist is concerned with providing wellness services such as massages, pedicures, manicures, skin care, and other health and beauty treatments. Additional responsibilities include maintaining the proper operation of the wellness facility (including booking) and its tidy appearance, i.e. cleaning. Furthermore, spa therapists can specialise in providing only one of the named wellness treatments or in providing a combination of them. It is fair to say that the responsibilities and tasks of spa therapists heavily depend on the size of the company they are working in. Moreover, spa therapists in bigger companies tend to specialise in specific activities such as hair treatment, consulting, massage, skin care, manicures/pedicures, whilst spa therapists in smaller companies have to provide a greater variety of services. However, the main part of spa therapist's job in Slovakia seems to be massage. In the huge majority of advertisements, employers require previous experience in massage and every found job vacancy in Slovakia included the duty of providing massages. Consequently, the meaning of the occupation spa therapist is an indication of a place of work which is a wellness facility where many health and beauty treatments are provided, but not necessarily by one person.

Examples of job titles: Spa therapist, Wellness worker, Masseur, Cosmetician, Pedicurist, Manicurist.

More information about the specifics of the spa therapist occupation may be found on:

-Wikipedia: <https://en.wikipedia.org/wiki/Spa>

-Wisegeek: www.wisegeek.com/what-does-a-spa-therapist-do.htm

Is this position related to any existing occupations?

As was already mentioned, spa therapist seems to merge several wellness occupations which are thus provided by one person in one facility. In larger companies, spa therapists usually specialise in specific fields, but the whole bundle of health and beauty treatments is still provided in one facility. As a result, related current occupations to spa therapist are, for example, *masseur, beauty/health consultant, cosmetician, pedicurist, manicurist, wellness worker, hair dresser, etc.*

How prevalent is the occupation of a spa therapist in Slovakia?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise:

Job portals

- Profesia.sk: five vacancies for the entry "Spa therapist" (SK: spa terapist)
- Inzerciapraca.sk: zero vacancies for the entry "Spa therapist"
- Kariera.zoznam.sk: zero vacancies for the entry "Spa therapist"
- Inzeraty.sme.sk: zero vacancies for the entry "Spa therapist"
- Praca.bazos.sk: zero vacancies for the entry "Spa therapist"
- Ponuky.sk: 0 vacancies for the entry "Spa therapist"

Google Search (limited to .sk websites):

- spa terapist: about 1,090 results
- "spa terapist": about 1,060 results
- Spa therapist: about 2,600 results
- "Spa therapist": about 720 results
- Spa terapia: about 36,100 results
- "Spa terapia": about 1,530 results
- Spa therapy: about 8,600 results
- "Spa therapy": about 1,090 results

2. What are the responsibilities and tasks of a spa therapist?

This information is obtained from a sample of job vacancies, extracted from job portals (for Slovakia)

As was mentioned before, the search mechanism on the Slovak job portal profesia.sk is based on tags - categories which we also used. Using the tag "spa therapist" we found five actual vacancies from which we extracted tasks and responsibilities.

We can distinguish two groups of spa therapist duties. Firstly, administrative and maintenance duties (client booking, receptionist's duties, cleaning, product-selling, etc.) and secondly, providing spa therapy services such as massages, beauty and health consulting and other treatments.

- Regarding administrative and maintenance duties: the spa therapist has to make sure all the facility's services are running correctly (saunas, pools, whirling bathtubs, etc.)

and clean, and that clients' needs are met. Duties and responsibilities also include booking new clients, providing information and selling cosmetic products.

- Regarding spa services: the spa therapist has to provide various beauty and health treatments, including consulting. A spa therapist can be specialised in one or more fields. Duties include massages, hair treatments, pedicures, manicures, cosmetic treatments, and health and beauty consultations.

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Slovakia)

Formal education required

Is formal education required?	Yes
Level of education	High school with school leaving exam (Maturita exam)
Field of education	Not specified. Sometimes massage and other courses are required.

Skills required

Communication skills	Excellent communication skills, fluent spoken English, knowledge of German language is welcome
Computer skills	Not required
Non-cognitive skills	Ability to work with both significant autonomy and in a team, excellent organisational skills, responsibility
Occupation-specific skills	Knowledge of various massage/health and beauty treatments

Experience required

Is experience required?	Mostly minimum experience of one year is required
Is job-related experience required?	Yes, experience with massage or other related activities

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:

In case job descriptions (tasks, requirements) differ significantly in the predefined clusters of countries (WE, SE, CEE, NE), we will present them separately.

Similar vacancies in Western Europe

France	<i>We only found similar occupations under the tags masseur, masseur-physiotherapist</i>
Germany	<i>We only found similar jobs like hairdresser, masseur, cosmetician, etc., under the category of "personal/body care" (Körperpflege) on the German job portal. Via Google we found an offer for "Spa Therapeut"</i>
The Netherlands	<i>Spa therapist, Massage therapist, Beauty Specialist</i>
UK	<i>Spa therapist, Holistic/Beauty therapist, Massage therapist, Sports therapist</i>
Belgium	<i>Massage Therapist, Holistic Spa Therapist</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES	<p>Tasks/Responsibilities: performing massages and specific medical and relaxation treatments, relaxation and rehabilitation consulting, preparation and maintenance of the facility</p> <p>Requirements:</p> <ul style="list-style-type: none"> -education of masseur or physiotherapist -additional certificates -previous experience in the field -fluent English

Similar vacancies in Southern Europe

Italy	<i>Spa therapist, Estetista</i>
Spain	<i>Spa terapeuta</i>
Do these vacancies involve similar tasks and have similar requirements as the	<p>Tasks/Responsibilities: providing various facial and body massages, new techniques of treatments like ultrasound and pulsed light, beauty and health consulting, promotion and selling of products, maintaining and cleaning the facility</p>

vacancies for Slovakia? YES	Requirements: <ul style="list-style-type: none"> - High school diploma, vocational training - Experience in massages, pedicure/manicure with a certificate - Good knowledge of English
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Similar vacancies in Northern Europe

Denmark	<i>-Spa therapist</i>
Sweden	<i>-Spa therapist, Skin therapist, Massage therapist, Esthetician</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES	<p>Tasks/Responsibilities: facial and body treatments, providing other spa activities, health and beauty consulting</p> <p>Requirements:</p> <ul style="list-style-type: none"> - Relevant educational background (masseur course, cosmetician course, etc.) - English knowledge - Experience in the field

Similar vacancies in Central and Eastern Europe

Czech Republic	<i>Spa therapist, Saunový mistr</i>
Hungary	<i>We found only offers for masseurs</i>
Poland	<i>Praca terapeuta Spa, Spa therapist, Therapeut</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES	<p>Tasks/Responsibilities: providing beauty and health treatments (massages, pedicures, manicures, saunas, etc.), quality assurance of provided services, maintaining rooms</p> <p>Requirements:</p> <ul style="list-style-type: none"> - English and/or German - Previous experience in the field - Certificate of qualification - Sometimes vocational training is required or alternatively bachelor's/master's degree in physiotherapy

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *Spa therapist, Massage therapist*.

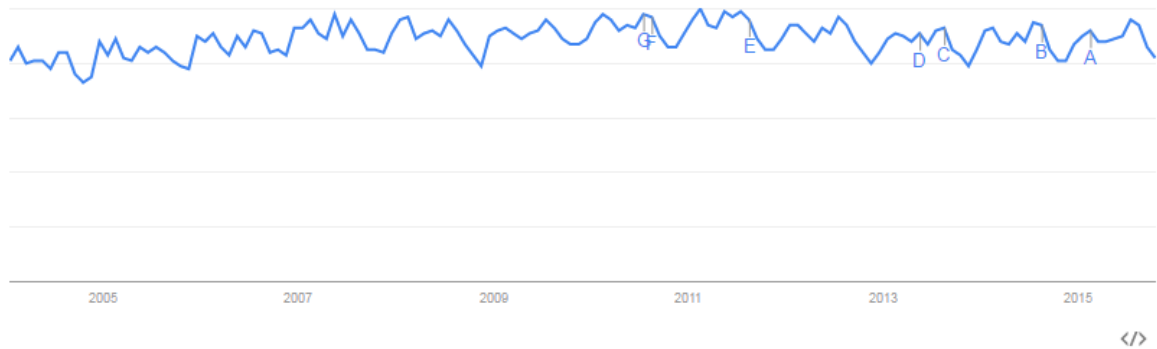
Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Slovakia? **YES**

- **Tasks/Responsibilities:** are relatively similar to those for Slovakia. Tasks are divided into several categories, as in Slovakia. First, spa therapists have to take care of the tidiness and maintenance of facility rooms; second, they have to actively help customers by choosing the best products, promoting products and other consulting. Finally and mainly, spa therapists have to offer the spa services such as various health and beauty treatments. In comparison with Slovakia, the job vacancy requirements in the US do not focus on providing mainly massages; techniques like aromatherapy, music therapy and reflexology are also mentioned. Another crucial difference was that the job vacancies for spa therapists in the US were more oriented toward recent graduates. US employers would provide all training for the job.
- **Requirements:** As was already mentioned, the main difference between the US and European jobs is the requirement of previous experience. US vacancies were more oriented toward recent graduates whilst the European vacancies mostly required previous experience. Furthermore, US vacancies were more targeted toward non-cognitive skills and character traits, such as: honesty, openness, transparency, integrity, pleasant demeanour, outgoing, courteous, approachable, self-confident, mature, positive attitude, etc. On the other hand, we also found job offers in the US which required previous experience, but not to the same extent as that in Europe, where almost every job vacancy required previous experience and/or formal education. US vacancies mostly did not require any formal education.

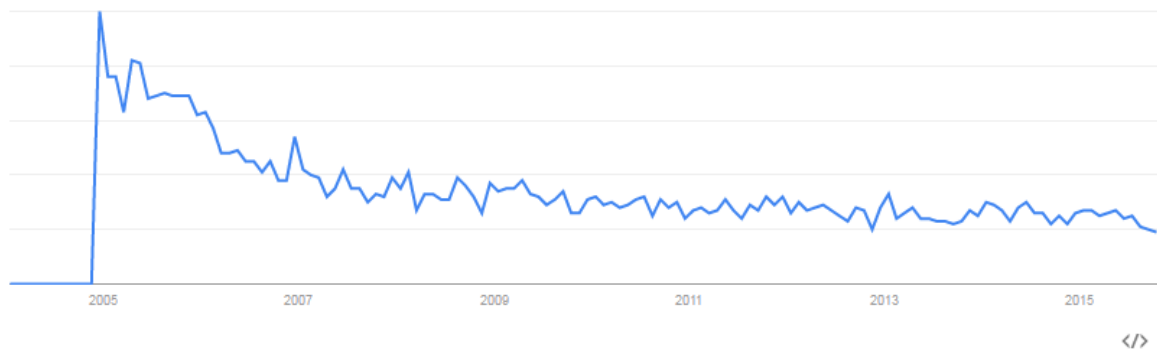
3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global): We notice that the term “spa” fluctuates around the stable values in web searches. Even though the term “spa” has quite a stable position in terms of interest, as we can see in the graph 2 below, “spa therapy” is currently steadily falling to its lowest point. On the other side, we can notice the steady rise in the interest for the job “spa therapist”. Spa therapy and spa therapist occupations are, according to the graphs below, relatively new targets of interest in terms of web searches, given we notice their emergence in 2005 and 2007, respectively. On the basis of the trend pictured in graph 3, we can expect rising interest in the spa therapist occupation in the future.

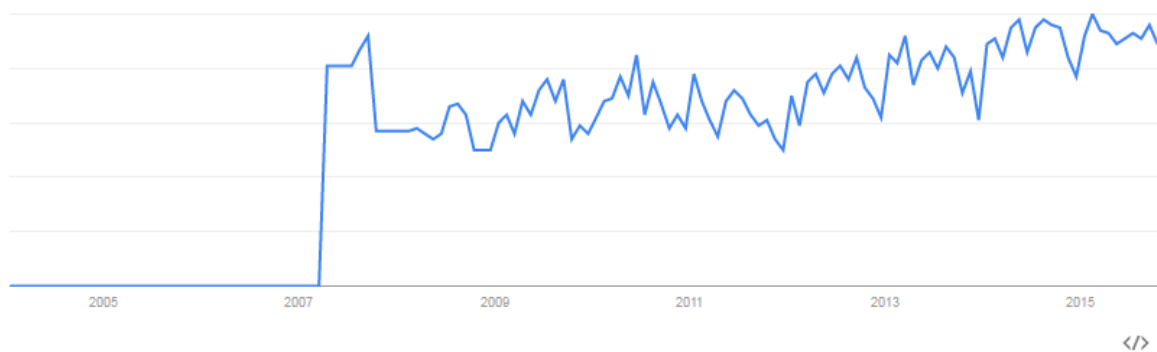
Google Trends 1: "Spa" worldwide (3/11/2015)



Google Trends 2: "Spa therapy" worldwide (3/11/2015)



Google Trends 3: "Spa therapist" worldwide (3/11/2015)



E. Occupational classification

1. International classifications

ISCO 08: We have not found any separate category for spa therapist, however, there are some categories which include tasks and responsibilities of the spa therapist occupation. As a result, we will state the ISCO categories under which spa therapist could be categorised.

Where could this occupation fit in the ISCO08 classification?

- 2264 “Physiotherapists” – Physiotherapists’ tasks in this category are described as follows: “to improve or restore human motor functions, maximize movement ability, relieve pain syndromes, and treat or prevent physical challenges associated with injuries, diseases and other impairments.” Their job is also to apply a “broad range of physical therapies and techniques such as movement, ultrasound, heating, laser and other techniques”, which corresponds to services provided by a spa therapist. However, this category seems to be more connected with medical aspects of treatments. Examples of this occupation are: *physical therapist, physiotherapist, geriatric physical therapist, manipulative therapist, orthopaedic physical therapist and paediatric physical therapist.*
- 3255 “Physiotherapists and related associate professionals” – This category provides a description very similar to that of the previous category, while examples of this category’s occupations are more similar to the spa therapist occupation. These examples are: *acupressure therapist, electrotherapist, hydrotherapist, massage therapist, shiatsu therapist, physical rehabilitation technician and physiotherapy technician.*
- 5142 “Beauticians and related workers” – Along with the previous category, this category suits the spa therapist’s definition the most. This category seems to be disconnected from medical aspects, as it is focused on beauty treatments. The definition of this category provided by ISCO is: “Beauticians and related workers give facial and body treatments, apply cosmetics and make-up and give other kinds of treatments to individuals in order to improve their appearance”. Additionally, tasks of this category also include arranging appointments, collecting payments, advising clients on diet and exercise, attending to clients taking baths, administering elementary, facial and body massage, providing beauty and health treatments, and beauty and health consulting. Examples of the jobs in this category are: *bath attendant, beautician, make-up artist, manicurist, pedicurist, slimming consultant.*

ESCO: It appears separately in the ESCO classification.

Where could this occupation fit in the ESCO classification?

- “Spa therapist” – The occupation of spa therapist is listed separately in the ESCO classification, which states that its equivalent in the ISCO classification is category 5142 “Beauticians and related workers”, which we described earlier as one of the possible categories.

2. National classifications

Slovakia: The national classification in Slovakia is based on and fully compatible with ISCO08.⁵

In Europe⁶:

- **France:** PCS and PCS-ESE. Similarly as ISCO, spa therapist could be included in the 432b “Massage therapists – physiotherapists” (Masseurs-kinésithérapeutes rééducateurs) and 532a “Manicures, Beauticians” (Manucures, esthéticiens).
- **Germany:** Klassifikation der Berufe (KB) (most recent version is 2010), the occupation could be classified under “Physiotherapist”, which states physiotherapists work at rehabilitation centres, hotels and wellness centres.
- **Belgium:** based on ISCO (from 2011 onwards).
- **The Netherlands:** based on ISCO (Central Bureau for Statistics, from 2013 onwards).
- **UK:** SOC (most recent version is 2010), spa therapist could be included in categories 2221 “Physiotherapists” and 6222 “Beauticians and related occupations” even though spa therapy is not directly mentioned.
- **Italy:** has the Classificazione delle professioni (CP, most recent version 2011, an update of CP2001 and adapted to ISCO08). The only possible category is again 3.2.1.2.2 – “Physiotherapists”.
- **Spain:** has the Clasificación Nacional de Ocupaciones 2011 (CNO-11). Likewise, spa therapist could fit in the categories 2152 “Physiotherapists” or 3325 “Physiotherapy assistants”.
- **Denmark:** DISCO, Danish national classification based on ISCO, most recent version is DISCO 2008. Spa therapist could be part of 2264 “Physiotherapeutic and relaxation work”, more specifically 226410 “Physiotherapists” (Fysioterapeutarbejde) or additionally, 325500 “Assistant work in physiotherapy” (Assisterende arbejde inden for fysioterapi).
- **Sweden:** has the Standard för svensk yrkesklassificering (SSYK) (most recent version is SSYK2012), based on ISCO08. The most suitable categories for spa therapist are 5143 “Masseurs and massage therapists” (Massörer och massageterapeuter), 5149 “Other beauty and body therapists” (Övriga skönhets- och kroppsterapeuter) and 2272 “Physiotherapists” (Sjukgymnaster).
- **Czech Republic:** Klasifikace zaměstnání (CZ-ISCO), based on ISCO08. A few categories possibly suiting spa therapist were found: 32551 “Physiotherapist with certification”, 32552 “Physiotherapist without certification” and 51423 “Masseurs (except professional masseurs in health care sector)”.
- **Hungary:** has HCSO/FEOR (edition 2008). The specific occupations are not closely described, however, judging from the occupation names, 5215 “Beautician”, 2224 “Physiotherapist”, 3332 “Physiotherapist assistant, masseur/masseuse” could include some of the working aspects of spa therapist.

⁵ Available at www.sustavapovolani.sk/klasifikacia-zamestnani.

⁶ For countries with the yellow background Google Translate was used, because an English version was not available. We recommend checking the stated facts by the native speaker.

- **Poland:** has the Klasyfikacja zawodów i specjalności (KZiS 2014), based on ISCO08 (but it is updated more recently, 2014). In an alphabetical list, a likely suitable category for spa therapist was found: 229201 “Physiotherapist”.

In the rest of the world (US):

- **US** has SOC (last version is 2010). The only possible categories for spa therapist are: 29-1123 “Physical Therapists”, 29-1129 “Therapists, All other” and 31-9011 “Massage Therapists”.
- **US** also has the O*NET classification where we have not found any separate category for spa therapist similar to those in the overwhelming majority of other national classifications. The closest suitable categories are 29-1123.00 “Physical Therapists” and 31-9011.00 “Massage Therapists”.

F. Conclusions

Is Spa Therapist a new or emerging occupation?

In Slovakia?

We assess that the occupation spa therapist is relatively new and emerging in Slovakia. Even though the similar occupations have existed for a long time in Slovakia, spa therapist seems to combine their tasks and responsibilities. We can notice the emergence of this occupation along with that of wellness centres which specialise in providing a complex bundle of beauty and health products, treatments and consulting. As a result, it is hard to universally state the specific services provided by spa therapists, as they change case by case. However, in general we notice a tendency to focus on massage services, especially in Slovakia. Moreover, as was stated before, in bigger wellness centres, spa therapists specialise more in one field, whilst spa therapists in smaller companies/centres tend to be more universal in terms of services provided.

In comparison with experience from abroad, we note that Slovakian employers tend to focus on skilled professionals with previous experience. Nonetheless, this seems to be the case of other European countries as well. Employers in Slovakia also require some form of qualification, i.e. formal education or certificates. We believe there are no major implications for the Slovakian educational system (formal and informal certificates), as the qualifications needed for the occupation of spa therapist are already being taught and provided. For instance, formal

	<p>education can be achieved for masseurs/physiotherapists and other informal courses/certificates can be acquired for cosmeticians, hairdressers, pedicurists, manicurists, beauty/health consultants, etc.</p>
In Europe?	<p>Similar conclusions as in Slovakia can be drawn in the rest of Europe. It is not often possible to find job vacancies by the name of “spa therapist”, but it is possible to find vacancies which comprise a spa therapist’s tasks and responsibilities. This is the instance of France and Germany. Similarly as in Slovakia, employers in the rest of Europe also require qualification in the form of certificates or formal education, as well as previous experience in the related field in the overwhelming majority of the cases.</p>
Worldwide?	<p>In comparison with all the other studied countries, we note some main differences in the US job vacancies for spa therapists. Firstly, the more explicit use of the term “spa therapist” in the job description; secondly, the US employers are more “graduate-friendly”, as they do not focus solely on candidates with previous experience or qualification. Employers in the US tend to target graduates who pass their educational and training courses. Meanwhile, the responsibilities and tasks of spa therapists in the US do not differ substantially in comparison with those in Europe.</p>

Graphic Designer

Date: 10 February 2016

A. Identification

The identification of new occupations, such as image processing engineer, presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regularly intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In **July 2015**, a new tag was added to the **French** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for a **graphic designer** on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	July 2015
On which online job board was the tag/vacancy published?	keljob.com
Which country is covered by this job portal?	France
In which industry is the employer active?	Internet/Multimedia
What type of employer has posted the vacancy?	private company

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • The graphics and execution of administrative and commercial printed materials such as business cards, letterheads, flyers, brochures, posters and catalogues • The realisation of graphic design work and various graphics for clients
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • Education/training: minimum Bac+2 • Experience in the field of printing in a press service or web design service • Good knowledge of PAO software, office and file modification software • Master the tools of the graphic chain and web design • Keen interest in new technologies and their challenges • Desired: interpersonal skills, sense of team, inquiring mind, responsiveness and sense of initiative-taking
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • Sector: Internet/Multimedia • Employment type: permanent position

B. Definition, responsibilities and tasks

1. Definition

What is “graphic designer”?

A graphic designer is a professional within the graphic design and graphic arts industry who assembles images, typography or motion graphics to create a design. A graphic designer creates the graphics primarily for published, printed or electronic media, such as brochures (sometimes) and advertising. They are also sometimes responsible for typesetting, illustration, user interfaces, or web design, or take a teaching position. A core responsibility of the designer’s job is to present information in a way that is both accessible and memorable.

Current graphic designer jobs demand proficiency in one or more graphic design software programs. Graphic designers should also have a thorough understanding of production and rendering methods. Some of the technologies and methods of production are drawing, offset printing, photography, and time-based and interactive media (film, video, computer multimedia). Frequently, designers are also called upon to manage colour in different media.

Some examples of related job titles: “graphic artist”, “graphic production”, “designer”, “web-designer”, “multimedia artists and animators”.

More information on the occupation can be found on the Wikipedia pages:

- https://en.wikipedia.org/wiki/Graphic_designer).

Is this position related to any existing occupations?

Graphic design career paths cover the creative spectrum. Graphic design is vital in the sales and marketing of products, and is an essential part of print and digital communications. Sometimes graphic designers will work in partnership with executives and managers in advertising and promotions, public relations and marketing. A number of occupations are classified under the broad term of graphic designer: creative director, art director, art production manager, broadcast designers, logo designer, visual image developer, multimedia developer, interface designer, web designer, and package designer and so on; many of these job descriptions overlap broadly.

Fifty years ago, the graphic designer's portfolio was usually a black book or large binder in which samples of the artist's best printed work were carried to show prospective clients or employers. Since the 1990s, portfolios have become increasingly digitised and now may be entirely digitised and available on the Internet, on CD, DVD, or via email.

Current graphic designer jobs demand proficiency in one or more graphic design software programs; therefore, modern graphic designers must keep up to date with the latest software and computer technologies to stay competitive.

How prevalent is the occupation of a graphic designer in France?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise:

Job portals

- keljob.com: offers eight vacancies for graphic designers (but 843 for designers in general)
- indeed.fr: offers 1,133 vacancies for "graphiste"
- monster.fr: offers 396 vacancies for "graphiste"
- stepstone.fr: offers 162 vacancies for "graphiste"

Google Search (limited to .fr websites):

- "graphiste": about 26,300,000 results
- "graphiste emploi": about 684,000 results
- "graphic designer emploi": about 610,000 results
- "dessinateur graphique emploi": about 385,000 results

2. What are the responsibilities and tasks of a graphic designer?

This information is obtained from a sample of job vacancies, extracted from job portals (for France)

- Responsibilities of graphic designers usually involve working on various types of mock-up graphics such as posters, press, POS, packaging, newsletters and websites
- Technical support on all issues related to the image such as mounting photos, clipping paths, cleaning and chromes, with very high standards, is expected
- Some vacancies post specific software to be used, e.g. PAO software, Photoshop, InDesign, Illustrator

- Creativity of effective pictures with technical and aesthetic criteria are usually demanded at a low level
- Vacancy announcements usually mention that the graphic design should be done in such a way that the communication objectives and business challenges are met and respected. In that sense, graphic designers are expected to coordinate with other units/colleagues on marketing and strategy
- Some vacancies require further technical and internal support achievements

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for France)

Formal education required

Is formal education required?	Yes
Level of education	Graduate of advanced training at the university level (Bac+2 at the least, where Bac is high school completion)
Field of education	Most of the vacancies do not specify a field of education; some require a graduate higher education in visual communications

Skills required

Communication skills	Good understanding of and listening to others to translate the decisions into a graphic/visual design, visual communication skills
Computer skills	PAO, Illustration, Photoshop, InDesign, web design, After Effects
Non-cognitive skills	Good general culture, artistic sensitivity, sense of urgency and priorities, rigour, precision, sense of organisation, availability, flexibility and adaptability, autonomy, versatility and resourcefulness, patience, listening, empathy, involvement, responsiveness and dynamism
Occupation-specific skills	Visual culture, knowledge of graphic chain, artistic design, having a portfolio of graphic design

Experience required

Is experience required?	Yes, but the duration of experience demanded varies from two to over six years
Is job-related experience required?	Yes, in most vacancies similar experience is required: <ul style="list-style-type: none"> - experience in printing/ press - experience in web design

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:
Some of the job portals consulted: Indeed, Monster, Stepstone...

Similar vacancies in Western Europe

Belgium	<i>Junior Graphic Designer, Designer, Visual Designer, Web designer</i>
Germany	<i>Grafik-Designer, Grafiker, Mediengestalter, Mitarbeiter Grafik Design, Grafik Kommunikationsdesign, Visual UX Designer, Art Director</i>
The Netherlands	<i>Grafisch Ontwerper, Multimedia Designer, Grafisch Vormgever</i>
UK	<i>Graphic designer, Web Designer, Digital Designer, Fashion Graphic Designer</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for France? YES	<p><u>Tasks/Responsibilities:</u></p> <ul style="list-style-type: none"> - Designing for both digital media and print, creating design for new pages, preparation of in-house marketing materials, following new/emerging technologies, new media and digital trends, layout of brochures, flyers, event invitations, proposals, using a wide range of media including photography and computer-aided design <p><u>Requirements:</u></p> <ul style="list-style-type: none"> - Minimum years of experience (depending on the seniority of the position), interest in new technologies and digital media, knowledge of various design software (InDesign, Photoshop, Illustrator, Adobe Creator Suite, Dreamweaver and web programmes), previous experience in similar job with a portfolio; verbal communication skills as well as language requirements are more commonly found in other countries' portals than in France's

Similar vacancies in Southern Europe

Italy	<i>Grafico, Grafico Stilisto</i>
Spain	<i>Diseñador Gráfico, Desarrollador Web</i>

Do these vacancies involve similar tasks and have similar requirements as the vacancies for France?
YES

Tasks/Responsibilities:

- Processing graphics, video and audio editing, creative programme designer, capable of operating Internet and office instruments

Requirements:

- Experience in graphic design for print and digital productions, good level of programming, knowledge of software (Photoshop, Illustrator, Freehand, Flash, Dreamweaver, Fireworks, Director, QuarkExpress, InDesign, artwork for printing, HTML, 3DStudioMax, JAVA/JavaScript, PHP, ActionScript), foreign language requirements (mainly English, sometimes German), portfolio

Similar vacancies in Northern Europe

Denmark	<i>Grafisk designer</i>
Sweden	<i>Designer, Grafisk fromgivare, Specialist in video and graphic design</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for France? YES	<p><u>Tasks/Responsibilities:</u></p> <ul style="list-style-type: none"> - Having design skills to contribute to marketing and communication materials, ensuring that any videos, motion graphics, info graphics, etc., produced is in line with corporate identity and brand strategy, responsible for producing videos for both internal product (such as e-learning clips and product or strategy updates) and external use (such as product launch videos and customer testimonials, technical series related to bolted joints) - Graphic advice and guidance to internal partners, co-development of graphic expression with external suppliers of graphic services <p><u>Requirements:</u></p> <ul style="list-style-type: none"> - At least a medium higher relevant education within any of the following: communication and media studies, photography/film/video production, fine art/visual art, information technology/multimedia or graphic design - A minimum of three years practical experience in bureau or larger communications as art director, graphic designer, illustrator or equivalent, have a proven experience in graphic supplies of high quality

Similar vacancies in Central and Eastern Europe

Hungary	<i>Grafikus, Multimédia-tervező, Számítógépes Grafikus</i>
Poland	<i>Design graficzny</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for France? YES	<p><u>Tasks/Responsibilities:</u></p> <ul style="list-style-type: none"> - Advertising and knowledge of design trends, web development - Preparation of ads, posters, flyers and other creative materials planning, design and editing, creating and developing websites, continuous maintenance and updating of 3D renderings and printing materials - Creating graphics for mobile applications <p><u>Requirements:</u></p> <ul style="list-style-type: none"> - Vocational education in graphic design, English language skills - Knowledge of Adobe programs and experience in drawing 2D graphics in games for mobile devices

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *Graphic Designer, Digital Graphic Designer, Graphical Content & Web Design, Social Graphic and Media Designer, Graphic Web Designer, Graphic Designer Consultant*.

Some of the job portals consulted: Indeed, Monster, Glassdoor...

Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for France? **YES, but the vacancies are much more detailed.**

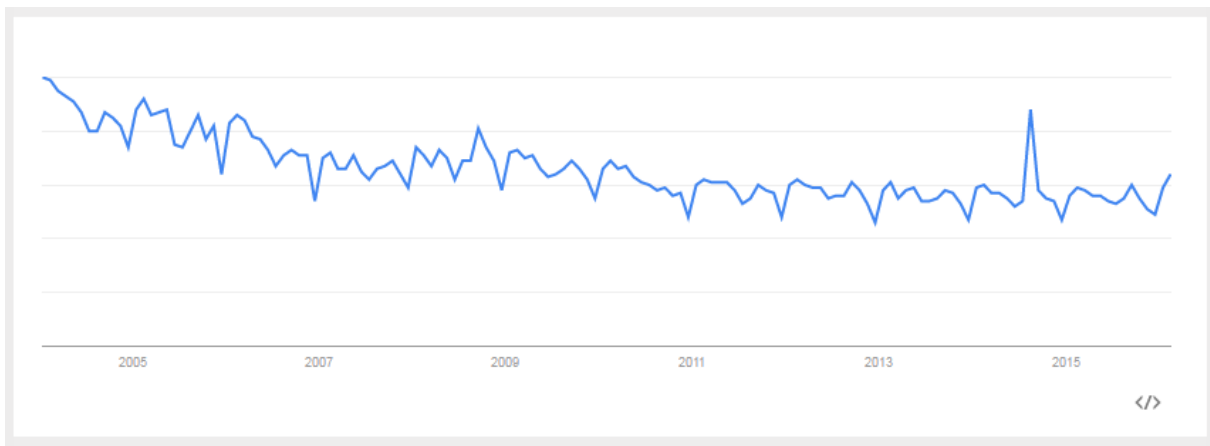
- **Tasks/Responsibilities:** are relatively similar to those for France, but there are more details regarding the responsibilities and tasks in general. The tasks and responsibilities commonly involve conceptualising, designing and manipulating graphics for advertising, communications and social media outlets. Other tasks are related to consulting with clients to understand graphic design needs strategy, creative direction, technology, financial, and conceptualising print and multimedia solutions based on creative direction.
- **Requirements:** are rather similar yet very detailed as well. Almost all vacancies require experience in a similar role and sector. **Education and cognitive skills:** at least a bachelor's degree in a related field, knowledge of graphical and design techniques, web design, MS Office, Photoshop, After Effects, Dreamweaver, HTML5, JavaScript, JQuery, CSS3, written and communication skills, project management. Some vacancies

require excellent written and verbal communication skills. Non-cognitive skills: culturally suited, genuinely ambitious, desire to progress, team mentality, respectful of everyone in the office, passionate and team spirit.

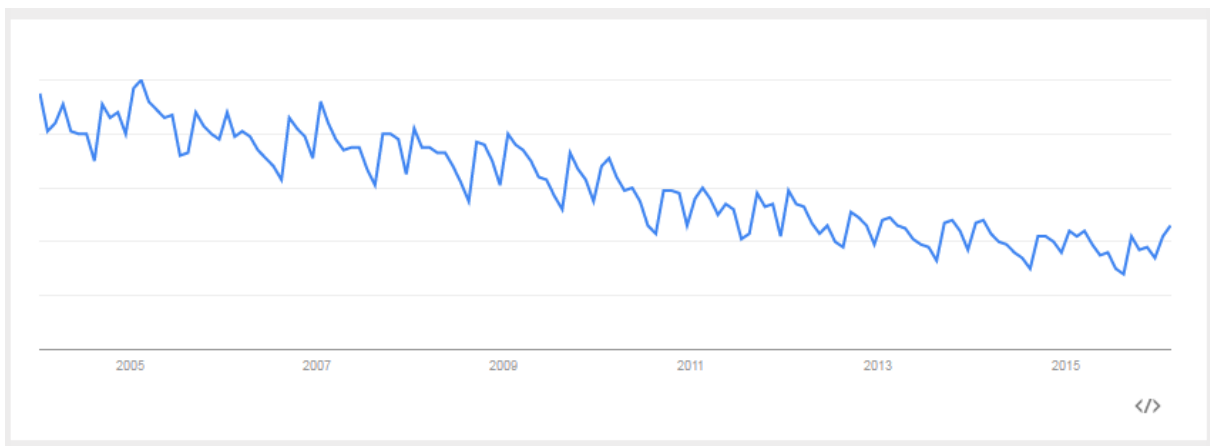
3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global), which suggest that the interest in “graphic designer” has been declining over time; the small end-2014 peak could be just another of many, given the zigzag.

Google Trends: “graphic designer” worldwide (10/2/2016)



Google Trends: “graphiste” worldwide (10/2/2016)



E. Occupational classification

1. International classifications

ISCO 08: The occupation is included in the ISCO08 classification.

Occupation 2166: Professionals => science and engineering professionals => architects, planners, surveyors and designers => graphic and multimedia designers.

ESCO: This occupation is included in the ESCO classification.

Occupation 2166: Graphic designer.

Other related occupations with the same code: Graphic and multimedia designer, illustration drawer, illustrator, layout designer, layout director, art director.

Other related occupations with a different code (2651): Graphic artist.

2. National classifications

France: occupation is included in PCS and PCS-ESE:

- 465a: *Concepteurs et assistants techniques des arts graphiques, de la mode et de la décoration.*

In Europe:

- **Belgium:** occupation is included in the ISCO08 classification.
- **Germany:** Klassifikation der Berufe (KB) (most recent version is 2010), occupation is included: 23223 *Grafiker/in*. Other related occupations with the same code are *Grafikgestallter/in*, *Gebrauchsgrafik*. There is also another related occupation *Grafik-Kommunikationsdesigner/in* (23224).
- **The Netherlands:** based on ISCO (Central Bureau for Statistics, from 2013 onwards), hence occupation is included.
- **UK:** based on SOC (most recent version is 2010), and occupation is included: Major Group 3: Associate Professional and technical operations => Sub-major group: Culture, media and sports occupations => Minor group 342: Design occupations => 3421: Graphic designers.
- **Italy:** has the *Classificazione delle professioni (CP)*, most recent version 2011, an update of CP2001 and adapted to ISCO08); in this classification there is an occupation named *Creatori artistici a fini commerciali (esclusa la moda)* (code 2.5.5.1.4, in which job titles include *grafico creative*, *illustratore pubblicitario*, *webdesigner*), which is part of the *professioni intellettuali, scientifiche e di elevate specializzazione* => *Specialisti in scienze umane, sociali, artistiche e gestionali* => *Specialisti in discipline artistico-espressive* => *Pittori, scultori, disegnatori e restauratori di beni culturali*.
- **Spain:** based on *Clasificación Nacional de Ocupaciones 2011 (CNO-11)*, the occupation "Graphic and multimedia designers (code 2484)" is included.
- **Denmark:** DISCO, Danish national classification based on ISCO, most recent version is DISCO 2008; the occupation is included as *Arbejde med grafisk og multimediedesign* (code 2166). A similar occupation is under the category *grafisk arbejde: prepressarbejde og grafisk formfremstilling* (code 7321).

- **Sweden:** has the Standard för svensk yrkesklassificering (SSYK) (most recent version is SSYK2012), based on ISCO08. The occupation *grafisk designer* is included (code 2172).
- **Hungary:** has HCSO/FEOR (edition 2008) and the occupation is included as *Graphic and Multimedia designer* (code 2136).
- **Poland:** has the Klasyfikacja zawodów i specjalności (KZiS 2014), based on ISCO08 (but it was updated more recently, in 2014). In an alphabetical list, similar occupations are listed: *Projektant aplikacji multimedialnych, animacji i gier komputerowych* (251302) and *Grawer poligraficzny* (code 732104).

In the rest of the world (US):

- **US** has SOC (last version is 2010), occupation is included: 27-1024 Graphic Designers lists Graphic Artist and Catalogue Illustrator as example jobs (part of 27-1000 Art and Design Workers).
- **US** also has the O*NET classification: the occupation exists as Graphic Designers (27-1024.00 – www.onetonline.org/link/summary/27-1024.00).

O*NET summary of graphic designers: Create designs, concepts, and sample layouts, based on knowledge of layout principles and esthetic design concepts; determine size and arrangement of illustrative material and copy, and select style and size of type, confer with clients to discuss and determine layout design; develop graphics and layouts for product illustrations, company logos, and web sites; review final layouts and suggest improvements as needed. Examples of job titles: Artist, Composing Room Supervisor, Creative Director, Creative Manager, Design Director, Designer, Desktop Publisher, Graphic Artist, Graphic Designer, Graphic Designer/Production.

F. Conclusions

Is Graphic Designer a new or emerging occupation?

In France?	<p><u>This occupation is not new or emerging per se</u>; however, given the rapid technological advancement and digitalisation of most of the communication and visual products and services, graphic design requires following the latest software, programming and graphical analysis tools. Moreover, there are now more platforms where graphic designer are needed; for example, graphics and animation in social media, mobile device applications, and so on. In that sense, <u>the tools and content of this occupation is evolving</u> continuously. Does this occupation <u>have a future</u>? Surely, yes.</p> <p>What is the <u>impact on training</u>? What are the <u>skills implications</u>? Educational institutes will have to keep in mind that graphic</p>
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	<p>designers of the future will have to have up-to-date programming and technical skills as well as an understanding of basic communication and marketing strategy to keep up with the technological advancement and demands of various platforms. This means that students will need to learn how to work with these programs, tools and platforms (Google Analytics, SEO, e-mail marketing, social media) and how to reach their target audience in these ways. Moreover, firms that want to remain competitive should make sure that their employees receive on-the-job training or have other training opportunities, to keep up with technological and market changes.</p>
In Europe?	<p>A similar conclusion is reached for Europe. In many countries, the classification is already present in the most recent national occupational classification; therefore, this occupation is not very new in that sense. However, the demands and rapid developments in graphic design tools and presence of such tools in many more platforms makes graphic designer a highly sought-after and re-emerging occupation.</p> <p>Given that the tasks, responsibilities and requirements are comparable in other European countries, the conclusions formulated above apply here. Education should focus on new technologies, recent graphic design software and communication skills. Companies can benefit from providing on-the-job training to their staff, to keep up with recent developments.</p>
Worldwide?	<p>For the US, the occupation appears to be not so new but in high demand and quite prestigious as well, depending on the industry and firm considered. The occupation is included in SOC and O*NET. Similar conclusions are reached for the educational institutes, firms and individuals.</p>

Biomedical engineer

Date: 19 January 2016

A. Identification

The identification of new occupations, such as biomedical engineer presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regular intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In the beginning of **August 2015**, a new tag was added to the **Polish** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for biomedical engineer on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	August 2015
On which online job board was the tag/vacancy published?	Pracuj.pl
Which country is covered by this job portal?	Poland
In which industry is the employer active?	Medical
What type of employer has posted the vacancy?	private company

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • Worker will be deployed on clients' premises based on the maintenance and new machine installation needs • Installation and implementation of medical equipment • Configuration, technical inspections, diagnosis and repair, • Preparation of technical documentation • Electrical safety testing and related activities • Contact with the customer in case of maintenance requests • Traveling to clients • Training of medical personnel • Reporting performance of the equipment
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • Master's technical degree, ideally biomedical engineering, mechatronics, electronics and related degrees acceptable • Mobility, readiness for business trips throughout the country and abroad • Driving licence • Customer orientation, professional conduct • Self-reliance • Good knowledge of English spoken and written (necessary for participating in training abroad, mainly in Germany and the US) • German or Russian language knowledge welcomed
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • NA (not displayed)

B. Definition, responsibilities and tasks

1. Definition

What is "biomedical engineering"?

Wikipedia defines bioengineering as *application of engineering principles and concepts for healthcare purposes*. As such, the field is at the crossroads of engineering and medicine and is applied in all stages of medical activities (diagnosis, monitoring, therapy). The applications include development of biocompatible prostheses, various medical devices used in the hospital setting, as well as pharmaceutical drugs. It is, therefore, a very heterogeneous occupation, containing a range of different specialisations. Furthermore, there are signs of the biomedical engineering occupations becoming yet more diverse. Just like other types of engineering, it has been changed by scientific progress, leading to innovations such as bioinformatics and tissue engineering. Consequently, in the future there is likely to be a growing connection between biomedical engineering and ICT/biochemistry fields.

More information on the occupation can be found on the Wikipedia page https://en.wikipedia.org/wiki/Biomedical_engineering.

Is this position related to any existing occupations?

At first sight, the position of coordinator biomedical engineer appears to **combine** some of the tasks and responsibilities of *lab technician* and *maintenance* of biomedical machinery. In stark contrast, with the definition of the occupation outlined above, the typical advertised position in this occupational category has little to do with developing medical equipment and drugs, but rather providing technical or lab support. In spite of being labelled as such, we can ask whether these advertisements actually offer biomedical engineering jobs, or just use the label to make maintenance and support jobs sound more prestigious.

How prevalent is the occupation of a biomedical engineer in Poland?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise were disappointing, as there were hardly any matches:

Job portals

- Pracuj.pl: offers three positions in different regions
- One medical sales position labelled as biomedical engineer at the company website found through indeed.com
- GazetaPraca.pl has one position, without details

Google Search:

- 'inżynier biomedyczny praca: about 370,000 results

2. What are the responsibilities and tasks of a biomedical engineer?

This information is obtained from a sample of job vacancies, extracted from job portals (for Poland)

- Responsibilities are generally limited to maintenance or sales tasks, no specific tasks and responsibilities relevant to the field of biomedical engineering mentioned.
- Jobs stress language knowledge and ability to travel for training abroad, as the advertisements foresee regular travel abroad for training.
- General importance of soft skills, such as interpersonal skills, teamwork, service skills, customer focus.

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Poland)

Formal education required

Is formal education required?	Yes
Level of education	Tertiary education: master's degree
Field of education	Engineering, preferably biomedical or mechanical engineering

Skills required

Communication skills	Fluent English AND typically also German
Computer skills	MS Office, internet (email)
Non-cognitive skills	Customer orientation, development of relationships with customers, service skills, willingness to travel, driver's licence, teamwork
Occupation-specific skills	Very few specific, typically combination of engineering background and willingness to master the technologies offered by the company advertising the job

Experience required

Is experience required?	Zero to two years
Is job-related experience required?	Typically not

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:
Some of the job portals consulted: Indeed, Monster, Stepstone...

Similar vacancies in Western Europe

France	<i>Ingénieur Biomédical; Chef de Projet Certification; Chef de Projet Biomédical; Ingénieur d'Application</i>
Germany	<i>Biomedizintechniker; Field Clinical Engineer; Serviceingenieur</i>
The Netherlands	<i>Biomedisch Technoloog; Project Engineer</i>
UK	<i>Field Clinical Engineer; Junior Biomedical Engineer; Junior Field Biomedical Engineer</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Poland? PARTLY	<p>Tasks/Responsibilities: For most of the offered positions the emphasis is on the work with the clients and maintaining medical equipment, which is not the traditional understanding of the biomedical engineer. Main responsibilities include:</p> <ul style="list-style-type: none"> - maintaining medical/laboratory equipment - work with clients to fix malfunctioning equipment

- keep in touch with clients; customer trainings
 - work closely with the sales team
 - providing technical support on products
- Requirements:**
- degree in biomedical engineering or equivalent
 - proven experience in the field
 - good analytical skills
 - fluency in English
 - sense of teamwork; knowledge of how to work with clients
 - perfect communication skills

Similar vacancies in Southern Europe

Italy	<i>Ingegnere biomedico; Field clinical engineer; Field clinical specialist;</i>
Spain	<i>Biomédicos del ingeniero</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Poland? YES	<p>Tasks/Responsibilities: Similarly to the positions offered in Western Europe, the emphasis is on the work with clients/field work. Main responsibilities include:</p> <ul style="list-style-type: none"> - ensuring technical support - monitoring the performance of medical devices/equipment - making product presentations - business sales and the sale of devices - training courses for hospital staff/clients <p>Requirements:</p> <ul style="list-style-type: none"> - degree in biomedical engineering or other relevant discipline - basic knowledge of mechanics - good/excellent command of English - previous experience in sector sales and service - excellent problem-solving skills - strong scientific and technical bases - willingness to travel as part of the working day - good management skills and practical sense

Similar vacancies in Northern Europe

Denmark	<i>Biomedicinsk ingeniør</i>
Sweden	<i>Field Service Engineer</i>

<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Poland? NOT NECESSARILY</p>	<p>Tasks/Responsibilities: The position requires more technical skills in the field of medical maintenance. Main responsibilities include:</p> <ul style="list-style-type: none"> - delivering high quality technical service - visiting customers for preventative maintenance, repairs, fault analysis, phone support and upgrades - identify, assess and develop new concepts and techniques and apply these to potential inventions and products - gather input on customer's needs and requirements <p>Requirements:</p> <ul style="list-style-type: none"> - degree in engineering/applied physics/electronics or equivalent - previous experience in hardware design - fluency in English - strong communication skills - experience in field work with high tech equipment - familiarity with standard IT tools - technical school background
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Similar vacancies in Central and Eastern Europe

Czech Republic	<i>Biomedicínský inženýr, servisní technik</i>
Hungary	<i>Junior folyamatmérnököt keresünk orvosbiológiai</i>
Poland	N/A
<p>Do these vacancies involve similar tasks and have similar requirements as the vacancies for Poland? YES</p>	<p>Tasks/Responsibilities:</p> <ul style="list-style-type: none"> - development and maintenance of software - technical support - servicing medical devices - communication with foreign suppliers <p>Requirements:</p> <ul style="list-style-type: none"> - diploma in electronic or mechanical engineering - ability and willingness to travel - proficiency in English - biomedical education is an advantage - analytical thinking in solving problems - good communication and verbal skills

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *Biomedical Engineer*.

Some of the job portals consulted: Indeed, Monster, Stepstone...

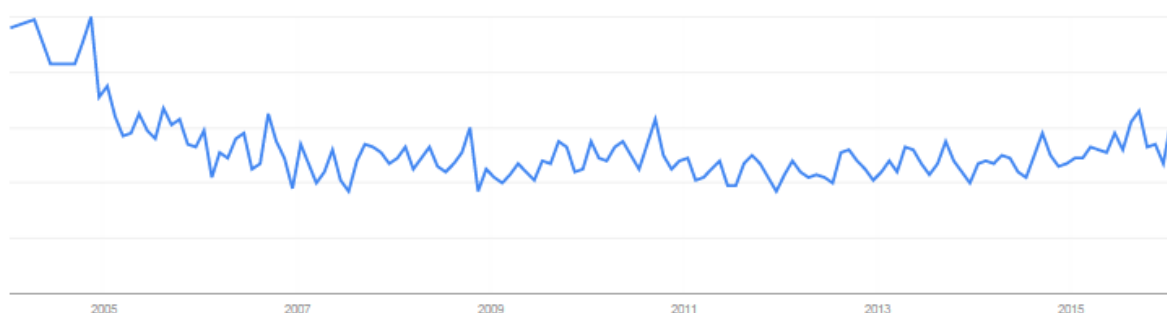
Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Poland? **NOT NECESSARILY**

- **Tasks/Responsibilities:** In particular in the US, the job of biomedical engineer is often connected to cutting-edge research. The jobs advertised require an ability to work with biomedical data just as much as with the hardware. Nonetheless, there are some jobs similar to those in Poland, that is, more related to maintenance than to actual biomedical engineering.
- **Requirements:** reflect difference in the focus of the jobs. **Education and cognitive skills:** at least a bachelor's degree in engineering, data analysis, running controlled trials, but also traditional skills such as maintenance of biomedical machinery. **Non-cognitive skills:** willingness to learn, cooperation and communication.

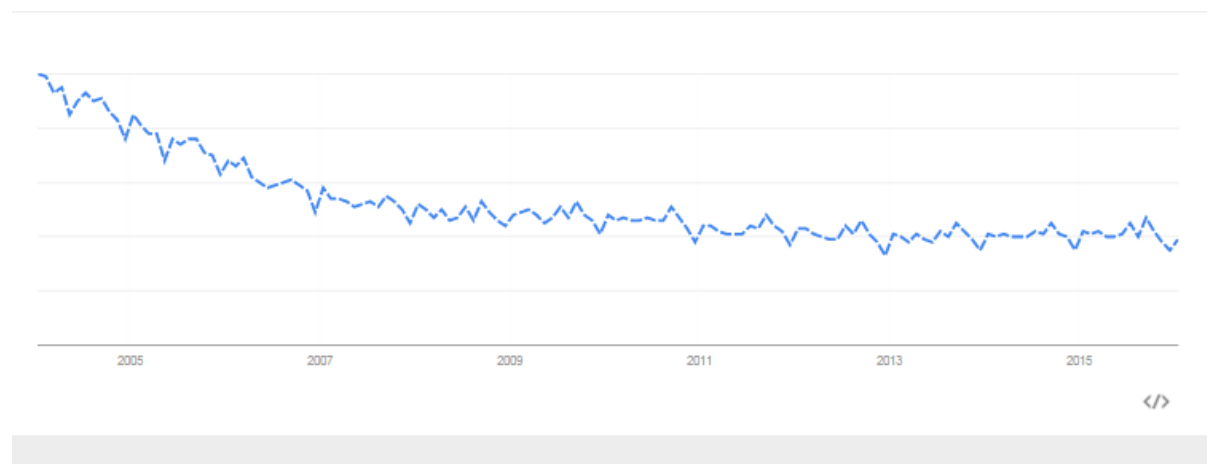
3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global): interest seems to have decreased over the last decade. This is highly visible when considering biomedical engineering as a field of study. Interestingly, interest seems to have peaked in the mid-2000s in the developed countries, followed by countries such as India and Iran, where it only peaked in the early 2010s.

Google Trends: biomedical engineer (17/01/2016)



Google Trends: biomedical engineering – field of study (17/01/2016)



E. Occupational classification

ISCO 08: There is no biomedical engineer profession in the ISCO 08 classification.

Where could this occupation fit in the ISCO08 classification?

- 2433 Technical and medical sales professionals (excluding ICT)
- 3211 Medical imaging and therapeutic equipment technicians
- 3212 Medical and pathology laboratory technicians

ESCO: “17601 Biomedical analyst” – an occupation encompassing technical support work in a laboratory, or “18567 Medical engineer”, which entails development of medical machines.

Where could this occupation fit in the ESCO classification?

- 404 Technical and medical sales professionals (excluding ICT)
- 246 Medical imaging and therapeutic equipment technicians
- 242 Medical and pathology laboratory technicians

1. National classifications

In Europe:

- **France:** Occupation is not found; different position names checked.
- **Germany:** Occupation is included in *Berufe in der Bio- und Medizininformatik KldB2010_4* or *Berufe in der Bio- und Medizininformatik - hoch komplexe Tätigkeiten KldB2010_5*; information from *Klassifikation der Berufe* (Edition 2010).
- **The Netherlands:** the occupation is not included in the ISCO 08.
- **UK:** in SOC (most recent version is 2010), the position is “engineer, biomedical”, code 2129.
- **Italy:** Checked for the occupation in point 3. PROFESSIONI TECNICHE where all the technical positions are listed, no similar positions were found.

- **Spain:** No match, various ‘traditional’ engineering positions.
- **Denmark:** Not found in DISCO, Danish national classification based on ISCO, most recent version is DISCO 2008.
- **Sweden:** 3212 “Biomedicinska analytiker m.fl”.
- **Czech Republic:** Not found on the list (CZ-ISCO). Other engineering and technical positions available, for instance, “chemical engineer” (Edition 2011).
- **Hungary:** Does not include the specific occupation, but under the engineering positions there is 2139, which is “Other engineer”, not elsewhere classified.
- **Poland:** Found 214905 *Inżynier biocybernetyki i inżynierii biomedycznej*, which is defined through tasks such as development of equipment, computer programs and medical drugs, which is in line with the biomedical engineering jobs identified in Northern and Western Europe, but not in Poland (Edition 2014).

In the rest of the world (US):

- **US** has SOC (last version is 2010), in which the occupation is included. It can fall under the following four types of occupations.

Biomedical Engineering Technicians 17-3029

Biomedical Engineers 17-2030

Biomedical Engineers 17-2031

Biomedical Equipment Technicians 49-9062

- **US** also has the **O*NET** classification: the occupation exists in O*NET as 17-2031.00 – Biomedical Engineers (more information on the occupation can be found here: www.onetonline.org/link/summary/17-2031.00).

***Sample of reported job titles:** Biomedical Electronics Technician, Biomedical Engineer, Biomedical Engineering Director, Biomedical Engineering Technician, Biomedical Equipment Technician (BMET), Biomedical Manager, Biomedical Technician, Clinical Engineer, Professor, Research Engineer

F. Conclusions

Is Biomedical
Engineer a new or
emerging occupation?

In Poland?

There does not seem to be significant “genuine” biomedical engineering in Poland, or in other peripheral countries. Rather, these positions seem to focus on maintaining and selling biomedical machinery developed in countries like the US or Germany.

What is the impact on training? What are the skills implications?
The rather low number of positions and their relatively unsophisticated nature do not signal much potential for

	development of area-specific skills. At best, a limited number of engineers can find employment in the field, but these can be trained <i>ad hoc</i> in the core countries.
In Europe?	Situation in the east and south rather similar to Poland, but in the west and north, much more attention is paid to the potential for innovation and lab work. Consequently, there is more demand for specialised skills in these parts of Europe. Usually, the job advertisements show preference for candidates with a specialised biomedical degree.
Worldwide?	For the US, the occupation seems to be well established both in terms of R&D and application.

OSS/BSS Specialist

Date: 6 June 2016

A. Identification

The identification of new occupations, such as the Operations Support System/Business Support System (OSS/BSS) Specialist presented in the current document, is based on an innovative methodology that we are piloting here. This methodology is embedded in the rapidly growing strand of the literature that relies on web-based data sources to conduct labour market research (see Askitas & Zimmermann, 2015). The main idea behind our methodology is to identify new occupations via the **occupational classification** that online job portals use to guide job seekers on their website. Typically, such occupational classifications have – at their core – a **tag system**, i.e. a list of tags, that is used to assign vacancies to specific job categories. This list of tags can be published online or stored in a library accessed by an API search when a job seeker enters a word in the search box. Earlier research suggests that job portals tend to regularly update their list of tags, to account for the emergence of new occupations and the disappearance of redundant ones.

In our pilot study, we focus on 11 countries for which we keep track of one of their main online job portals. For these countries, we created a **benchmark**, which is composed of their occupational classification (their list of tags) on 30 June 2015. Our goal is to determine whether this tag system could also be used to identify new occupations, by comparing the benchmark classification with the **current occupational classification** of the portal at regular intervals, i.e. every month. The **tags that are not yet included** in the benchmark, i.e. missing from the list of tags when the benchmark and the new list of tags are compared, could point to new or emerging occupations. For more details on our methodology, we refer to the **Methodological Note** that is available on the website in the New Occupations Observatory.

In the beginning of **August 2015**, a new tag was added to the **Slovak** online job board in our pilot. This tag was picked up (either via the API or via a web crawling technique that extracts the list of tags – this depends on the portal) and stored in a database. We then searched for an actual vacancy for biomedical engineer on this portal (to discover what triggered the new tag). More details on this tag/vacancy can be found below; these details cover (i) the portal to which the tag was added and on which the vacancy was found, and (ii) the content of the sample vacancy that we study in more depth (to identify tasks and responsibilities – skills and other requirements).

Details on the tag and the job advertisement

When did the tag/vacancy appear online?	August 2015
On which online job board was the tag/vacancy published?	Profesia.sk
Which country is covered by this job portal?	Slovakia
In which industry is the employer active?	Telecom
What type of employer has posted the vacancy?	private company

Sample job advertisement

Job description (responsibilities and tasks of the job)	<ul style="list-style-type: none"> • Data analysis and automation • Design of suspicious behaviour of customers/fraud detection systems • Support of data collection done by other units • Overview of functioning of business support systems, including identification of their weak points and participation in their upgrade • Preparation of ad hoc reports for the management
Job profile (education, skills and other requirements for the job)	<ul style="list-style-type: none"> • Upper secondary or above in IT field • Fluent in English • Advanced UNIX/Linux skills • Advanced *SQL, Oracle database, Perl and Java skills • Driving licence • Two years of experience in telecom, knowledge of relevant technologies, particularly telecom information systems • Proficiency in working with big data
Job portal tags (tags attached to the vacancy on the job board)	<ul style="list-style-type: none"> • NA (not displayed)

B. Definition, responsibilities and tasks

1. Definition

What is "OSS/BSS"?

OSS/BSS are computer systems used in the telecom industries to manage their networks. They represent setting the architectures of processes, data, applications and technology (OSS) and product, customer, revenue and order management (BSS). In other words, it is a field involving the design and oversight of the entire operation of a telecom company.

While the nature of the work itself has always entailed technology-heavy work content, in the past many of the aspects of OSS/BSS were done manually. The current trend is a push towards automation and computerisation of all aspects, including dealing with customers. As a result of this trend, the importance of data collection and application has increased significantly.

More information on the occupation can be found on the Wikipedia pages:
https://en.wikipedia.org/wiki/Operations_support_system
https://en.wikipedia.org/wiki/Business_support_system

Is this position related to any existing occupations?

At first sight, the position is very close to the up and coming position of data scientist. In some way, OSS/BSS could be seen as a precursor to data science, because the telecom industry has always included a data focus. In terms of tasks, the job demands a combination of data-related skills, with knowledge of relevant technologies used in the telecom industry.

How prevalent is OSS/BSS in Slovakia?

We looked for similar occupations on several job portals and did a Google search. Results of this exercise were disappointing, as there were hardly any matches:

Job portals

- We found no vacancies for OSS/BSS professionals on Slovak job portals

Google Search:

- Both “OSS/BSS specialista praca” and “OSS/BSS specialist zamestnanie”: about 10,500 results

2. What are the responsibilities and tasks of an OSS/BSS specialist?

This information is obtained from a sample of job vacancies, extracted from job portals (for Poland)

- Not possible to determine due to non-existing demand at the moment

C. Education, skills and other requirements

This information is obtained from a sample of job vacancies, extracted from job portals (for Poland)

Formal education required

Is formal education required?	N/A
Level of education	N/A
Field of education	N/A

Skills required

Communication skills	N/A
Computer skills	N/A
Non-cognitive skills	N/A
Occupation-specific skills	N/A

Experience required

Is experience required?	N/A
Is job-related experience required?	N/A

D. Geographical prevalence

1. A European perspective

Results from **job portals** and **Google search** for countries in different parts of Europe:
Some of the job portals consulted: Indeed, Monster, Stepstone...

Similar vacancies in
Western Europe

France	<i>Architecte SI Telecom, Solution Architect, Ingénieur Support Radio</i>
Germany	<i>Software architect fur Telecommunication, Consultant "OSS/BSS" Telecommunication, Software-Ingenieur fur Telecommunication</i>
The Netherlands	<i>Solution Architect; BSS Solution Architect</i>
UK	<i>Technical Consultant, Solution Architect, Digital Architect</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? Yes	<p>Tasks/Responsibilities: The position appears very well specified, the tasks are always nearly identical: - designing and upgrading OSS/BSS systems - coordinating with other units data collection and use</p> <p>Requirements: - STEM degree - good knowledge of the telecom field - analytical and problem-solving skills - knowledge of suppliers, negotiating skills</p>

Similar vacancies in
Southern Europe

Italy	<i>BSS Solution Architect</i>
Spain	<i>BSS Digital Teleco Consultant</i>

Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? **YES**

Tasks/Responsibilities:

- identical to those in Western Europe

Requirements:

- relevant degree
- experience in teleco
- English proficiency

Similar vacancies in Northern Europe

Denmark	<i>Network manager, consultant</i>
Sweden	<i>Technical platform owner</i>
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Poland? Yes	<p>Tasks/Responsibilities:</p> <ul style="list-style-type: none"> - same as elsewhere <p>Requirements:</p> <ul style="list-style-type: none"> - experience in the field - knowledge of relevant systems, APIs

Similar vacancies in Central and Eastern Europe

Czech Republic	<i>Mobile access quality expert</i>
Hungary	<i>Junior folyamatmérnököt keresünk orvosbiológiai</i>
Poland	N/A
Do these vacancies involve similar tasks and have similar requirements as the vacancies for Slovakia? YES	<p>Tasks/Responsibilities:</p> <ul style="list-style-type: none"> - same as elsewhere <p>Requirements:</p> <ul style="list-style-type: none"> - degree in electrical engineering - knowledge of relevant technologies - proficiency in English - biomedical education is an advantage - analytical thinking in solving problems - good communication and verbal skills

2. A global perspective

Results from **job portals** and **Google search** for countries in different parts of the world: we focus mainly on the United States, for which we find vacancies for *OSS/BSS Specialist*.
Some of the job portals consulted: *Indeed, Monster, Stepstone...*

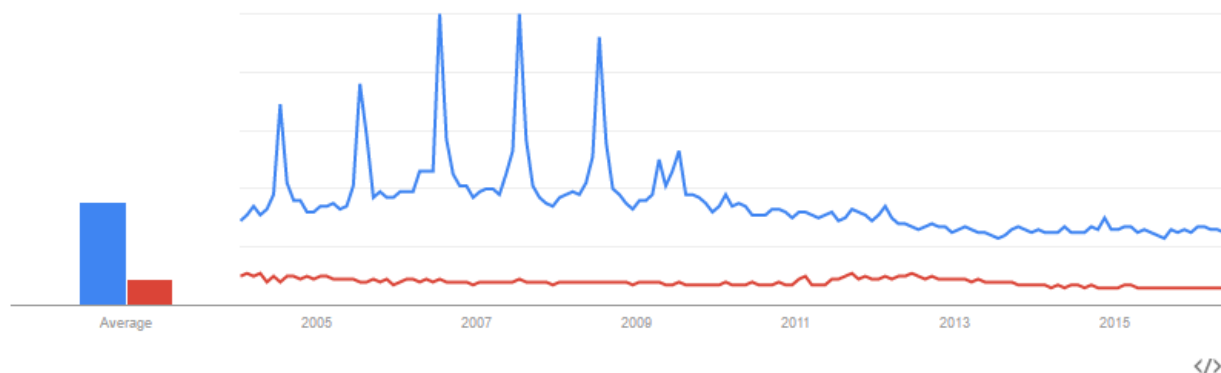
Do these vacancies involve **similar tasks** and have **similar requirements** as the vacancies for Slovakia? **YES**

- **Tasks/Responsibilities:** The same as everywhere else
- **Requirements:** Education and cognitive skills: relevant quantitative bachelor's degree, substantial experience in the field. Non-cognitive skills: process-oriented, able to build relationships, flexibility

3. A Google Trends Analysis

An analysis on the basis of Google Trends reveals the following patterns (see graphs, global): interest seems to have decreased over the last decade. This is highly visible when considering biomedical engineering as a field of study. Interestingly, interest seems to have peaked in the mid-2000s in the developed countries, followed by countries such as India and Iran, where it only peaked in the early 2010s.

Google Trends: OSS (blue) BSS (red) (15/06/2016)



E. Occupational classification

ISCO 08: is represented as 2153 Telecommunications engineers

ESCO: there is "18073 Operations engineer", which seems to precisely cover the occupation in question

National classifications

In Europe:

- **France:** Occupation listed as 388d Ingénieurs et cadres technico-commerciaux en informatique et télécommunications.
- **Germany:** Occupation is included in 26314 *Berufe in der Informations- und Telekommunikationstechnik – hoch komplexe Tätigkeiten* (Edition 2010).
- **The Netherlands:** Based on ISCO, so the telecommunication engineer category applies.
- **UK:** Generally in 2139 Information technology and telecommunications professionals n.e.c.
- **Italy:** Listed as 2.2.1.4.3 - Ingegneri in telecomunicazioni.
- **Spain:** Occupation listed as 2443 Telecommunications engineers.
- **Denmark:** Based on ISCO, so the telecommunication engineer category applies.
- **Sweden:** 2144 Civilingenjörer m.fl., elektronik och teleteknik.
- **Czech Republic:** Based on ISCO, so the telecommunication engineer category applies.
- **Hungary:** 2123 Telecommunications engineer.
- **Poland:** 215301 Inżynier telekomunikacji (Edition 2014).

In the rest of the world (US):

- **US** has SOC (last version is 2010), in which the occupation is included in the 17-2072 Electronics Engineers, Except Computer category
- **US** also has the **O*NET** classification: the occupation exists in O*NET as 15-1143.01 Telecommunications Engineering Specialists (more information on the occupation can be found here: www.onetonline.org/link/summary/15-1143.01).

***Sample of reported job titles:** Consultant, Network Technician, Principal Consultant, Registered Communications Distribution Designer (RCDD), Senior Consultant, Senior Telecommunications Consultant, Telecom Network Manager (Telecommunication Network Manager), Telecommunication Engineer, Telecommunication Systems Designer, Telecommunications Consultant

F. Conclusions

Is Biomedical
Engineer a new or
emerging occupation?

In Slovakia?	It seems to be fully in line in terms of content of the occupation with the worldwide standards, suggesting a high level of globalisation in the telecom industry. However, the vacancies are quite rare.
In Europe?	The job seems to be pretty well-defined; noteworthy that the job title is typically in English.
Worldwide?	No differences compared to Europe.

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