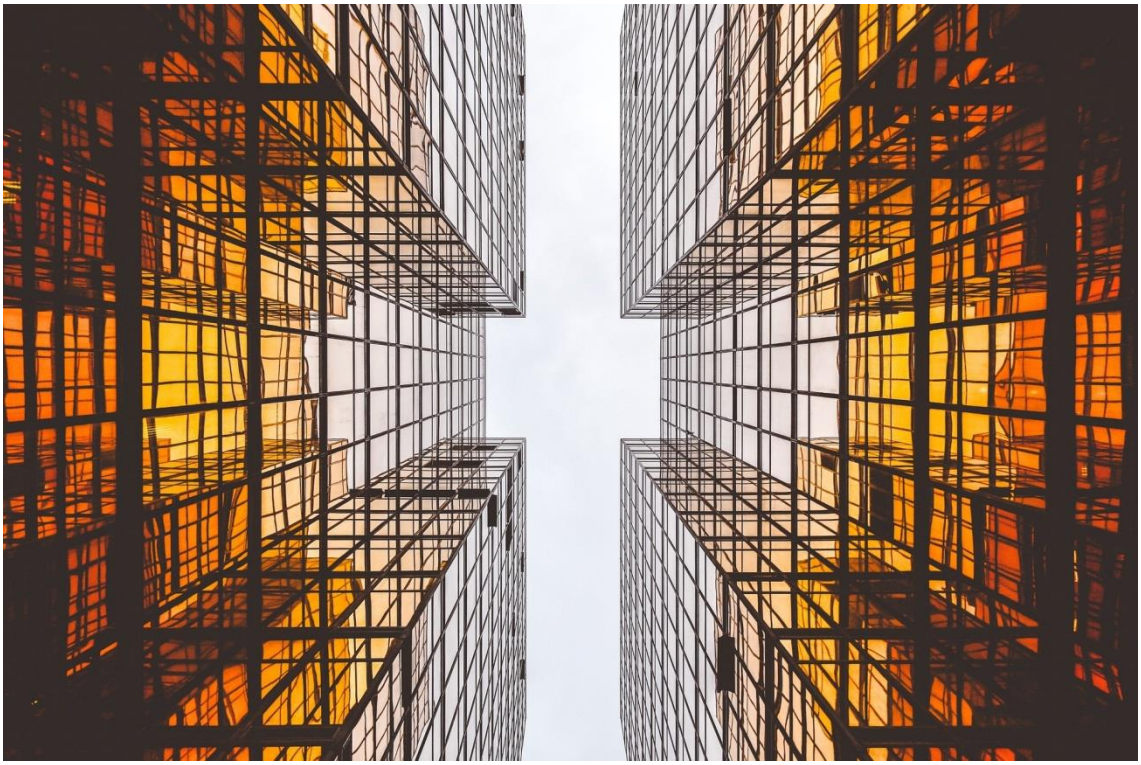

D14 Intervention plan: improvement measures

Report	WP5. Exploitation of results DETECTA: competence and formative analysis of the construction sector
Version	2.0
Status	Final
Date of issue	
Dissemination level	Public
Authors	Anselmo Navarro, Pilar Híjar, Ángel Esteban (FORTEC)
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Project website	www.e-detecta.eu

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Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Project Number:59184-EPP-1-2017-1-ES-EPPKA2-SSA-N

Disclaimer:

This publication has been produced in the frame of the DETECTA Project. The project has been funded with support from the European Commission, ERASMUS+ Programme. The information contained in this publication reflects only the author's views and the Commission cannot be held responsible for any use which may be made of the information contained therein. Sole responsibility lies with the authors.

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1 Executive Summary

The planning of training measures to improve the competitiveness of a sector and the employability of workers must be based on a reliable and continuous analysis of training needs.

In general, the current systems for detecting employment and training needs have significant shortcomings:

- They are in many cases static reports made at a certain date, which quickly become obsolete.
- They cannot be updated over time.
- They are based on small samples and not on the REALITY of job applications that occur.

Through the DETECTA project and the IT tool that has been built based on semantic intelligence and Big Data, it has been possible to develop a novel approach: training needs are not based on surveys, interviews, expert meetings, etc., but on data directly provided by companies through their JOB OFFERS. There is no point in activating measures in a sector if they are not aligned with what the labour market is demanding through its companies. Nor is it of much use to predict that in 5 years there will be a technological change that will create many jobs. It is now that we must respond to the current demands of companies and guide workers to the occupations for which they should be trained.

The development of the tool has led us to discover that there is no point in training an environmental technician if companies are intensively looking for plasterers because there are no people qualified to carry out this occupation and, furthermore, we are drawing this conclusion from a massive and continuous search of the job offers published by companies.

Based on the above premises, this report aims to offer a realistic view of issues such as:

- Most demanded skills in the construction sector
- State of the situation of the training offer.
- Evolution and trends in occupations in the sector.

2 Spanish Case

2.1 SKILLS MOST IN DEMAND IN JOB OFFERS

In the last 3 months, the most in-demand skills, from highest to lowest demand, are as follows:

- examining building materials
- working ergonomically
- following health and safety procedures in construction
- using measuring instruments
- transporting construction materials
- interpreting 2D drawings
- interpreting 3D drawings
- solving operational problems
- using safety equipment on construction sites
- testing products

If we go back three months, the ranking changes slightly, with certain trends becoming apparent:

- working ergonomically
- using measuring instruments
- examining construction materials
- following health and safety procedures in construction
- testing products
- using safety equipment on construction sites
- transporting construction materials
- interpreting 2D drawings
- interpreting 3D drawings
- solving operational problems

The skill related to "**examining building materials**" becomes more important. This skill is related to the growing need for product knowledge and its application in the corresponding constructions, i.e., less general and more sector-specific skills. Along these lines, "**transporting construction materials**" also becomes more relevant.

Specific competences are all those skills, knowledge, values, and thoughts required to perform a task or a job properly. In contrast to basic and general competences, they are only useful for a specific field, and to develop them it is necessary to undertake learning designed for them.

However, companies in the construction sector, despite being a sector with very different characteristics and skills, have a strong demand for **transversal skills** adapted to the sector. Among these, those related to the **prevention of occupational risks**, of obvious importance in the sector, stand out. This skill is due to socio-labour and regulatory changes that are already

well established, and it is impossible to conceive of any work that is not respectful of occupational risk prevention regulations in the sector in question.

Mainstreaming Health and Safety at Work in training means considering that, for workers to develop the competences to care for themselves and others, it is necessary to incorporate this perspective in all learning situations, as well as in the different stages and products that guide the work processes. This implies considering risks and their incidences, as well as healthy and safe working practices in relation to all work processes and each specific technical competence comprised in the professional profile.

Another transversal skill that appears in the ranking is "**solving operational problems**": Problem solving competence is the ability of an individual to engage in cognitive processing to understand and solve problematic situations where a simple solution is not so obvious. It includes the willingness to engage with such situations to achieve one's potential as a constructive and reflective citizen. (OECD, 2010) Developing analytical skills to be able to evaluate information or situations; Breaking problems down into their key components; Considering various ways of approaching and solving them and deciding which is most appropriate. Problem solving includes recognising the long-term consequences of solutions to problems and studying, developing, implementing, and evaluating a problem-solving action plan (Brewer, 2013). Moreover, it is the ability to use ordinary elements in a creative way to produce new and efficient solutions using divergent thinking.

2.2 MOST FREQUENTLY USED WORDS IN JOB OFFERS

An excellent approximation to the demand of companies is the concept of the most frequently used terms in the job offers tracked by the DETECTA software at any given time. At the time of writing, the ranking is made up of the following terms:

- officer
- maintenance
- electricians
- masons
- repairers
- installers

These are, as can be seen, terms that refer to **traditional occupations**. These tasks are carried out with conventional machine tools, technologically traditional processes or chains, hand tools or any other traditional production equipment. Despite the emerging occupations described in the WP2 reports, the reality indicates that most companies' requests are for traditional profiles and it is therefore essential that the training measures adopted include these occupations, among others.

2.3 WORDS THAT APPEAR MORE FREQUENTLY THAN IN THE PREVIOUS QUARTER

This information extracted from the tool shows the growing trend of terms related to occupations demanded by companies.

- maintenance
- official
- industrial
- electrician
- carpenters
- aluminium
- mechanic
- repair

Let us take a closer look at the term that appears at the top of the ranking: **maintenance**. At first glance, it would not seem to be an essential element in the demand of companies, however, the results of the DETECTA tool have been conclusive. The fact is that the term maintenance is closely related to the economic efficiency of the company.

The maintenance of equipment, machinery and facilities will help to increase the useful life of this equipment, thereby reducing the need for spare parts and minimising the annual cost of used material.

If machinery is not properly maintained, it can be damaged very frequently, considerably disrupting production schedules or worse, failing customers.

In the construction industry, machinery can be divided into small, medium, and large machines:

- *Small:* electric vibrators, combustion vibrators, pneumatic and electric hammers, rotary hammers.
- *Medium:* Vibro compactors, vibro plate, welder 180, rangers, mixers,
- *Large:* lighting towers, air compressors, double smooth rollers, mini loader, backhoe, electric lift.

According to the bibliography consulted, this equipment requires maintenance depending on the number of working hours, for small machines there are 100 working hours and for large machines there are 250 working hours for maintenance to be carried out.

In addition, they are given either preventive or corrective maintenance, in the case of the former it is a matter of changing oils, changing the oil mantle, cleaning the spark plugs, changing air and fuel filters, cleaning the carburettor and a general inspection of the equipment, this process can last a few hours.

In the case of corrective maintenance, this is the correction of breakdowns or faults when they occur. It is the repair after a breakdown that forced to interrupt the installation or machine affected by the failure.

For example, if the pinion shaft of a mixer is damaged, the equipment must be stopped, spare parts must be found, and this takes a long time to solve the problem. Or if the motor of an air compressor is damaged, pistons, rings and all the engine parts must be replaced. This maintenance can take 3 to 4 days.

2.4 MOST COURSES OFFERED

It is interesting to contrast the information analysed in the previous sections relating to the occupational field with the information provided by the DETECTA tool on the most frequent terms associated with training courses for employment. The ranking of current terms and associated courses is presented below.

Key words (terms in bold) and associated courses:

(Note: keywords and courses are ordered from most frequent to least frequent).

ORP (Occupational Risk Prevention, PRL in Spanish).

1. ORP FOR MASONRY WORK
2. ORP FOR WELDING WORK
3. ORP IN CEMENT WORKS
4. ORP FOR GYPSUM PLASTERING WORK
5. ORP FOR OPERATORS OF LIFTING EQUIPMENT
6. ORP FOR PLUMBING AND AIR-CONDITIONING INSTALLATION WORK.
7. ORP FOR MASONRY WORK (SPECIFIC PART)
8. ORP FOR ROAD MAINTENANCE AND OPERATION WORK.
9. ORP FOR WELDING WORK. SPECIFIC PART
10. ORP FOR MIDDLE MANAGEMENT IN CONSTRUCTION COMPANIES

GENERAL CONSTRUCTION

1. Planning in construction.
2. Construction representations.
3. INDUSTRIAL PAINTING IN CONSTRUCTION
4. Documentary control in construction.
5. BASIC LEVEL OF PREVENTION IN CONSTRUCTION
6. ORGANISATION OF PAINTING WORK IN CONSTRUCTION.
7. FLAT SCREEDS FOR CLADDING IN CONSTRUCTION.
8. ORP FOR MIDDLE MANAGEMENT IN CONSTRUCTION COMPANIES.
9. Painting, priming and protective materials in construction.
10. ORGANISATION OF RESOURCES AND TASKS ON CONSTRUCTION SITES.

BIM (Building Information Modelling)

1. BIM CIVIL
2. INTRODUCTION TO BIM METHODOLOGY
3. APPLICATION OF BIM TECHNOLOGY IN BUILDING PROJECTS
4. PRACTICAL APPLICATION OF BIM IN BUILDING PROJECTS WITH ALLPLAN
5. PRACTICAL APPLICATION OF BIM IN BUILDING PROJECTS WITH REVIT
6. CALCULATION AND DESIGN OF REVIT BIM STRUCTURES WITH CYPECAD
7. INTRODUCTION TO BIM. MODELLING PLATFORMS: REVIT AND ALLPLAN
8. BASIC BIM MODELLING IN BUILDING PROJECTS WITH REVIT
9. BIM MODELLING AND MANAGEMENT OF BIM INSTALLATIONS WITH REVIT MEP
10. CALCULATION AND DESIGN OF REVIT BIM INSTALLATIONS WITH CYPECAD MEP

WORKS

1. Layout of projects and works.
2. BUILDING ENVELOPE WORKS.
3. Exposed masonry works.
4. Building works for cladding.
5. SPECIFIC WORKS OF REHABILITATION IN BUILDING.
6. FOUNDATION AND STRUCTURAL WORKS IN CIVIL WORKS.
7. PARTITIONING AND FINISHING WORKS, AND INSTALLATIONS IN BUILDING CONSTRUCTION.
8. ORGANISATION OF RESOURCES AND WORKS IN CONSTRUCTION WORKS.
9. HEALTH AND SAFETY COORDINATOR IN CONSTRUCTION WORKS.
10. LAND PREPARATION WORKS, FOUNDATIONS AND STRUCTURE IN BUILDING WORK.

EDIFICATION

1. BUILDING ENVELOPE WORKS.
2. SPECIFIC REHABILITATION WORKS IN BUILDINGS.
3. APPLICATION OF BIM TECHNOLOGY IN BUILDING PROJECTS.
4. PARTITIONING AND FINISHING WORKS, AND INSTALLATIONS IN BUILDING.
5. PRACTICAL APPLICATION OF BIM IN BUILDING PROJECTS WITH ALLPLAN.
6. PRACTICAL APPLICATION OF BIM IN BUILDING PROJECTS WITH REVIT.
7. BASIC BIM MODELLING IN BUILDING PROJECTS USING REVIT
8. LAND PREPARATION WORKS, FOUNDATIONS AND STRUCTURE IN BUILDING WORK.

STRUCTURES

1. CALCULATION OF CONCRETE STRUCTURES WITH CYPECAD
2. LIGHT METAL STRUCTURE FOR ROOFS.
3. INTRODUCTION TO THE MODELLING OF STRUCTURES AND INSTALLATIONS WITH REVIT
4. CALCULATION OF STRUCTURES AND STRUCTURAL ELEMENTS WITH CYPE
5. FOUNDATION AND STRUCTURAL WORKS IN CIVIL ENGINEERING.
6. CALCULATION AND DESIGN OF REVIT BIM STRUCTURES WITH CYPECAD.
7. LAND PREPARATION WORKS, FOUNDATIONS AND STRUCTURE IN BUILDING WORK

ALBAÑILERÍA

1. Masonry work
2. ORP FOR MASONRY WORKS
3. ORGANISATION OF MASONRY WORKS FOR URBANISATION.
4. OPR FOR MASONRY WORK (SPECIFIC PART)
5. MASONRY WORK ON SEWERAGE INSTALLATIONS AND SERVICE NETWORKS.
6. TREATMENT OF SUBSTRATES FOR CLADDING IN CONSTRUCTION

FRAMING

1. ERECTION OF VERTICAL FORMWORK.
2. SETTING OF HORIZONTAL FORMWORK.
3. PRE-ASSEMBLY OF NON-MODULAR FORMWORK PANELS.
4. PRE-ASSEMBLY AND ERECTION OF CLIMBING FORMWORK.
5. ORGANISATION OF FORMWORK AND CONCRETE ERECTION WORK.
6. ON-SITE SETTING OF FORMS, PASSIVE ARMOURS AND CONCRETE. 9711-4102-AEOB-:evc OFFICIAL STATE BULLETIN No. 31 Wednesday, February 5, 2014 Sec. I. Page 8634

CONCRETE

1. LAYING OF CONCRETE.
2. CALCULATION OF CONCRETE STRUCTURES WITH CYPECAD
3. PRINTED CONCRETE PAVING AND COBBLESTONES.
4. PASTES, MORTARS, ADHESIVES AND CONCRETES.
5. ORGANISATION OF FORMWORK AND CONCRETE INSTALLATION WORK.
6. FORMWORK, PASSIVE REINFORCEMENT AND CONCRETE INSTALLATION ON SITE.

PAVEMENTS

1. URBANISATION PAVEMENTS.
2. RAISED ACCESS PAVEMENTS.
3. LIGHT PAVING WITH CONTINUOUS SUPPORT.
4. PRINTED CONCRETE AND COBBLESTONE PAVEMENTS.
5. FURNITURE AND COMPLEMENTARY ELEMENTS OF PAVING IN URBANISATION.
6. CONTINUOUS RESIN PAVING

COVERS

1. ROOF SKIRTS.
2. TILE AND SLATE ROOFS.
3. FLAT ROOFS AND WATERPROOFING SYSTEMS.
4. LIGHT METAL STRUCTURE FOR ROOFS.
5. ORGANISATION OF ROOFING AND WATERPROOFING WORKS.

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2. CALCULATION OF STRUCTURES AND STRUCTURAL ELEMENTS WITH CYPE
3. CALCULATION AND DESIGN OF REVIT BIM STRUCTURES WITH CYPECAD
4. CALCULATION AND DESIGN OF REVIT BIM INSTALLATIONS WITH CYPECAD MEP

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1. ERECTION OF TUBULAR SCAFFOLDING
2. BASIC TASKS IN THE ERECTION OF TUBULAR SCAFFOLDING.
3. ORGANISATION AND SUPERVISION OF THE ERECTION OF TUBULAR SCAFFOLDING.

ASSEMBLY

1. MANUAL ASSEMBLY AND ASSEMBLY OF REINFORCEMENT.
2. ORGANISATION OF PASSIVE REINFORCEMENT WORK.
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1. MEASUREMENTS AND BUDGETING WITH REVIT AND PRESTO (COST-IT)
2. Cost control in construction.

MEMBRANES

1. SYNTHETIC MEMBRANES
2. BITUMINOUS MEMBRANES

FOUNDATION

1. FOUNDATION AND STRUCTURAL WORKS IN CIVIL WORKS.
2. GROUND PREPARATION WORKS, FOUNDATIONS AND STRUCTURE IN BUILDING CONSTRUCTION.

2.5 RECOMMENDED ADJUSTMENTS OF TRAINING SUPPLY AND COMPANY DEMAND

Let us remember and analyse the correspondence between the skills most in demand by companies and the response that the training offer is providing.

- WORK ERGONOMICALLY, USE SAFETY EQUIPMENT ON CONSTRUCTION SITES and RESPECT HEALTH AND SAFETY PROCEDURES IN CONSTRUCTION. In this case, the alignment between the demand from companies and the existing training offer is very clear. It is a fact that the most frequently offered courses are related to health and safety at work and occupational risk prevention.

- EXAMINING CONSTRUCTION MATERIALS AND TRANSPORTING CONSTRUCTION MATERIALS. This competence is widely present in the course offerings, not directly expressed under the term "materials", but in all categories addressing specific "product" competences, in which the following are being trained:

    - Masonry.
    - Formwork.
    - Concrete.
    - Flooring.
    - Roofing.
    - Scaffolding.
    - Reinforcement.
    - Membranes.
    - Foundations.

- USING MEASUREMENT INSTRUMENTS. This is one of the skills with the least presence in the sector's training offer, so it is essential to take action to remedy the deficit detected.

- INTERPRET 2D PLANS and INTERPRET 3D PLANS. Although not explicitly, both the Structures and Calculation categories represent related courses. However, the interpretation of plans specifically constitutes one of the areas not adequately covered by the sector's training offer.

- SOLVING OPERATIONAL PROBLEMS. This is a case of a transversal competence which, unlike occupational risk prevention, is very little present in the sector's training offer. In what has been studied of the sector, we have detected a lack of importance given by the entities promoting training in the construction sector to transversal skills that are increasingly present in other sectors of activity. There are initiatives such as Keystart2Work, promoted by the Erasmus+ programme, which identifies the key competences that need to be addressed in the field of training:

    - Intercultural skills and global awareness.
    - Flexibility and adaptability.
    - Strategic and innovative thinking.
    - Organisation and time management.
    - Decision-making.
    - Teamwork.
    - Empathy / Ability to build relationships.
    - Problem solving.
    - Learning orientation.
    - Negotiation skills.
    - Leadership.
    - Information gathering and processing.

- TESTING PRODUCTS. This skill is not considered in any of the categories analysed. Therefore, it requires training measures.

3 Belgianand French Cases

3.1 SKILLS MOST IN DEMAND IN JOB OFFERS

In the last 3 months, the most in-demand skills, from highest to lowest demand, are as follows:

- inspecting construction materials
- work ergonomically
- follow construction health and safety procedures
- use measuring instruments
- interpret 2D drawings
- interpret 3D drawings
- using construction safety equipment
- transport construction materials
- perform troubleshooting
- ensure availability of equipment

If we go back three months, the ranking changes slightly, with certain trends becoming apparent:

- work ergonomically
- use measuring instruments
- inspecting construction materials
- follow construction health and safety procedures
- carry out functional tests
- use construction safety equipment
- transport construction materials
- interpret 2D drawings
- interpret 3D drawings
- perform troubleshooting

However, companies in the construction sector, despite being a sector with very different characteristics and skills, have a strong demand for **transversal skills** adapted to the sector. Among these, those related to the **prevention of occupational risks**, of obvious importance in the sector, stand out. This skill is due to socio-labour and regulatory changes that are already well established, and it is impossible to conceive of any work that is not respectful of occupational risk prevention regulations in the sector in question.

As in the Spanish case, the skill related to "**examining building materials**" becomes more important. This skill is related to the growing need for product knowledge and its application in the corresponding constructions, i.e., less general and more sector-specific skills. Along these lines, "**transporting construction materials**" also becomes more relevant.

Specific competences are all those skills, knowledge, values, and thoughts required to perform a task or a job properly. In contrast to basic and general competences, they are only useful for a specific field, and to develop them it is necessary to undertake learning designed for them.

Un aspecto particular del caso que analizamos es que cobran en los últmos meses más importancia las habilidades específicas relacionadas con "**interpretar dibujos 2D y 3D"** que tiene relación con la planificación de proyectos y que denotan un incremento de la promoción de actividades inmobiliarias. Observando los planos en 2D y 3D se pueden detectar futuros fallos y posibles soluciones, con lo cual se consigue ahorrar tiempo a la hora de estar el constructor en la reforma y dinero al tener todos los oficios que deben hacer en la reforma bien claros, y no gastar más horas y dinero replanteando cuestiones.

However, as in the Spanish case, However, companies in the construction sector, despite being a sector with very different characteristics and skills, have a strong demand for **transversal skills** adapted to the sector. Among these, those related to the **prevention of occupational risks**, of obvious importance in the sector, stand out. This skill is due to socio-labour and regulatory changes that are already well established, and it is impossible to conceive of any work that is not respectful of occupational risk prevention regulations in the sector in question.

Mainstreaming Health and Safety at Work in training means considering that, for workers to develop the competences to care for themselves and others, it is necessary to incorporate this perspective in all learning situations, as well as in the different stages and products that guide the work processes. This implies considering risks and their incidences, as well as healthy and safe working practices in relation to all work processes and each specific technical competence comprised in the professional profile.

Another transversal skill that appears in the ranking is "**solving operational problems**": Problem solving competence is the ability of an individual to engage in cognitive processing to understand and solve problematic situations where a simple solution is not so obvious. It includes the willingness to engage with such situations to achieve one's potential as a constructive and reflective citizen. (OECD, 2010) Developing analytical skills to be able to evaluate information or situations; Breaking problems down into their key components; Considering various ways of approaching and solving them and deciding which is most appropriate. Problem solving includes recognising the long-term consequences of solutions to problems and studying, developing, implementing, and evaluating a problem-solving action plan (Brewer, 2013). Moreover, it is the ability to use ordinary elements in a creative way to produce new and efficient solutions using divergent thinking.

3.2 MOST FREQUENTLY USED WORDS IN JOB OFFERS

An excellent approximation to the demand of companies is the concept of the most frequently used terms in the job offers tracked by the DETECTA software at any given time. At the time of writing, the ranking is made up of the following terms:

- mechanic
- plumber
- electrician
- bricklayer
- carpenter
- electrician

These are, as can be seen, terms that refer to **traditional occupations**. These tasks are carried out with conventional machine tools, technologically traditional processes or chains, hand tools or any other traditional production equipment. Despite the emerging occupations described in the WP2 reports, the reality indicates that most companies' requests are for traditional profiles and it is therefore essential that the training measures adopted include these occupations, among others.

There are notable differences with respect to the Spanish case. The concepts of mechanic, plumber or electrician only appear in the French case. However, they are not among the most frequently used terms in job offers for maintenance or repair, which is the case in Spain.

3.3 WORDS THAT APPEAR MORE FREQUENTLY THAN IN THE PREVIOUS QUARTER

Through this information extracted from the tool, it is possible to observe the growing trend of terms related to occupations demanded by companies. The following stand out above the rest:

- carpenter
- plumber
- fitter

It should be noted that, compared to the Spanish case, the terms plumber and installer are new and characteristic of Belgium and France. Focusing on the concept of installer, it can cover many areas: electrician, appliances, gas, air conditioning, etc. However, it is a term that is very frequently used for domotics, solar panels, thermal insulation, etc., which would point to changes in the sector.

3.4 MOST COURSES OFFERED

It is interesting to contrast the information analysed in the previous sections relating to the occupational field with the information provided by the DETECTA tool on the most frequent terms associated with training courses for employment. The ranking of current terms and associated courses is presented below.

Key words (terms in bold) and associated courses:

(Note: keywords and courses are ordered from most frequent to least frequent).

CPA (Certificate of Professional Aptitude, CAP in Spanish):

1. Mosaic tile setter CAP
2. CAP bricklayer
3. CAP Plastering and Insulation Trades
4. CAP Mobile Structures Assembler
5. CAP plasterer-plasterer
6. CAP floor layer
7. CAP staffeur-ornemaniste
8. CAP stone cutter

Electrician:

1. Electrical installer - fitter
2. Electrical installer - fitter
3. Industrieel Elektrotechnisch Installer - industrial electrician
4. Residential Electrical Installer
5. Installer - Residential Electrician
6. Residential Electrical Installer
7. Residentieel Elektrotechnisch Installer / Residential Electrician

Heating:

1. Heating: boiler repair
2. Heating: ILL GI boiler technician
3. Heating: boiler technician GII
4. Heating: Boiler technician ILL
5. Boiler technician G1 and L EPB
6. Heating Technician - Liquid and gaseous fuel boiler

BIM:

1. BIM (Building Information Modelling/Modelling/Management) REVIT: Consultation
2. BIM (Building Information Modelling/Modelling/Management) REVIT: full training
3. BIM (Building Information Modelling/Modelling/Management) REVIT: presentation
4. BIM Coordinator
5. BIM Revit MEP modelling
6. BIM Revit (short modules)

Consultant:

1. Home Automation and Smart Home Advisor
2. Energy consultant
3. BEP Advisor
4. EPB Advisor: Retraining III (e-learning)
5. ILL Advisor: Refresher III

Tiler:

1. Tiler
2. Tiler
3. Tiler: Tiler
4. Tiler: preparation for the Validation of Competences

Tile setter:

1. Site manager
2. Asset manager
3. Construction technician - execution oriented | Construction technician - execution oriented
4. Building technician - preparation-oriented | Building technician - preparation-oriented | Building technician - preparation-oriented

Carpenter:

1. Carpentry: previous training
2. Carpentry worker
3. Joiner: previous training
4. Carpentry techniques

AutoCAD:

1. AutoCad
2. Autocad (short modules)
3. AutoCAD (short modules)
4. CAD Autocad

Architect:

1. Global interior designer
2. Interior designer
3. Architect interior designer

3.5 RECOMMENDED ADJUSTMENTS OF TRAINING SUPPLY AND COMPANY DEMAND

Let us remember and analyse the correspondence between the skills most in demand by companies and the response that the training offer is providing.

- WORK ERGONOMICALLY, USE SAFETY EQUIPMENT ON CONSTRUCTION SITES and RESPECT HEALTH AND SAFETY PROCEDURES IN CONSTRUCTION. In this case, the alignment between the demand of companies and the existing training offer is null. In the ranking, there is no training offer related to health and safety at work. This may be because, being a skill in demand by companies, very good training work has been carried out in this area for years and it no longer makes sense to continue offering this type of course. Or it may also be the case that the training supply market is not responding to the labour market and courses related to the main requirement of companies are not being offered.

- INTERPRETING 2D AND 3D DRAWINGS. This specialised skill set, which is particularly prominent in the Belgian/French case, is indeed being met with a response in the field of training. Two areas such as BIM modelling and AutoCAD are among the highest ranked in terms of training provision, responding to the demand from companies.

- EXAMINING CONSTRUCTION MATERIALS. This competence is hardly present in the range of courses on offer; there are no training areas directly related to materials, except for those related to tiling or tile installation. In the Spanish case, there was clearly a training response through areas such as Formwork, Concrete, Roofing, Membranes, Foundations, which in this case are not observed.

  In contrast, the Belgian/French offer is much more focused on specific occupations, the most frequent of which are the following:
  - Electrician
  - Heating
  - Carpenter
  - Air conditioning installer.

- USING MEASUREMENT INSTRUMENTS. This is one of the skills with the least presence in the sector's training offer, which is why it is essential to take action to remedy the deficit detected.

- SOLVING OPERATIONAL PROBLEMS. This is a case of a transversal competence which, unlike occupational risk prevention, is very little present in the sector's training offer. In what has been studied of the sector, we have detected a lack of importance given by the entities promoting training in the construction sector to transversal skills which are increasingly present in other sectors of activity. There are initiatives such as Keystart2Work, promoted by the Erasmus+ programme, which identifies the key competences that need to be addressed in the field of training:
    - Intercultural skills and global awareness.
    - Flexibility and adaptability.
    - Strategic and innovative thinking.
    - Organisation and time management.
    - Decision-making.
    - Teamwork.
    - Empathy / Ability to build relationships.
    - Problem solving.
    - Learning orientation.
    - Negotiation skills.
    - Leadership.
    - Information gathering and processing.

Finally, if we carry out the reverse analysis, there is an important training offer, not mentioned above, which corresponds to skills that are not predominant in the sector. Among the most important areas, we can highlight the following:

- Consultant
- Architect.

4 Irish Case

Before analysing the Irish case, it should be noted that this is a geographical area where there is not a large centralisation of training offers in a reference portal, nor is the EURES job portal widely used. Therefore, the results analysed correspond to small samples and are less conclusive than in the cases analysed above.

4.1 SKILLS MOST IN DEMAND IN JOB OFFERS

In the last 3 months, the most in-demand skills, from highest to lowest demand, are as follows:

- inspect construction supplies
- work ergonomically
- follow health and safety procedures in construction
- use measurement instruments
- interpret 2D plans
- interpret 3D plans
- troubleshoot
- use safety equipment in construction
- transport construction supplies
- ensure equipment availability

If we go back three months, the ranking changes slightly, with certain trends becoming apparent:

- work ergonomically
- use measurement instruments
- inspect construction supplies
- follow health and safety procedures in construction
- perform test run
- use safety equipment in construction
- transport construction supplies
- interpret 2D plans
- interpret 3D plans
- troubleshoot

As in the other cases analysed, skills related to "**construction supplies**" are becoming more important. This skill is related to the increasing need for product knowledge and its application in the corresponding constructions, i.e., less general and more sector-specific skills. Specific competences are all those skills, knowledge, values, and thoughts required to perform a task or a job properly. Unlike basic and general competences, they are only useful for a specific field, and in order to develop them it is necessary to carry out learning designed for them.

Another remarkable aspect, which also appeared in the Belgian/French case, is the increasing rise of specific skills related to "interpreting 2D and 3D drawings" which are related to project planning and which show an increase in the promotion of real estate activities. By looking at 2D and 3D drawings, future faults and possible solutions can be detected, thus saving time for the builder in the renovation and money by having all the trades to be done in the renovation clear, and not spending more hours and money rethinking issues.

However, just like the other cases, companies in the construction sector, despite being a sector with very different characteristics and skills, have a strong demand for **transversal skills** adapted to the sector. Among these, those related to the **prevention of occupational risks**, of obvious importance in the sector, stand out. This skill is due to socio-labour and regulatory changes that are already well established, and it is impossible to conceive of any work that is not respectful of occupational risk prevention regulations in the sector in question.

Mainstreaming Health and Safety at Work in training means considering that, for workers to develop the competences to care for themselves and others, it is necessary to incorporate this perspective in all learning situations, as well as in the different stages and products that guide the work processes. This implies considering risks and their incidences, as well as healthy and safe working practices in relation to all work processes and each specific technical competence comprised in the professional profile.

Another transversal skill that appears in the ranking is "**solving operational problems**": Problem solving competence is the ability of an individual to engage in cognitive processing to understand and solve problematic situations where a simple solution is not so obvious. It includes the willingness to engage with such situations to achieve one's potential as a constructive and reflective citizen. (OECD, 2010) Developing analytical skills to be able to evaluate information or situations; Breaking problems down into their key components; Considering various ways of approaching and solving them and deciding which is most appropriate. Problem solving includes recognising the long-term consequences of solutions to problems and studying, developing, implementing, and evaluating a problem-solving action plan (Brewer, 2013). Moreover, it is the ability to use ordinary elements in a creative way to produce new and efficient solutions using divergent thinking.

4.2 MOST FREQUENTLY USED WORDS IN JOB OFFERS

An excellent approximation to the demand of companies is the concept of the most frequently used terms in the job offers tracked by the DETECTA software at any given time. At the time of writing, the ranking is made up of the following terms:

- electrician
- production
- supervisor
- air installations
- laboratory

As can be seen, these terms refer to general occupations, identified through transversal terms such as production, supervisor, or laboratory. However, two very specific "occupations" stand out, such as electrician or air installation technician.

4.3 WORDS THAT APPEAR MORE FREQUENTLY THAN IN THE PREVIOUS QUARTER

Through this information extracted from the tool, it is possible to observe the growing trend of terms related to occupations demanded by companies. The following stand out above the rest:

- electrician
- production
- supervisor
- air installations
- laboratory
- chemical analyst
- business management

Dos términos que no se encuentran todavía entre los más utilizados en las ofertas de trabajo, pero sí siguen una tendencia creciente son:

- Supervisor, who is the person whose function is to supervise and monitor the work related to a construction site, complying with, and enforcing the applicable regulations. He/she is also in charge of verifying the time and work carried out.
- Chemical analyst: this is related to "laboratory" work. This involves characterising construction materials in accordance with current regulations: cements, concretes, plasters, limes, metals (steels) and plastics.
- Management of the construction business, where specific issues such as the importance of prior planning and research, communication, time & cost management stand out.

4.4 MOST COURSES OFFERED

It is interesting to contrast the information analysed in the previous sections relating to the occupational field with the information provided by the DETECTA tool on the most frequent terms associated with training courses for employment. The ranking of current terms and associated courses is presented below.

Key words (terms in bold) and associated courses:

(Note: keywords and courses are ordered from most frequent to least frequent).

Welding:

- Skills To compete - Welding Intermediate
- Skills to Compete - Welding - MMA Flat-Horizontal - Plate Short course Dundalk
- Skills to Compete - Construction Ground Work Skills
- content Plate Short course
- Construction Ground Work Skills-Skills to Compete
- Skills To Compete - Welding/Fabrication
- Skills To Compete - Engineering Skills
- Skills to Compete - Plant Machinery Operator Ticket (New Entrant))
- Skills to Compete - Intermediate Welding EN9606/ASME IX
- Skills to Compete - Coded Plate and Intermediate Pipe Welding

Sustainable Construction:

- Construction Groundworks Skills and Maintenance
- Sustainable Construction Technologies
- Construction Ground Work Skills - SP4
- Traditional Stonewall Construction
- Sustainable Construction Technologies
- Construction Groundworks Skills and Maintenance
- Sustainable Construction Technologies

Gas

- Domestic Gas Safety
- Domestic Solar Hot Water Systems Installation
- Domestic Heat Pump Installation
- *RGI* Gas Installer Reassessment and Training

Computer design

- Computer Aided Design and Manufacturing RSTC
- CAD - Computer Aided Draughting and Design

Automation:

- Robotic Process Automation Developer Foundation
- Electrical & Programmable Automation

Others:

- Curtain Wall/Glazing Installer
- Kerb and Flag Paviour Laying
- Steel Fixing
- Cleanroom and Packaging Operations Traineeship

4.5 RECOMMENDED ADJUSTMENTS OF TRAINING SUPPLY AND COMPANY DEMAND

Let us remember and analyse the correspondence between the skills most in demand by companies and the response that the training offer is providing.

- inspect construction supplies
- use measurement instruments
- troubleshoot
- transport construction supplies
- ensure equipment availability

- INTERPRETING 2D PLANS and INTERPRETING 3D PLANS. Although not explicitly, the Computer design category represents courses related to 2D and 3D drawings.
- WORK ERGONOMICALLY, USE SAFETY EQUIPMENT ON CONSTRUCTION SITES and COMPLY WITH CONSTRUCTION HEALTH AND SAFETY PROCEDURES. In this case, as in the Belgian/French case, the alignment between companies' demand and the existing training offer is null. It is not present in the ranking of training provision related to health and safety at work. This may be because, being a skill in demand by companies, very good training work has been carried out in this area for years and it no longer makes sense to continue offering this type of course. Or it could also be the case that the training supply market is not responding to the labour market and courses related to the main requirement of enterprises are not being offered.
- The competence to use measuring instruments is related to a thriving training area in the sector's training offer, such as process automation, which reaches its highest level through the increasing robotisation of processes.INTERPRETAR PLANOS EN 2D e INTERPRETAR PLANOS EN 3D. Aunque no de forma explícita, la categoría de Computer design representa cursos relacionados con los planos en 2D y 3D.

- The competences related to transport and inspection of supplies are related to courses offered with a more traditional character such as:

- Curtain Wall/Glazing Installer
- Kerb and Flag Paviour Laying
- Steel Fixing

- - The problem-solving competence is a transversal competence which, unlike occupational risk prevention, is very little present in the sector's training offer, despite its growing presence in any sector of activity.

Finally, if we carry out the reverse analysis, there is an important training offer, not mentioned above, which corresponds to very specific skills in the sector. We can highlight the following:

- Welding
- Gas installations.

The knowledge area of Sustainable Construction deserves a special mention, which does not yet have a large number of job offers, but which, through the increasingly important training offer, points to an upward trend, mainly due to regulatory, social and environmental changes.

5 Conclusiones: plan de intervención

Todo plan de intervención en el ámbito formativo sigue una metodología análoga a la propuesta por la herramienta informática DETECTA, que se sintetiza en las siguientes etapas:

1. Orientación profesional y/o análisis de necesidades formativas.

2. Organización e impartición de acciones formativas.

1.- Orientación profesional y/o análisis de necesidades formativas.

Habitualmente la orientación profesional está pensada para todas aquellas personas en período de transición laboral o que tienen inquietudes respecto a elecciones ya realizadas y desean repensar su lugar en el mundo laboral, elegir una nueva formación o empleo o conseguir un nuevo puesto de trabajo.

Este proceso debería realizarse de manera continua a lo largo de la vida de las personas (y no sólo durante los períodos de crisis o transición), ya que puede resultar ampliamente beneficiosa para el establecimiento y la consecución de metas.

Además, debemos tomar en cuenta que en la actualidad una transición de carrera no es un hecho aislado, seguido o precedido por momentos de calma. Actualmente vivimos de transición en transición, por lo que debemos aceptar que el cambio es lo normal y no la excepción y más en sectores que evolucionan constantemente como el sector de la construcción.

Entendemos la **orientación profesional** como el proceso mediante el cual una persona recibe la ayuda o guía necesaria para alcanzar un profundo conocimiento sobre sí misma, sobre sus valores, sus intereses, sus gustos, sus capacidades, sus aptitudes.

Existen muchas variables personales que salen reforzadas tras un proceso de orientación, como la autoestima, las expectativas de éxito, la motivación de búsqueda, la autoeficacia, la confianza y la seguridad de la persona para afrontar nuevos procesos de selección.

La orientación profesional puede ayudar, por ejemplo, a:

- Conocerte mejor a vos misma/o: tus intereses, aptitudes, habilidades, tus debilidades, etc.
- Esclarecer tu vocación y definir tus objetivos personales: ¿qué es lo que realmente quiero profesionalmente?
- Planificar los pasos necesarios para alcanzarlos: ¿cómo voy a alcanzar aquello que quiero para mi vida laboral?
- Aprender a tomar decisiones, aumentando la autonomía.
- Conocer la situación del mercado laboral actual, ya sea local, nacional y/o internacional.
- Integrar el proyecto profesional en el proyecto vital, contribuyendo al desarrollo personal.
- Desarrollar las competencias necesarias para alcanzar el éxito laboral.

- Afrontar las etapas de transición (formación/empleo, empleo/desempleo o empleo/jubilación).

La herramienta DETECTA sustentada en las tecnologías de inteligencia artificia y BigData, es un excelente apoyo de orientación profesional para trabajadores del sector de la construcción, personas desempleadas que desean integrarse en el sector o empresas que esperan conocer hacia dónde dirigir sus planes de formación. Por tanto, desde nuestro punto de vista puede constituir un pilar fundamental del plan de intervención del sector.

DETECTA actúa elaborando recomendaciones de itinerarios formativos, según la siguiente secuencia de procesamiento del siguiente tipo de información:

- Información personal. Los datos a rellenar son los que aparecen en el siguiente pantallazo: nombre, apellidos, dirección, país, región, sitio web, etc.
- Habilidades personales. Información de capacidades y experiencia del usuario (experiencia profesional, permiso de conducir, lengua materna, idioma extranjero, nivel…)
- Educación. Formación adquirida por el usuario en el tiempo: titulación reglada, formación para el empleo y otros cursos.
- Expectativas: Ocupaciones a las que desearía migrar o competencias que quiere adquirir.

2.- Organización e impartición de acciones formativas.

Una vez que la persona, empresa, centro de formación u organización representativa del sector conoce hacia dónde dirigir sus esfuerzos de formación, es el momento de:

- Buscar cómo satisfacer las necesidades formativas que a través de la orientación laboral se han detectado (caso trabajadores y empresas).
- Promover acciones formativas en línea con los resultados que la herramienta ofrece acerca de las verdaderas demandas y requisitos de las empresas en sus ofertas de empleo.

De nuevo, DETECTA actúa como una potente herramienta ya que:

- Ofrece en tiempo real acciones formativas que se van a impartir, de forma que tanto personas como empresas pueden incorporarse a las mismas, con el fin de incrementar su empleabilidad.
- Ofrece en tiempo real información relevante para centros de formación y organizaciones del sector que determinan qué acciones formativas cubrirían la adquisición de capacidades que están siendo demandadas por el mercado laboral.

Basándonos en el análisis realizado con la herramienta DETECTA durante diciembre de 2020 se pueden encontrar varios **puntos comunes** entre los países analizados.

Es preciso impulsar todo tipo de información que esté relacionada con materiales y oficios tradicionales de la construcción. Existe lo que se puede denominar un efecto migratorio del

sector hacia otros ámbitos y una falta de atractivo del sector para los jóvenes. Es preciso fomentar y prestigiar los diferentes oficios del sector y favorecer la cualificación para los mismos. En los países analizados se encuentran ocupaciones comunes con déficits formativos:

- Albañiles.
- Encofradores.
- Instaladores de andamios.
- Electricistas
- Técnicos de climatización.
- Carpinteros.

Otro ámbito donde es común la necesidad de impulsar actuaciones formativas es interpretación de planos 2d e interpretación de planos 3d, estrechamente relacionada con cambios tecnológicos del sector.

Una tercera área a potenciar es la competencia transversal de resolución de problemas. Se trata de una competencia que está muy poco presente en la oferta formativa del sector.A nivel general, en lo que se ha estudiado del sector, se ha detectado una falta importante de oferta formativa en el sector dirigida a a la adquisición de competencias transversales que cada vez más presentes cualquier sector de actividad: organización y gestión del tiempo, toma de decisiones, trabajo en equipo, liderazgo, etc.

Finalmente, otra competencia muy particular con escasa presencia en la oferta formativa del sector es la utilización de instrumentos de medida., por lo que es imprescindible actuar en este sentido para subsanar el déficit detectado. -

Y también se han encontrado **elementos particulares** por paises:

España

- Trabajar ergonómicamente, utilizar equipos de seguridad en las obras y respetar los procedimientos de seguridad y salud en la construcción es una de las áreas claramente a potenciar desde un punto de vista formativo.

Bélgica / Francia

- Utilización de instrumentos de medida. Se trata de una de las competencias con menor presencia en la oferta formativa del sector, por lo que es imprescindible actuar para subsanar el déficit detectado.

Irlanda

- Transporte y la inspección de suministros
- Construcción sostenible.