## Erasmus+

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IO 01 - BBE COMPETENCES NAVIGATOR

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Authors
Hans Blankestijn, Elke Halm, Frank Hiddink, Canice Hamill, Hilda Weges
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List of competences and skills

## BioComp - List for competences and skills

## Introduction

Dear reader,

Probably, you have filled in our online ranking list for BBE related competences and uploaded to the BioComp website. Thank you for your valuable contribution to our project BioComp. It aims to develop Bio-based competences and skills. Based on a big number of interviews in companies, we have developed a long-list of competences and skills. These are divided in three categories: personal, transversal and technical competences and skills.

In the ranking list, you only see competences. May-be you get interested in competences and you like to know more about it. On our website www.Biocompetences.eu you find more background information, including this document. It is about the connection between competences and skills.

## List of competences and skills

## I Personal competences

In this project, we consider personal competences as a combination of self-awareness (emotional self-aware, accurate self-assessment and selfconfidence) and self-management (control of your emotions, having commitment and being conscientious). These competences are important to function in a certain job. Related to these competences are the social competences, with a focus on self-awareness and relation-management. Other documents also speak about 'soft skills' or 'emotional intelligence'.

| Topics | Competences | Skills |
| :--- | :--- | :--- |
| Self-regulation | The ability to understand, activate, monitor, control and adapt <br> emotions, thoughts, attention, behaviour and cognitive strategies. | Being able to remain calm and rational in most situations and exercise <br> discipline when needed. People with self-control tend to think before they |


|  |  | act because they are more aware of how they react or feel in most situations <br> and how that impacts others. |
| :--- | :--- | :--- |
| Empathy | The ability to understand, vicariously experience and respond to <br> another person's feelings, emotions and thoughts (emotional, cognitive <br> and perspective taking). | Being able to put yourself into someone else's place, and see their <br> perspective (Cognitive empathy, also known as 'perspective-taking). |
| Growth Mindset | Being motivated to reach higher levels of achievement by continuously <br> learning new skills in order to move with a changing market. Essentially, <br> it is being adaptable and willing to go above and beyond the soft and <br> hard skills you already have. | To be able to grow and adapt to changes within your industry and the job <br> market as a whole. |
| Wellbeing | Achieving a state of contentment, with low levels of distress, overall <br> good physical and mental health, and good quality of life | Enjoy living morally and ethically, and value being able to be brave, self- <br> controlled, generous, etc. Not for the external rewards and recognition, but <br> because living in this way is the right thing to do and brings its own rewards. |
| Adaptability | The ability to be flexible and respond positively to a rapidly evolving <br> environment, coming out the better for it (bouncing forward). | Having flexibility in handling change, being able to juggle multiple demands, <br> and adapting to new situations with fresh ideas or innovative approaches. |
| Collaboration | Being part of a relational system in which two or more stakeholders <br> pool together resources, ideas and actions to meet common goals that <br> neither could meet individually - with shared commitment and <br> ownership. | Being able to work effectively with others on a common task; taking actions <br> which respect the needs and contributions of others; contributing to and <br> accepting the consensus; negotiating a win-win solution to achieve the <br> objectives of the team. |
| Communication | Using words, sounds, signs, or behaviours to express or exchange <br> information, thoughts, ideas, feelings to someone else. It may be <br> vocally (using voice), written (using printed or digital media such as <br> books, magazines, websites or emails), visually (using logos, maps, <br> charts or graphs) or non-verbally (using body language, gestures and <br> the tone and pitch of voice). | The ability to communicate information accurately, clearly and as intended |

## II Transversal competences

Several competences and skills are transferable between professions. People also used to call "experience". In this list, they are described as transversal competences and skills.
Examples from transversal competences in our Navigator are digital competences and entrepreneurial competences.
For subjects such as quality assurance, marketing and management, these competences are essential. The combination of the right personal and transversal competences makes from a worker a good worker.

## II.a Digital competences

| Topics | Competences | Skills |
| :--- | :--- | :--- |
| Information and <br> Data Literacy | Managing data, information and digital content: To organise, store and <br> retrieve data, information, and content in digital environments. To <br> organise and process them | Independently, according to my own needs, and solving well-defined and <br> non-routine problems, I can: <br> - organise information, data and content to be easily stored and retrieved. <br> - organise information, data and content in a structured environment |
| Communication | Interacting through digital technologies: To interact through a variety of <br> digital technologies and to understand appropriate digital <br> communication | On my own and solving straightforward problems, I can: <br> - perform well-defined and routine interactions with digital technologies, <br> and <br> - select well-defined and routine appropriate digital communication means <br> for a given context. |
| Collaboration | Collaborating through digital technologies: To use digital tools and <br> technologies for collaborative process, and for co-construction and co- <br> creation of data. | Independently, according to my own needs, and solving well-defined and <br> non-routine problems, I can: <br> • select digital services in order to participate in society. <br> $\bullet$ discuss appropriate digital technologies to empower myself and to <br> participate in society as a citizen. |


| Safety | Protecting devices: To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security | On my own and solving straightforward problems, I can: <br> - indicate well-defined and routine ways to protect my devices and digital content, <br> - differentiate well-defined and routine risks and threats in digital environments, <br> - select well-defined and routine safety and security measures. <br> - indicate well-defined and routine ways to have due regard to reliability and privacy |
| :---: | :---: | :---: |
| Safety | Protecting personal data and privacy: To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used. | On my own and solving straightforward problems, I can: <br> - explain well-defined and routine ways to protect my personal data and privacy in digital environments, and <br> - explain well-defined and routine ways to use and share personally identifiable information while protecting myself and others from damages. <br> - indicate well-defined and routine privacy policy statements of how personal data is used in digital services. |
| Safety | Protecting the environment: To be aware of the environmental impact of digital technologies and their use. | On my own and solving straightforward problems, I can: <br> - indicate well-defined and routine environmental impacts of digital technologies and their use. |
| Problem solving | Solving technical problems: To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems). | Independently, according to my own needs, and solving well-defined and non-routine problems, I can: <br> - differentiate technical problems when operating devices and using digital environments, and <br> - select solutions to them |
| Problem solving | Identifying needs and technological responses <br> Please rate your ability: To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility). | Independently, according to my own needs, and solving well-defined and non-routine problems, I can: <br> - explain needs, and <br> - select digital tools and possible technological responses to solve those needs. <br> - select ways to adjust and customise digital environments to personal needs. |


| Problem solving | Creatively using digital technology: To use digital tools and technologies <br> to create knowledge and to innovate processes and products. To <br> engage individually and collectively in cognitive processing to <br> understand and resolve conceptual problems and problem situations in <br> digital environments. | On my own and solving straightforward problems, I can: <br> • select digital tools and technologies that can be used to create well-defined <br> knowledge and well-defined innovative processes and products. <br> - engage individually and collectively in some cognitive processing to <br> understand and resolve well-defined and routine conceptual problems and <br> problem situations in digital environments. |
| :--- | :--- | :--- |
| Problem solving | Identifying digital competence gaps : To understand where one's own <br> digital competence needs to be improved or updated. To be able to <br> support others with their digital competence development. To seek <br> opportunities for self-development and to keep up-to-date with the <br> digital evolution | Independently, according to my own needs, and solving well-defined and <br> non-routine problems, I can: |
| • discuss on where my digital competence needs to be improved or updated, |  |  |
| • indicate how to support of others to develop their digital competence. |  |  |
| $\bullet$ indicate where to seek opportunities for self-developments and to keep up- |  |  |
| to-date with the digital evolution |  |  |$|$| Use of |
| :--- |
| Augmented <br> Reality (AR) |

## II.b Entrepreneurial competences

| Topics | Competences | Skills |
| :---: | :---: | :---: |
| Ideas and Opportunities | Spotting Opportunities: Identify and seize opportunities to create value by exploring the social, cultural and economic landscape. Identify needs and challenges that need to be met. Establish new connections and bring together scattered elements of the landscape to create opportunities to create value. | On my own and together with my peers: <br> - I can explain what makes an opportunity to create value. <br> - I can identify opportunities to solve problems in alternative ways. <br> - I can explain that different groups may have different needs. <br> - I can tell the difference between contexts for creating value (for example, communities and informal networks, existing organisations, the market). |

$\left.\begin{array}{|l|l|l|}\hline \begin{array}{l}\text { Ideas and } \\ \text { Opportunities }\end{array} & \begin{array}{l}\text { Creativity: Develop several ideas and opportunities to create value, } \\ \text { including better solutions to existing and new challenges. Explore and } \\ \text { experiment with innovative approaches. Combine knowledge and } \\ \text { resources to achieve valuable effects }\end{array} & \begin{array}{l}\text { On my own and together with my peers: } \\ \text { - I can experiment with my skills and competences in situations that are new } \\ \text { to me. } \\ \text { I can experiment with different techniques to generate alternative solutions } \\ \text { to problems, using available resources in an effective way. }\end{array} \\ \text { - I can take part in group dynamics aimed at defining open-ended problems. } \\ \text { - I can identify the basic functions that a prototype should have to illustrate } \\ \text { the value of my idea. }\end{array}\right\}$

| Into Action | Taking the initiative: To initiate processes that creates value. Take up <br> challenges. Act and work independently to achieve goals, stick to <br> intentions and carry out planned tasks. | Taking and sharing some responsibilities: <br> I I can take individual and group responsibility in value-creating activities. <br> I am driven by the possibility of being able to initiate value-creating <br> activities independently. |
| :--- | :--- | :--- |
| Into Action |  |  |
| value. |  |  |

In this section, you can find a set of competences, related to three processes: Biogas, Food for packaging and Algae

## III.a Biogas

Biogas technicians work in the derivation of gas from organic matter and produced as landfill gas or digested gas. They operate equipment in biogas plants, perform tests and maintenance tasks, and take action in the event of a failure.

| Topics | Competences | Skills |
| :---: | :---: | :---: |
| operate biogas plant | Operate equipment, which treats energy crops, and waste from farms, called anaerobic digesters. Ensure the equipment functions correctly in the transformation of biomass to biogas, which is used for the generation of heat and electricity. | I know about: <br> - The variety of plants, their cultivation and harvesting <br> - Biology and growing the plants <br> - Storage and processing of biomass for energy use |
| Composting of organic waste (Biomass) | Identifying needs and technological responses: to know the types of bio-waste, the recovery routes (composting, digestion, incineration) | I know: <br> - The variability of bio-waste <br> - the composition and ingredients <br> - their ways of utilization through chemical, thermal, and biochemical methods. |
| Composting of organic waste (Biomass) | Identifying needs and technological responses: to know the chemistry and biology processes of composting | I know about: <br> - Conversion process whereby biological material becomes heat through chemical, thermal, and biochemical methods. |
| Bio conversion process | Identifying needs and technological responses: to assess needs and to identify, evaluate, control the heating process of biological material, control the combustion process, know and be able to analyse the chemical, thermal, and biochemical methods. | I know about: <br> - Conversion process whereby biological material becomes heat through combustion or biofuel through chemical, thermal, and biochemical methods. |
| Composting of organic waste and management | Identifying needs and technological responses: to assess needs and to identify, evaluate, control the process of biological material, control the combustion process, know and be able to analyse the chemical, thermal, and biochemical methods. | Independently, according to my own needs, and solving well-defined and non-routine problems, I can: <br> - Determine and select the quantity of raw material components used <br> - Control and evaluate the process results and plant performance <br> - Help to eliminate faults |


|  |  | • Carry out care and maintenance work |
| :--- | :--- | :--- |
| Resolve equipment <br> malfunctions | Identify, report and repair equipment damage and malfunctions; <br> communicate with field representatives and manufacturers to <br> obtain repair and replacement components. | Independently, according to my own needs, and solving well-defined and <br> non-routine problems, I can: <br> - Help to eliminate faults <br> - Carry out care and maintenance work |
| Recycling | Identifying needs and technological responses: <br> To know the circular economy, the compost processing and the <br> use of fermentation | I know: <br> - Forms, products, use and sustainability of the circular economy <br> - Use of the fermentation residues (liquid and solid) as fertilizer) |
| Management | Identifying needs and mechanism of the overall managing the <br> biogas production process. | Independently, according to my own needs, I can: <br> - Implementation of the specifications for documentation <br> - Document the process in detail <br> - Information of customers and market partners about the environmentally <br> sound operation of plants for energy production from biomass |

## III.b Food for packaging

The module Food and Packaging focus on the processing of packaging materials and other products, made from bio-materials, such as Rice, Corn, Starch, Cereals, Tomato plants, etc.
In this overview, competences are described for the production of the biomass and for the processing of it.

For production, competences are given for the cultures of rice and tomatoes.

For the processing, the needed technical competences and skills are closely related with the profession of chemical processing plant controllers, who control the chemical production processes and the quality of the products. They operate machines and systems, being responsible to monitor and maintain the equipment and the instruments in control.
See also transversal competences such as Health and Safety, GMP and HACCP.

| Topics | Competences | Skills |
| :--- | :--- | :--- |
| Tomatoes production |  | I know <br> $\bullet$ how to control the light (intensity and duration) |
| Working in a <br> greenhouse | Identifying the instructions of climate control (light, heat, <br> humidity) | Identifying of preparing the soil and nutrition/water system and <br> planting |
| Working in a <br> greenhouse | I can <br> $\bullet$-work with rock wool and connect it to the recirculation water system |  |
| Working in a <br> greenhouse | Identifying the monitor the growing process and the quality <br> control of it | I can <br> $\bullet$ • use biological products, such as humble bees for pollination |
| Cultivation of plants according the instruction <br> tomatoes | Identifying the management of harvesting of tomatoes and post <br> harvesting activities | I can <br> $\bullet$ eharvest the tomatoes on the right time and prepare them for selling |
| Harvesting tomatoes |  |  |


| Energy uses | Identifying by-products for non-energy and energy uses | I know: <br> - Straw as crop residues derived from harvest, found in the field for nonenergy and energy uses <br> - Rice husk and brand derived from milling process for non-energy and energy uses |
| :---: | :---: | :---: |
| Biomass evaluation | Identifying of biomass as a by-product of food production process that can be re-used | I know: <br> -The content, the availability, purity and quality of biomass <br> -The aiming at construction material and material for plastic of bio-fibers |
| Packaging process |  |  |
| Biobased material | Identifying physical and mechanic features / characteristic of Biobased material | I know about: <br> - The variety of bioplants, their physical and mechanic characteristic <br> - Biology and growing the bioplants <br> - Biology and fermentation of bioplants |
| Production of biopackaging material | Identifying technological and chemistries responses: to know the process of fermentation, the processing methods / types | I know about: <br> - The process of fermentation of bioplants <br> - Conversion process whereby bioplants becomes heat through chemical, thermal, and biochemical methods <br> - the variety of processing methods <br> - The design of bio-packaging according the specifications of the product and offer solutions to solve packaging problems. <br> - About different processes PLA, CPLA, TPS |
| Production of biopackaging material | Identifying the technical features, benefits and limits of biopackaging | I know about: <br> - the process of producing bio-package and <br> - I know the features of bioplants for the production process I can: <br> - analyse bio-packaging requirement considering engineering, economic, ergonomic, and other perspectives. |
| Production of biopackaging material | Identifying new packaging concepts | I know about: <br> - Innovative packaging concepts a) sugar (cane) for Tetra pack, b) milk for eatable foil, c) Algae, d) PLA (compostable bottles) |


| Control of process | Identifying the Standard Operating Procedures (= SOP). | I know about: <br> - The instructions of the SOP <br> - Carry out complex routine operations I can: <br> - Write a standard operating procedures <br> - apply quality standards <br> - control the production process |
| :---: | :---: | :---: |
| Control of process | Identifying the monitor manufacturing quality standards | I know about: <br> - The ranking of factors and the product quality <br> - how its customers define quality <br> - the parameters of the production process <br> I can: <br> - sacrifice some aspect of quality for the sake of the process or underlying economics <br> - solve problems <br> - measure the quality of the products <br> - optimise the production process parameters |
| Quality control | Identifying the testing procedures | I know: <br> - when I have to take samples, analyse the samples and make conclusions <br> - how to take samples <br> - how to analyse the samples and make conclusions |
| Quality control | Identifying the test procedures and the ICT systems | I know: <br> - the ICT systems <br> I can: <br> - test the raw material for the process <br> - manage and monitor facts and figures of the process and products |
| Logistics | Identifying the manufacturing deadlines pressure | I can: <br> - Cope with a tight schedule on the manufacturing processes level <br> - take the necessary actions when deadlines approach or when some processes fail |


| Ecological benefits | Identifying benefits of bio-packaging | I know about: <br> $\bullet$ The circular economy of the process, <br> $\bullet$ The sustainable process and the, |
| :--- | :--- | :--- |
| $\bullet$ The reduction of CO2 and NO2 |  |  |
| $\bullet$ The re-usability of the products |  |  |

III.c Algae

Aquaculture workers breed and raise fish and cultivate mussels, oysters and other forms of aquatic life, for sale or delivery on a regular basis to wholesale buyers, marketing organizations or at markets.

| topics | Competences | Skills | ranking |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Very important | important | Less important |
| Breeding, reproduction, structure and cultivating | To know about structure, breeding rearing, and production | I know about: <br> - The variety of algae, their mechanism and periods of reproduction <br> - Biology and growing <br> - The complete process of algae breeding (precultivation - screening- industrial algaecultivation in open basins |  |  |  |
| Production and environmental data | Ensure that operations comply with standards for sustainable aquaculture | Independently, according to my own needs, and solving well-defined and non-routine problems, I can: <br> - Use the methods, characteristics and equipment to cultivate microalgae <br> - Control and evaluate the production process <br> - Use the environmental data <br> - ensure maintenance of optimum conditions for aquatic life <br> - Carry out care and maintenance work |  |  |  |



## IV How to set up a bio-based company?

In this section, you find competences and skills, which are important for starting a bio-based company. You will see that these competences and skills are not pure technical, but more connected to entrepreneurial competences, as described in section II.
$\left.\begin{array}{|l|l|l|}\hline \text { topics } & \text { Competences } & \text { Skills }\end{array} \left\lvert\, \begin{array}{l}\text { I know about: } \\ \text { - The European strategy and the goal of the circular economy } \\ \text { - The definition and principles of circular / bio-based economy } \\ \text { - Sustainable growth and revitalising rural area } \\ \text { I can: } \\ \text { - Explain the specific orientation of Bio-Based Economy, it's goal / vision in } \\ \text { Europe and in my region }\end{array}\right.\right\}$

|  |  | - Identify the basic function of BBE for my own company <br> - Tell about the value and benefit of developing a BBE-company <br> - Explain the benefit of social, ecologic and economic value |
| :---: | :---: | :---: |
| Business plan | To Identify legal and financial aspects for setting up a BBEcompany | On my own and together with my peers I know about: <br> - Measures to support the setting up procedure <br> - Legislations rules <br> On my own and together with my peers I can: <br> - Create a financial business plan <br> - Be active to communicate with financial partners <br> - Explain my financial business plan in my network |
| Business plan | To monitor market activities | On my own and together with my peers I can: <br> - Check market activities <br> - Plan the production to meet contract requirements and market demand |
| Marketing plan | To identify measures and marketing tools to create a marketing plan | On my own and together with my peers I know about: <br> - Measures, like planning, communication, negotiation, relationship, to create a marketing plan, <br> - Marketing tools |
| Marketing plan | To establish a partnership | On my own and together with my peers I can: <br> - Create a network <br> - Take part in group dynamics aimed to create a BBE-system in the region <br> - Explain and illustrate the value of my idea |
| Human Resource plan | To identify measures and methods to develop a human resource plan / management | On my own and together with my peers I know about: <br> - Identity of my company business <br> - The development of an educational plan <br> - Measures and methods to develop my teams <br> On my own and together with my peers I can: <br> - Develop an educational strategy for development of my teams |


|  |  | $\bullet$ Motivate my teams <br> $\bullet$ Communicate the human resource activities |
| :--- | :--- | :--- |
| Control | To identify control mechanism | On my own and together with my peers I know about: <br> $\bullet$ Measures and methods of controlling <br> $\bullet$ Controlling and evaluation the process |

