Smart Unions for New Industry

National Report

SWEDEN

Case Study on IF Metall

Conducted by
Jan Johansson, Lena Abrahamsson

LTU
Luleå University of Technology

SUNI (*Smart Unions for New Industry*) is a project co-funded by the European Commission, DG Employment, Social Affairs and Inclusion, budget heading VP/2017/002 (Grant Agreement VP/2017/0426), Information and training measures for workers' representatives

COORDINATOR

FIM-CISL – Federazione Italiana Metalmeccanici-CISL
Rome, Italy

CO-APPLICANTS

RUB – Ruhr-Universität Bochum
Bochum, Germany

ADAPT – Associazione per gli studi Internazionali e Comparati sul Diritto del Lavoro e sulle Relazioni Industriali
Modena, Italy

LTU – Luleå University of Technology
Luleå, Sweden

IF Metall – Industrifacket Metall
Stockolm, Sweden

UDIMA – Universidad a Distancia de Madrid
Madrid, Spain

UGT-FICA – Federación de Industria, Construcción y Agro de la Union General de Trabajadores
Madrid, Spain

SCIENTIFIC COORDINATOR

Paolo Tomassetti – ADAPT Senior researcher

This document was produced with the financial support of the European Union. The viewpoints expressed herein reflect the opinion of the authors and, therefore, do not represent, under no circumstance, the official position of the European Commission, which is not responsible for any use that may be made of the information this document contains

Index

Executive summary

- Traditionally the Swedish state entrust labour market relations to the social partners: employers' organisations and the trade unions. The high degree of membership of these social partners provide them with a high degree of legitimacy in negotiations. There is also a tradition of cooperation where these social partners seek a consensus of relations in the labour market; the aim is to maintain stability.
- There are well-established institutional and regulatory frameworks guiding the management of issues of every kind concerning technical and organizational change: such as Industry 4.0 for example.
- Sweden also has comprehensive legislation regulating labour market conditions, many of which are the result of close cooperation between trade unions and the Social Democratic party. These laws have such strong social recognition that change in government has not endangered change in any significant extent; at least not in the short term.
- The current Social Democratic and the Green Party government has formed a national strategy for the implementation of Industry 4.0. This strategy depicts a very positive image of the effects it will have in terms of productivity and well-being, as well as for the content of work and the attractiveness of workplaces. In Sweden there is no significant critical national discourse in relation to the content of Industry 4.0 or the effect it will have on daily life and work.
- There is an asymmetry between the social partners' negotiating mandate in relation to Industry 4.0. Companies that are members of the employers' organisation are in direct competition, which makes it difficult for them to form a common strategy for implementing Industry 4.0. Their focus will therefore be on prerequisites for successful implementation, such as provision of skills, labour legislation, etc.
- The relationship is the opposite for the trade unions: common strategies give strength in negotiations. Consequently, many union requirements must be prepared and negotiated at local level.
- One strength that IF Metall has is that they have formulated a program for future industrial work that can also support the clubs in their local activities. One problem is that in the workplace knowledge in relation to Industry 4.0 is

limited. In order to be successful, skills need to be developed in relation to the threats and opportunities associated with the new technologies.

Introduction

Industrie 4.0 is a strategy shaped by the German government in 2013 (www.plattform-i40.de) that is described as the next great industrial revolution. The revolution consists of an implementation of the "Internet of Things, Humans and Services" where the entire production process is included in internet-based networks that transform factories to smart factories. The concept is formulated in the report *Recommendations for implementing the strategic initiative Industrie 4.0 – Final report of the Industrie 4.0 Working Group* (Kagermann et al., 2013). Similar concepts are General Electrics *Industrial Internet* and others like *Integrated Industry* or *Smart Manufacturing*.

The Swedish government has recently presented its strategy for digitalization of industry in the report *Smart Industry – a strategy for new industrialisation for Sweden* (Regeringskansliet, 2016). The strategy is inspired by the German strategy, uses the same term *Industry 4.0*, and accepts the German description of the past; stating that we find ourselves facing "the fourth industrial revolution". As the steam engine, electricity and electronics have been in the past, embedded and connected systems are proclaimed as the saviours of Sweden.

The German vision paints a bright picture of future industry where the integration of software in product development and production links the virtual and the physical world into a powerful whole. Here we see how the machines are doing calculations and decisions, not only just "physical work" (Gill, 2013; Lasi et al., 2014). This is often depicted as Cyber-Physical Systems – or even socio-cyber-physical systems – in which smart machines, smart materials, smart warehouses and other smart systems in factories continuously exchange information with each other, and humans. Similar and related concepts are factory of the future, smart manufacturing, cloud manufacturing, the social enterprise and the enterprise 2.0. The German strategy highlights the potential for skill development and a richer working life with more challenging work tasks. Kagermann et al. (2013) note that it is important for companies to have a socio-technical approach where human participation in job design is central. There are several articles predicting and arguing that Industry 4.0 is a flat organisation with more organisational innovations, learning, enhanced human-machine interaction and a more human-centred view on new technology as core tasks for the success of industrial production in the future (cf. Dombrowski, Wagner, 2014; Kopacek, 2015; Lee et

al., 2014; Stocker et al., 2014). Yao, Jin and Zhang (2015) are even launching the vision of "wisdom manufacturing" where things, computers and humans, ubiquitous artificial and collective intelligence, as well as explicit and tacit knowledge, are integrated into a whole. Stock and Seliger (2016) argue that the development towards Industry 4.0 provides huge opportunities for the realization of sustainable manufacturing. At the same time, the German strategy also emphasizes the reduced need for the number of workers. There will be reduced labour costs while the job security for the staff that remain will be increased (Kagermann et al., 2013; Lee et al., 2014).

According to the visions of Industry 4.0, the industrial worker, humans, will be experts that make sure that production runs smoothly. Humans may no longer be "locked" to a control room. Instead the real-time process data and status of machines follows them when they move in the factory. Humans can solve problems on the spot by remotely interacting with other production operators, experts, suppliers or customers in multi-competent teams or interact with a humanoid robot that assists in decision-making and analyses. The production control can be done far away from the factory or even in a digital model of the factory. In short, the augmented human has extended senses and extended memory through technology that takes advantage of, and support, human skills, keep vigilance and motivation high and increase situation awareness, for example through sensors, embedded in the human's clothes.

There appears to be much that is positive in this development, probably most parts, but there is an urgent need to investigate not only how these technologies are designed, chosen and implemented but also their (and their discursive companions') impact on work in industry. There are a number of questions that need to be asked, such as; How does Industry 4.0 relate to sustainable working life? Is Industry 4.0 a discourse, an organizational model or just technology? What will happen to the workers' collective and other power systems? Will Industry 4.0 open up for a new gender order? How will Industry 4.0 affect the competence and skill requirements of the future workforce? How will the physical and psychosocial work environment be affected? What exactly is the role of human beings in this more digitalized production system? What does including and attuned communication between humans and the internet of things involve? How can humans design the new technology from a user and organisational perspective? These questions can be condensed into broader issues that more clearly highlight the width and the dynamics of our program: *What will it be like working in the future digital context?*

In this national report we focus on Sweden and how Sweden has positioned itself in relation to Industry 4.0. We focus on the future work based on workers perspectives, more specifically the Swedish metal workers and their trade union.

The report is based on studies of literature, scientific articles and various types of documents describing Industry 4.0 and its implementation. The final section of the report is based on interviews with representatives of the Swedish metal workers trade union IF Metall.

Section 1.
Governmental plans for Industry 4.0

Sweden has a long and successful industrial tradition, with large companies like Volvo, Scania, ASEA, Ericsson, Sandvik and Atlas Copco. The industrial sector drives Sweden's economic growth. It creates employment opportunities and plays a significant role in Sweden's prosperity and welfare system. Around one million people work in the industrial sector and industrial services sector in Sweden and account for one fifth of the country's gross domestic product (GDP) and 77% of the total value of Swedish exports.

After the financial crisis 2007-2008, this success story has been largely toned down. This has meant that Sweden, at least temporary, has become less attractive to investments in industrial operations. A number of companies have also chosen to move manufacturing or research and development to other countries.

Worried about this development in January 2016 the Swedish Government (Social Democrats and the Green Party) formed a strategy to strengthen the development of Swedish industry called *Smart industry* with the purpose to strengthen the industrial sector's competitiveness and reinforce Sweden's position as an attractive location for industrial production (Regeringskansliet, 2016). The idea is to remain competitive in a changing global market, and to succeed Swedish industry must be at the forefront of the digital transformation and adopt sustainable production methods. The strategy was formed in close dialogue with the social partners.

The government's analysis is based on the fact that the major gains for industrial companies have often been in moving simpler manufacturing occupations to low-cost countries. But now the wages are increasing in the new emerging economies and are on the path to eroding the cost savings that previously formed the basis of the decision to move. At the same time, production technology is developing rapidly and an ever-greater degree of automation in the manufacturing process is making wage costs less decisive. When wage costs become less decisive, other factors gain greater significance when faced with decisions about where the production of goods and services is to be located. In the light of this, the return of production to Sweden and other industrialised nations from what were previously low-cost countries is being considered as a likely scenario.

The smart industry strategy focuses on enhancing companies' ability to manage the rapid transformation of Sweden's industrial sector. Four focus areas have been chosen: *Industry 4.0, Sustainable production, Industrial skills boost* and *Testbed Sweden.*
The goal of *Industry 4.0* is that companies in the Swedish industrial sector are to be leaders of the digital transformation and in exploiting the potential of digitalisation. According to the strategy, actions in the following areas are required:

- Stimulating the development, spread and use of digital technologies that have the greatest potential to lead the industrial sector's transformation.
- Exploiting the potential of digitalisation broadly, irrespective of industry, company size and geographical location.
- Encouraging new business models and organisational models in order to tap the potential of the new technology.
- Meeting new knowledge requirements that are brought about by digital development.
- Adapting framework conditions and infrastructure to the digital era.

The objective of *Sustainable production* is that increased resource efficiency, environmental considerations and more sustainable production will contribute to the industrial sector's value creation, job creation and competitiveness throughout the entire country. According to the strategy, implementation needs to be directed at the following:

- Developing new or improving existing technologies, goods and services with consideration given to sharp reductions in emissions, the phasing out of particularly harmful substances, higher energy and resource efficiency, greater reusability and recyclability and higher environmental performance.
- Exploiting the potential of new digital and other technologies for the transition to a fossil free and circular economy.
- Encouraging circular economy business models.
- Ensuring that regulations and other governance mechanisms incentivise and facilitate resource efficient and environmentally friendly production and a sustainable supply of raw materials.

The objective of *Industrial skills boost* is that the system for supplying skills at the local, regional and national level is to meet the industrial sector's needs and promote its long-term development. According to the strategy, implementation needs to be directed at the following:

- Increasing interest in science and engineering and increasing the attractiveness of industrially relevant study programmes.

- Improving the matching between the industrial sector's labour requirements and the education system at all educational levels.
- Ensuring that the education system provides students with not only the right knowledge, but also with the right capabilities and skills required in the knowledge society and for the transition to a digitalised and circular economy.
- Improving the conditions for lifelong learning.
- Promoting career changes and mobility between the higher education sector and the business sector.

The objective of *Testbed Sweden* is to lead research in areas that contribute to strengthening industrial production in Sweden. According to the strategy, implementation needs to be directed at the following:

- Targeting research and innovation investments at areas that have a particularly great potential to contribute to new industrialisation and long-term competitiveness.
- Opening up the public sector in order to provide the industrial sector with a testbed for solving societal challenges in close collaboration with other actors at the local and regional level.
- Increasing the use of innovation friendly procurement practices.
- Promoting research collaboration between academia and the industrial sector, as well as developing the institute sector.
- Making Sweden a more attractive place for researchers to work.
- Making Sweden a more attractive place for companies to invest in and carry out R&D activities.

The smart industry strategy is intended to lay the foundation for a concerted national effort. The Government will take action to facilitate structural transformation in the industrial sector. The tools will include laws and regulations, investments in enterprise, education and innovation, public procurement and opening up the public sector, providing testbeds and open data. To date, the government has presented two action plans, each containing measures in several different areas.

To conclude, the Swedish vision Smart industry is, if possible, even more positive than the German Industrie 4.0. In addition to the expected impact on growth and welfare, the Swedish vision argues that Smart industry creates an innovative and sustainable industrial production that is environmentally friendly and provides the conditions for an attractive workplace. In contrast to its German role model the reduced need for employees is not mentioned, on the contrary, it underlines the creation of new occupations.

Section 2.
Main features of industrial relations in the metalworking sector

The Swedish labour market model is based on a division of responsibilities between the State and the social partners. The role of the State is to ensure good working conditions and facilitate the creation of new employments through appropriate regulations and other policy levers, while conditions are created for the social partners to take responsibility for designing more detailed terms of collective agreements.

2.1. Government's National Labour Market Policy

The current Swedish government's objective for working life policy is to ensure good working conditions and opportunities for development in the workplace for both women and men (Arbetsmarknadsdepartementet, 2018).
Working life policy consists of three sub-areas: work environment, labour legislation and wage formation. Below are the objectives for each area:

- A working environment that guards against ill health, accidents and prevents people from being excluded from the labour market, takes account of people's different circumstances and contributes to the development of both individuals and organisations.
- Labour legislation that lays the foundations for working life that meets both employees' and employers' needs for flexibility, security and influence.
- Wage formation that is consistent with macroeconomic balance and industrial peace.

2.1.1. Sustainable working life

Fair conditions and a good working environment are prerequisites for high productivity in the Swedish economy, which is distinguished by high labour force participation and a high level of employment. Everyone who works in Sweden should have an occupation that does not exploit them or wear them out. No one

should have to risk death or injury when at work. The measures to prevent work-related ill health and reduce the risk of employees being injured or worn out are necessary to achieve sustainable working life.

2.1.2. Fair working conditions

Conditions in the Swedish labour market must be fair and decent. A company should not risk being driven out of business as a result of other companies' substandard working conditions. Competition should be based on knowledge and skills – not on reduced wages, poor working conditions or an unsafe workplace.
The current government is working on several fronts to strengthen and develop the Swedish labour market model, both nationally and internationally. The status of collective agreements must be strengthened and safeguarded. The principle should be 'equal pay for equal work' in accordance with applicable laws and collective agreements in the country of employment, with respect for free movement. In the EU, Sweden must ensure that Member States set high occupational safety and health standards. Swedish wages and conditions must apply to everyone who works in Sweden.
Workplace inspections are crucial to maintain worker protection and to ensure that fair competition prevails in the labour market. Efforts are essential to prevent companies from contravening work environment regulations in various ways to gain a competitive edge. A poor working environment must never be a means of competing, either nationally or within the EU.

2.1.3. Responsible wage formation

The social partners' responsibility for wage formation is a cornerstone of the Swedish labour market model. The State has overall economic responsibility, but primary responsibility for wage formation lies with the social partners. The basis of the Swedish wage formation model is that the sector exposed to international competition has a normative role in wage formation. This model has contributed to long-term real wage growth for the past two decades. It is important for this positive trend to continue.
The labour market needs to become less gender-segregated, and full-time work must be the norm regardless of gender. Gender pay gaps are unacceptable and must be successively reduced. Unjustified pay gaps should not occur. Women often take greater responsibility for care of relatives and work part-time to do so. No one should need to reduce their working hours because the quality of welfare services is inadequate. Women's work must be valued the same as men's.

2.2. Trade unions in Sweden

Swedish unions are organised into three larger confederations: The Swedish Trade Union Confederation (LO – *Landsorganisationen*) which organise blue-collar workers within both the private and the public sectors; The Swedish Confederation of Professional Employees (TCO – *Tjänstemännens* Centralorganisation) that organise white-collar workers both in the private and the public sectors; The Swedish Confederation of Professional Associations (SACO – *Sveriges Akademikers Centralorganisation*) which organise academics or graduate professionals with a university or college degree. Each confederation gathers unions, which deal with different parts of the occupational structure.

Below we describe the most relevant or these three confederations for this project: The Swedish Trade Union Confederation.

The Swedish Trade Union Confederation, LO, is the central organisation for 14 affiliates that organise workers within both the private and the public sectors. The 14 affiliates, where IF Metall is one, have together around 1,470,000 members, of whom about 684,000 are women. The 14 affiliates of LO have independent status, and LO is primarily an organisation for co-ordination of general union activities, research, signing labour market insurance schemes and creating public opinion at central and regional levels.

Wage bargaining, international activities, trade union education, children's and young people's education, gender equality and social security are some of the areas for which LO is responsible for co-ordinating. The individual affiliates have full responsibility within their industrial sectors at central, regional and local levels. They are also responsible for the administration of the unemployment insurance funds.

An important task for LO is to protect the trade union movement's interests in relation to Parliament, the authorities and other organisations. LO is therefore a body to which proposed legislative measures affecting society as a whole are referred for consideration. LO is also involved in matters concerning the Swedish labour market and the political development as a whole.

Contacts with the Social Democratic Party are frequent and LO has a representative on the party's executive committee elected by the Party Congress. LO and the Social Democratic Party are two independent organisations which have common objectives and common viewpoints on most issues. On the other hand, LO and the Social Democrats may sometimes hold different opinions as to the best way of achieving these objectives. Of some importance for the good relations between government and trade unions may be that Sweden's prime minister is the former president of IF Metall.

2.3. Laws and agreements in the Swedish labour market

Fundamental labour law in Sweden is laid down in legislation, for instance procedural rules for the right to negotiate and basic regulations for all who work in Sweden. Important examples of labour legislation are the Co-Determination Act and the Employment Protection Act. Labour legislation is based on collective representation and lays down frameworks and procedural rules.

2.3.1. The Collective Agreement

The contents of individual labour contracts are to a high degree established in collective agreements. There is no statutory minimum wage. There is actually no legislation stipulating that wages should be paid at all. Collective agreements and individual contracts are the only ways to define how much a worker should be paid for the work performed.

Without a collective agreement, an employer can pay as low a salary as possible, as long as the employee accepts it. Some labour legislation is semi-discretionary, which means that labour legislation can be derogated from by a collective agreement but not by a personal contract between the employer and the worker.

The collective agreement model is based on strong trade unions and employers' organisations. A high membership rate is a key feature. About 90% of the workers in Sweden are covered by collective agreements. About 70% of all workers in Sweden are affiliated to a trade union. This high level of unionisation, together with the absence of legal provisions restricting the organisations' activities means that there is a considerable degree of autonomy for the social partners to conclude collective agreements.

National collective agreements covering pay and general conditions of employment are negotiated by the social partners, via a central bargaining process. There are over a hundred national contracting parties in the Swedish labour market, covering over 650 collective agreements at national level. During the contractual period, the parties are under obligation to maintain industrial peace.

The obligation to maintain industrial peace applies during the term of the collective agreement. The peace obligation means that industrial action may not be resorted to for the purpose of changing the agreement or to obtaining benefits that are not included in the agreement. During negotiations for a new agreement industrial action is allowed. Industrial action must be duly approved by a trade union organisation in order to be regarded as permissible.

National agreements are often supplemented by local agreements that, for example, can allow higher rates of pay. They are results of bargaining in the workplace. If the workplace has a local union club the negotiations take place between elected union representatives and employers representatives. If there is no local club, representatives of the local branch negotiate with the employer.

2.3.2. Labour legislation[1]

The rights of workers are to be found in what is collectively called labour law. This is based on statutes, ordinances and regulations of various kinds.
Labour legislation has primarily given workers the right to holidays, parental leave, shorter working hours, labour representation in company boards, a better working environment, participation in decision-making at the workplace, and increased employment security. We will further develop the last four which may be of importance for the design and implementation of Industry 4.0.

2.3.3. The Board Representation (Private Sector Employees) Act

The Board Representation Act empowers employees to appoint board members in companies bound by collective bargaining agreements. The main purpose is to give employees, through the employees' organisation, a better view of and influence over the management of the company. Employee representatives have the same standing and responsibilities as other board members, except when there may be a conflict of interest, such as issues regarding collective bargaining agreements and industrial action.
Employees of companies with at least 25 employees are entitled to appoint two members and two deputy members to the board and in companies which more than 1,000 employees, three members and three deputy members. If there is an executive committee, employee representatives are entitled to participate in its work. This also applies to other planning bodies within the company, where such bodies deal with issues that are to be decided on later by the board of directors.
The Board Representation Act plays an important role in the relationship between club and company. Many members hold these assignments for a long time and are not seldom also important people in the board's internal work. Many CEOs choose to anchor initiatives early with union members.

[1] This section largely builds on a report, *A short introduction to Swedish labour law*, compiled by Teknikföretagen (2012).

2.3.4. Work environment

Sweden has a comprehensive work environment legislation that largely corresponds with other EU countries. The Swedish Work Environment Act 1977 (Arbetsmiljölagen) points out the responsibility for the employer and stipulates the basic demands on a good work environment. The act emphasizes preventive actions as well as cooperation between employers and employees. However, the cooperation does not diminish or abolish the employer's responsibility to carry out any measures necessary for the safety and health of the employees. The act gives the framework for Provisions issued by the Swedish Work Environment Authority.

The Work Environment Act states that employers and employees shall cooperate regarding work environment issues. Even though the employer holds ultimate responsibility for the working environment it is clearly stated that the organized work environment activities shall be performed in cooperation with the employees and their representatives, which is, in most cases, the safety representatives. Cooperation between employers and employees regarding work environment issues is formalized regarding Safety committees, Workers safety delegates and Occupational Health Services.

In principle, all companies now have the working environment as a priority issue and also very visible in policy documents, etc. Of course, it has not eliminated the working environment problems, but they have got a clearly higher status than ever before.

Safety committees

At every worksite where fifty or more persons are regularly employed, there shall be a safety committee consisting of representatives of the employer and of the employees. Safety committees shall also be appointed at worksites with smaller numbers of employees if the employees so require.

Employees' representatives shall be appointed from among the employees by the local trade union organization currently or customarily having a collective agreement with the employer. In the absence of such an organization, the representatives shall be appointed by the employees.

The safety committee shall participate in the planning of work environment measures at the worksite and observe their implementation. It shall maintain close observations of the development of questions relating to protection against ill-health and accidents and is to promote satisfactory work environment conditions.

The safety committee shall consider questions concerning:

- occupational health services,
- action plans,

- the planning of new or altered facilities, devices, work processes and working methods and of work organization,
- planning of the use of substances liable to cause ill-health or accidents,
- information and education concerning the working environment,
- occupation adaptation and rehabilitation activities at the worksite.

The safety committee has no right to decide on behalf of the employer.

Workers safety representatives

Typically, safety representatives are appointed for three years by the local labour union. If there is no union, then the employees can appoint representatives directly. The employer cannot appoint workers safety representatives.
The main task of the worker safety representative is to make sure that the employer operates a well-functioning management system regarding work environment issues, especially issues such as planning for major changes. The delegates who represent the employees have a number of privileges and obligations such as:

- They have a right for paid free time necessary for their duties.
- They can stop dangerous work.
- They are entitled to have necessary company information for their duties.
- They are obliged to be silent regarding sensitive information.
- A safety representative that neglects their duties cannot be punished for doing so.

The safety representative shall initially always turn to the business management with requests or demands on improvements. If the safety representative is unsatisfied with the response and sees no other alternative the delegate can turn to the Work Environment Authority inspectorate for a decision.

2.3.5. Participation in decision-making at the workplace

The Co-Determination Act, concerns the relationship between the employer and the employees through their local employees' organisation. The most significant areas of the Co-Determination Act are the collective bargaining agreement and the peace obligation, the right to negotiate, the right to information, the right of interpretation and right to veto. The right of co-determination does not in principle go further than a right to information and consultation before the employer makes a decision regarding significant changes. Some of the provisions of the Co-Determination Act are semi-discretionary and may be derogated from or

supplemented by collective bargaining agreements, so called co-determination agreements. For IF Metall, in regard to such agreements as the Collective agreement, the Development agreement and the Saltsjöbaden Basic Agreement, other rules apply.

Right of Association

Both the employee and the employer have the right to join associations and to engage in their activities. It is a right that has been regulated by statute for many years and forms the major legal basis for joint action by the employees' and employers' organisations. There is no need for a certain proportion of the employees to be associated in order to create a local branch of an employees' organisation, in Sweden the threshold to create an employees' organisation is low.

Right and Obligation to Negotiate

Employees' organisations have a right to negotiate with the employer in areas regarding the relationship between the employer and members of the organisation. Employers have a corresponding right to negotiate with employee organisations. An individual employee does not have a legal right to negotiate according to the Act.
Before an employer takes any decision regarding significant changes in their activities or in the working or employment conditions of individual employees, negotiations with the relevant employees' organisation must be initiate before a decision is made. The obligation to negotiate does not cover the day-to-day management and direction of how the work should be carried out. Issues that must be negotiated are, for example, the introduction of a new organisation, downsizing, hiring of a new manager, changing an individual's area of work and similar significant changes. If the employer makes a decision without negotiating, they may be liable to pay punitive damages. Such damages are decided by the Labour Court.

Right to Information

The employer is obliged to regularly inform his local negotiation partners about the development of their business in financial and operational terms as well as about personnel policy guidelines. In principle, the Co-Determination Act states that there should be an open attitude at the company giving the employees access to information about the general progress of the company.

Collective Bargaining Agreements

Collective bargaining agreements must be in writing and are concluded by an employer or an employers' organisation and an employees' organisation. ln general, industrial action is not permitted when there is a valid collective bargaining agreement. According to the Co-Determination Act, a party planning to take industrial action must first give notice to the opposing party and to the National Mediation Office. A special mediator may then be appointed to settle the dispute. This can be done even without the consent of the disputing parties. Industrial action can be postponed by the National Mediation Office for a period of up to two weeks. Any dispute over a collective bargaining agreement that is already in effect must be solved through negotiation and can, as a last resort, be tried by the Labour Court.

Right of Veto Over Engagement of Subcontractors

An employer planning to engage a subcontractor must first initiate negotiations with the relevant employees' organisation. The reason for negotiations in such cases is to give the employees' organisation an opportunity to examine, for example, whether the subcontractor applies illegal employment conditions. Employees' organisations have a right of veto if the employees' organisation declares that the action that the employer intends to take may be deemed to violate legislative provisions or the collective bargaining agreement or otherwise be in conflict with the established practices in the industry.

Right for the union to use consultants

There is a right to employ employee consultants at the company's expense when closures or major changes occur. The clubs bring in their own consultant who goes through the company's decision-making basis. Almost always, it works very well and the company takes on ideas from this second opinion.

2.3.6. Employment security

The Employment Protection Act covers, among other things, forms of employment – until further notice or for a fixed term, how to calculate the length of employment, employment in transfers of undertakings, termination of employment, shortage of work and time limits for initiating litigation.
The Employment Protection Act states that an employment is valid until further notice, except where otherwise agreed. Employments until further notice can be

terminated only if there are objective grounds for termination. Objective grounds are shortage of work or personal reasons.

Shortage of work includes all reasons for reducing the labour force that are not related to the personal behaviour of an individual employee. It is normally of a collective nature where several employees are given notice simultaneously, but may also be limited to an individual employee, for example after a reorganisation. Shortage of work may arise when a company or a unit is no longer profitable, but also if a company decides to organise its business in another way. Before reorganising the company and reducing the labour force due to shortage of work the employer must negotiate according to the Co-Determination Act.

Employments can also be terminated for personal reasons. Such reasons are related to the behaviour of the individual employee. The behaviour must be serious enough to constitute objective grounds for dismissal, such as absence without leave, refusal to accept orders, a distinct lack of the necessary abilities or disloyal behaviour in various forms.

Termination of an employment must be preceded by a notice of termination, followed by a notice period. Before the employer gives notice of termination, they must inform the employee and the local employees' organisation of their intention two weeks in advance. The employee and the employees' organisation are then entitled to deliberations with the employer before notice is given. The employer is obliged to give notice of termination in writing.

During the notice period, the employee is entitled to receive all regular employment benefits. The length of the notice period follows the rules in the Employment Protection Act. In normal cases the employees are guaranteed a period of notice from one month up to six months but employees who are 55 years old at the time of termination due to shortage of work and have been employed by the company for ten consecutive years, are entitled to a further six months notice period totalling twelve months. If the employee gives notice, the notice period can be from one month up to three months, depending on the length of the employment.

When the employer decides to reduce its work force because of shortage of work, the legal procedure is "last in – first out", meaning that the oldest part of the work force have a rather strong position. In companies with ten or fewer employees, two employees of particular importance for the future activities may be exempted from the special order of termination. According to the law it is reasonably easy in Sweden to reduce the workforce because of shortage of work, while it can be more difficult for the employer to keep the employees he wishes. Almost all local negotiations land in agreements where the club accepts exceptions for key competencies. It is in the interests of employees that the business does not suffer unnecessarily.

An employee may be immediately dismissed in situations where they have grossly neglected their obligations towards the employer in cases of serious misconduct such as theft, violence, threats, sexual harassment or longer absence. In such cases the employee will have to leave the company without any notice period.
An employee not given continued employment because of a shortage of work, with a length of employment of at least twelve months, has rights of priority for reemployment during nine months after the employment ended to any new employment within the operational unit and work covered by the same collective bargaining agreement under which they were previously employed.

Section 3.
Overview of the perspectives of trade unions and employers' associations in the metalworking sector on Industry 4.0

3.1. IF Metall's programme for future industrial work

At its congress in May 2017 (which is held every five years), IF Metall presented a programme for future industrial work, which formulates its positions for digitalization and Industry 4.0 (IF Metall, 2017). The overall strategy of the new programme is to describe the development of future industrial work as something positive, something that opens up opportunities for developing the content of work and improving its environment. However, IF Metall also proposes a number of requirements (for both employers and governments) that have to be satisfied in order for the full positive effect to be achieved. One could say that the programme invites to a dialogue, but not an unconditional dialogue. This is evident in the following quotation of the programme text:

> It is in the meeting with IF Metall's members that the potential of the new technology becomes reality. We, as trade unions, will participate in forming this meeting. In our commitment to future industry and industrial workers, we make demands. A heavy responsibility rests on the employers' willingness to invest in the development of workplaces and industrial workers.

IF Metall finds that the industry's future work is closely linked with industrial success, where a successful industry would create space for sustainable and developing occupational roles. A positive development lays the foundation for good wages and working conditions. As a trade union IF Metall will be involved in the realization of its members' future work in mines, workshops and factories. The demands relate to the organisation of work, the working environment and possibilities for learning at work. IF Metall argues that it should be a union acting as a progressive force that actively participates in this change.

IF Metall also demands that government policy creates good conditions for tomorrow's competitive companies. Sweden should be the obvious choice for investment and development of industry products and services.

The purpose and objective of IF Metall's programme are summarized in three points:

- The programme for future industrial *work* will guide IF Metall's efforts for sustainable work, new industrialization, skills supply and work transformation.
- IF Metall's vision for future industry is that Sweden should be at the forefront of digitalization, new materials and climate-conscious production.
- IF Metall's vision for future industrial work is that occupation and career development for each individual member creates an industry that is at the forefront of global development.

In its analysis of the technical challenges, IF Metall generally follows the line presented by the Swedish government in the national programme, *Smart industry*, using the same vocabulary, such as digitalization, the fourth industrial revolution and Internet of Things. Surprisingly, the term Industrial 4.0 is not mentioned in the text, but nonetheless feels constantly present.

The IF Metall programme is focused on saving jobs in Sweden, where the belief is that becoming stuck in old technology will risk the job security of the union's members. Technology development provides tools for competitive production, which means new and improved occupations, but it also means that jobs disappear.

The programme is rooted in good knowledge on how the digitalized future might be like, a future where service and maintenance of connected machines, trucks or machine components are essential components. The vision includes integrated biosensors that monitor how people feel. The future of the industry is located in data clouds, in nanotechnology's development of environmentally friendly plastics and steel, in the artificial intelligence and self-taught algorithms. New business models based on new abilities to benefit from huge amounts of data will appear. Relationships between manufacturers and customers will change with production in shorter series and greater variations. Using all this technology, digitalization also enables climate- conscious production.

IF Metall believes that the technology's possibilities create competitiveness and prerequisites for production in Sweden. However, this does not occur by itself. Action is required on many levels, and IF Metall sums it up in three points:

- IF Metall needs, at all stages and in collaboration, to help industrial workplaces to take advantage of technology development opportunities so that it benefits everyone.
- The state needs to continue developing its research and innovation policies through increased collaboration between industry, research institutes and universities.

- The state still needs to develop targeted investments that primarily encourage small and medium-sized industrial companies to develop products, services and business ideas using digital technology, new materials and climate-conscious production.

IF Metall describes the industrial worker of the future as a practical theoretician and theoretical practitioner. This must also be noted in the development of industrial occupations and professions, through enriching workplaces with job enrichment and solutions for flexible working hours. No one benefits from IF Metall's members being easily and cheaply replaceable; on the contrary, they should be considered as being the company's most important resource. If Sweden's mines, workshops and factories are going to be the winners of technology development, learning at work must move from vision to reality. This requires that industry workers can develop throughout their whole working lives. Lack of competence should not be a reason to dismiss people who never have the opportunity to develop through their work. IF Metall argues that they close that door and open new doors for its members' occupation and career development.
IF Metall will therefore use the venues at the negotiating table to strengthen its members' employability, occupation development and the chances of a successful transformation into the new industrial context. This may require changes to both collective agreements and legislation. The industry of the future is closely associated with learning at work. This is IF Metall's leading star when participating in and developing the organisation of work, when creating solutions to increased flexibility and when developing wage and working conditions. IF Metall summaries their strategy for learning at work in two areas:

- IF Metall needs to develop their efforts in both workplaces and central agreements so that learning at work becomes a guiding principle for its members' development in their occupations and professions and for the organisation of work.
- IF Metall needs to encourage employers in occupation and career development, as well as to help more workplaces to work with documenting skills, validation and skill development.

Learning at the workplace is about people's development throughout their working lives, and this needs to be clarified in a national policy that supports skill development. Learning provides workplaces with the ability to meet the potential of technology development. Learning ensures the employment of industrial workers and provides development at work. It prevents risks for long periods of unemployment. IF Metal therefore believes that learning at work is a social issue and summarizes its demands for the state in two points:

- The state needs to work with the social partners to develop a national system that promotes and realizes skill development in working life and helps to develop the national system for short-term work in deep crises to also include skill development efforts.
- The state needs to stimulate the introduction of industrial and vocational skill documentation and validation.

IF Metall knows from experience that automated processes both enrich and impoverish its members' work content. Technology development can help reduce risks and workloads, but it can also lead to increased psychosocial stress. This necessitates that the requirements of a good working environment are clearly included when investments are made and work organisation takes shape. At the same time, the new technology puts integrity on trial. Information can be collected and used to check employee performance, characteristics and behaviours. Collaboration between trade unions and employers is crucial to counteracting the use of new technologies for monitoring and integrity control.
IF Metal's role is to help the new technology to be used in ways that improve and develop its members' work environment and work content and summarize their strategy in two ways:

- IF Metall needs to insist on employer responsibility for sustainable jobs and help ensure that the elected representatives have access to education about the impact of new technology on work organisation.
- IF Metall needs to develop its members' knowledge of workplace and privacy issues linked to the introduction of digital technology at industrial workplaces.

IF Metall notes that technology development requires the education system of the country to have the ability to meet new and growing skill needs. This must also be noted in the development of the country's educational policy. The education system must to be able to respond to the need for both top and wide-ranging knowledge. Educators need to be receptive to the needs that arise and emerge in industry.
IF Metall thinks that education and training policies need to reach more people in working life. Educational policy must simultaneously provide skills, tools for transformation of occupations and realization of individual's life projects. Even in adulthood, people should experience that there are educational pathways that form new ways forward in working life. Moreover, it needs to happen with study and social conditions that work for people with an adult's responsibilities and living conditions.

The new technology also needs to be addressed in how the education system is developed further. IF Metall sums up its educational policy requirements in two areas:

- Educational policy needs to be developed in order to better meet the new technological needs that emerge and grow at industry workplaces.
- The scope of educational policy and the study of social conditions need to be developed to facilitate studies for further development in the profession or prepare for occupation transition.

Changes in labour market policy are also part of IF Metall's future industrial work programme, which states that people in industry bear the major risks in the Swedish labour market. Technology development challenges the employability of its members. Global competitors' business and market success affect job security in many workplaces in a long chain of suppliers of goods and services. To come to grips with these problems the social partners need to work together better. Economic security, through limiting periods of unemployment to being as short as possible, is an essential aspect, here unemployment insurance needs to be improved; 80% of beneficiaries should get 80% in remuneration.
The functioning of the labour market policy for the provision of skills must be developed. The way back to work is about rapidly developing and matching people's skills based on the needs of today's and future workplaces. Lack of competence at industrial sites and long-term unemployment among IF Metal members is not the answer to Sweden's ability to become the winner of technology development. IF Metal's programme for the work of the future ends with two points:

- IF Metall needs to develop work by strengthening the existing *Occupation transformation agreement.*
- Labour market policy needs to be developed to strengthen conditions for occupation transformation and occupation matching through early, individualized, skill-enhancing efforts that meet the skills needed in the workplace.

To summarise, a reflection on IF Metall's programme for industrial work in the future is that the overall development is described as something positive that opens up opportunities for developing the content of work and improving its environment. The risks associated with this development are discussed in terms of being resolved through responsible collaboration, where IF Metall sets a number of requirements, both for employers and the state. One could say that the programme is based on a long Swedish tradition where cooperation and

negotiation is the way forward, and the programme can be seen as an invitation to such a dialogue, a dialogue where IF Metall has set the agenda.

3.2. Employers' relationship to Industry 4.0

Employers' relationship with Industry 4.0 is not as easy to describe. The initiative lies with the individual companies, all of whom have their strategy of approaching digitization and Industry 4.0. The companies compete with one another, so there is no real incentive to shape a common strategy. However, there is a common discourse and ideology production with three main actors: the *Confederation of Swedish Enterprise*; the *Association of Swedish Engineering Industries*; and the *individual companies* can be identified.

3.2.1. The Confederation of Swedish Enterprise (*Svenskt näringsliv*)

Representing 49 member-organisations and 60,000 member-companies with over 1.6 million employees, The Confederation of Swedish Enterprise (*Svenskt näringsliv*) is Sweden's largest and most influential business federation in the private sector.

The role of the Confederation is protecting, supporting and promoting the interests of businesses as well as in creating broad popular support for the value and importance of enterprise.

The Confederation can be considered as the producer of ideology for Swedish companies and business organizations, where an important task is to compile analyses of various aspects of industrial development in Sweden. Analyses aimed both at their own member organisations and at the political establishment.

The Confederation provides its members with expert knowledge in a number of areas including labour market and law, taxes, corporate law and intellectual property, economics and macro analysis, constitutional and legal protection, security and risk management, and trade policy. Other important areas of expertise include competition, education and learning, research and training, climate and energy, environment and market-oriented solutions in the welfare sector.

Each Confederation member association negotiates separately with its respective union to arrive at mutually satisfying agreements. The Confederation plays a major role throughout this process by providing support and a structure for employer issues both when member organisations participate in negotiations as well as when member companies are financially hurt by labour market disputes.

Member organisations communicate with and counsel their member companies directly. The Confederation provides analysis and background information through reports, newsletters, research papers, its monthly magazine and its information-rich website.
The Confederation's policy production in relation to Industry 4.0 is not particularly extensive. Nonetheless, here lies the responsibility of the individual companies. The focus of the Confederation is on the general conditions, such as an education system that supports technical development and a tax system that stimulates growth, or a revision of the labour market principle "last in first out". A principle which the Confederation considers to be a remnant of a labour market with large employers and unskilled workers.

3.2.2. The Association of Swedish Engineering Industries (*Teknikföretagen*)

IF Metall has collective agreements with more than 40 employers' organisations, of which the Association of Swedish Engineering Industries are the largest and most important.
The association has more than 3,700 member-companies. Some of them have thousands of employees, most of them far fewer. Some of them sell advanced technological services and others produce components.
The association's mission is to strengthen the competitiveness of the member companies, both by supporting the individual companies and by influencing and monitoring decisions on labour law, environment, training and research.
An important task is to provide consulting services on issues arising from employer-employee relationships, such as negotiations, disputes, and the implementation of legal and contract provisions. When disputes arise, the association will assist with dispute resolution through negotiation or via the courts.
The Association of Swedish Engineering Industries have formulated a number of position papers that relate to different development areas. One of these is about Industrial production (Teknikföretagen, 2017). The main message is that the government needs to invest more in research, innovation and education that supports the development of advanced and sustainable production in Sweden. This is emphasized in four development areas.

Increasing innovation and technical development in the area of production

In order for the Swedish manufacturing industry to continue to be globally competitive, goods and services must be made more intelligently and in a more

sustainable manner and fully utilise the possibilities of digitalization. Produktion2030, a strategic innovation programme is run by the Engineering Industries in cooperation with IF Metall that invests in innovation and technology and skills development for sustainable production in Sweden (see section 4.3.1).

Test and demonstration of new production technology

In order for new production technology to reach small and large companies the government needs to support the demonstration and testing of new production technologies. This may involve, for example, industrial Internet and the use of additive manufacturing or 5G technology.

Growth of small and medium-sized manufacturing companies

Smaller manufacturing companies create jobs and are important suppliers of components and technical solutions for other companies in Sweden and internationally. The Association of Swedish Engineering Industries believes that the government must invest in knowledge areas such as digitalization as well as production and service development to strengthen the competitiveness of smaller manufacturing companies.

Internationalisation of production research

Swedish actors in industry, academia and research institutes must increase their participation in the EU's industry-relevant research programmes. Today, Sweden is far behind its competitor countries in terms of participation in research platforms, such as the EU-programme Factories of the Future.
The Association of Swedish Engineering Industries and IF Metall are collaborating to develop and increase the level of knowledge in production technology, work organisation and management in the companies. They initiated and develop projects, such as Produktion2030, Teknikcollege and the Flagship Factory.

Section 4.
The role of trade unions in Industry 4.0: the case of IF Metall

4.1. Brief overview of the national trade union selected as a case study

4.1.1. IF Metall

IF Metall is the largest trade union for industrial workers in Sweden with approximately 313,000 members. 66,500 of these are pensioners and approximately 21% are women. IF Metall work for the interests of its members in the workplace and in society, and for a democratic and equal society where everyone has the right to a good and secure occupation. IF Metall has an organisational level of 80%, which is quite high in an international comparison. They work in large parts of Swedish industry, including the plastics, pharmaceutical, building materials, steel, chemical and engineering industries. 30,000 of the members are also elected representatives, trade unionists, at the workplaces.

IF Metall's most important task is to organize all the blue collar workers in the companies and to negotiate good collective agreements. Through the collective agreement, IF Metall delivers industrial peace and employment obligations in return for reasonable wages and decent working conditions. The agreement guarantees the minimum wage, minimum holiday pay and the right to additional compensation for overtime, for work at inconvenient hours and more. The goal is that the agreement will give the members increased real wages and improved employment conditions.

IF Metall has an organisation in three decision levels, clubs, regional branches and the congress, plus a federal board that controls the ongoing work.

4.1.2. Clubs

IF Metall organise clubs in companies with many employees. Members elect a board of directors representing them in trade union activities and take members' interests against the employer. The members decide which issues the club will

drive. This is usually done through a members' meeting. The clubs board also deals with wages, work, study, and other issues of importance for the members.
In larger clubs there is often substructures which are closer to the various production groups, or teams. In small workplaces without a club there are often one union representative form the regional branch.

4.1.3. Regional branch

Members and clubs of one or more municipalities or local communities together form regional branches. This supports the trade union activities in workplaces within the given geographical area. IF Metall has 36 regional branches. Representatives elected by the members take the overall decisions at regional branch level. In the department office are ombudsmen and other employees involved in the negotiation assistance, unemployment insurance, membership fees and more.

4.1.4. Congress

The Congress is the union's highest decision-making body and meets every three years. At these meetings the 300 elected representatives from the departments set the objectives of IF Metall and the focus for trade union activities.

4.1.5. National committee

The mission of the National committee is to lead the activities of the union between congressional meetings. The committee consists of 17 members, 13 of which are active in production and four are employee representatives at the union office. The National committee office is located in Stockholm.

4.2. Trade union discourse

Below is an attempt to describe IF Metal's discourse about, and their relation to, Industry 4.0. This is presented as what is perceived as Strengths, Weaknesses, Opportunities and Threats.

Strengths:

- IF Metall is the major trade union that organizes industrial workers from all major export companies in Sweden which gives an extremely strong position.
- IF Metall has a high proportion of members (about 80%).
- IF Metall has a comprehensive network within politics, authorities and companies and especially good relations with the current government when the prime minister is a former chairman of IF Metall.
- IF Metall's central organisation has good knowledge of Industry 4.0 and has formed a strategy addressing how to meet it.
- IF Metall has a forum for dialogue with employers through the Industrial Agreement and a number of collective agreements.
- IF Metall has a history and tradition where technical development has been addressed.

Weaknesses:

- IF Metall has a slowly declining body of members because it is harder to recruit young people as members.
- A large proportion of IF Metall's members have a low-level of education.
- A large proportion of IF Metall's members lack knowledge of Industry 4.0.
- IF Metall has a traditional hierarchical organisation with risk for slow decision-making processes.

Opportunities:

- The high level of membership in combination with the Swedish negotiation tradition and the strong collective agreements provide a good negotiating position.
- The strategy of IF Metall, which invites to consensus, provides a good basis for negotiations.
- IF Metall's strong relationship with the current government acts to strengthen their negotiating position and open the possibility of legislation.
- Industry 4.0 can save jobs in Sweden
- A well-implemented Industry 4.0 can increase safety at work and contribute to more attractive workplaces and interesting working conditions.
- Industry 4.0 can open new training and development opportunities for members of IF Metall.
- The work of IF Metall members will transform into a white-collar work environment.

- Increased productivity can pave the way for an increase in wages.

Threats:

- Reduced labour needs and unemployment of IF Metal members.
- The members of IF Metall lack the skills required by Industry 4.0 and the industry decides to recruit new, younger, labourers at a lower cost.
- The members within the IF Metall collective will move into white-collar unions.
- The drop in the number of members leads to a reduction in the negotiating power of IF Metall.
- Government power shifts to the Liberal/Conservative block, IF Metall loses its political support and the labour market is deregulated.
- Increased share of individual salary and wage benefits impedes the collective agreement.
- A poorly implemented Industry 4.0: which means increased control and greater stress at work.

4.3. Trade union action

4.3.1. Research

There are a large number of research and development projects where IF Metall collaborates with research institutions. Below we will present some of the most important.

Produktion2030

Produktion2030 is the Strategic Innovation Programme for industrial production in Sweden (Produktion2030, 2017). Produktion2030's vision is that in year 2030 Sweden will be one of the world's leading countries for sustainable production. Produktion2030 builds on close co-operation between Swedish Engineering Industries, Universities and IF Metall.

Produktion2030 is based on five instruments: Projects, Small and medium-sized companies, Education, Mobility, and Inter nationalisation and analysis.

Produktion2030 has prioritized six areas of strength where industry, academia and research institutes are competitive, but where continued investments are necessary so that production in Sweden can remain sustainable and competitive in the long term:

- Resource-efficient production.
- Flexible production.

- Virtual production development.
- People in the production system.
- Circular production systems and maintenance
- Integrated product and production development.

Of particular interest for this report is area number 4, *People in the production system*, where the program states that people have a key role in the digitalised industry and future production systems. The complexity of production demands that competent people can collaborate with advanced, automated production systems, robots, and manufacturing processes. Employees must handle production processes and systems in virtual, digital, global networks. Digitalisation, sensors, and large quantities of data create new demands on security, advanced communication, interfaces, and the distribution of tasks between people and production systems. Advanced technical solutions enable the development of work stations, production and assembly methods, ergonomics as well as access to information independent of language.

Two cross cutting themes run through the five instruments and strong areas; Sustainable production and Digitalisation.

Ecological, social, and economic sustainability are fundamental for society. Production is an important enabler to increase sustainability in a broad societal perspective. The effective use of materials, energy optimisation, circular material flows and re-manufacturing are some examples of activities that contribute to environmental and economically sustainable production. Social sustainability involves creating attractive workplaces as well as designing collaboration between people and robots and support for human decision-making.

All projects in Produktion2030 encompass increased use of digitalisation. In an industrial context digitalisation means that all resources, namely products, machines, infrastructure, and people, can be described in a digital form through scanning, modelling and simulation. In its digital form production can be optimised to create benefit for manufacturing companies, e.g. through increased productivity, quality and flexibility. This will be possible through the Industrial Internet of Things. Connection and communication standards such as 5G will play an important role in the internet-enabled factory. It enables extremely fast transfer of large amounts of data and communication in real time. The internet-enabling of all parts of the production process is a prerequisite in order for customers and suppliers to be integrated into digital value chains.

"The production lift"

The production lift is a comprehensive national program initiated in 2005 by IF Metall and Teknikföretagen (Produktionslyftet, 2018). The purpose is to introduce Lean Production in a responsible manner, safeguarding skills development and a good working environment. The production lift is a three-step development program aimed at small and medium-sized enterprises and consists of training and coaching. The costs for the first two steps are about 50,000 euro for each participating company and another 25,000 euro for the third step. In addition to IF Metall and Teknikföretagen, the project includes one research institute and six universities, including Luleå University of Technology that is led by a board from the social partners' and chaired by a former IF Metall chair.

Smart Production

The Smart Production Project in Manufacturing and Processing Companies is a project that is owned by Blekinge county council, IF Metall participates as a partner (Region Blekinge, 2018). The project will organize seminars, industry-wide meetings and in-depth workshops over a three-year period. The activities aim at bringing together traditional manufacturing industry with information and communication technology companies to facilitate digitization of the production process. The objective is to increase the digitization capacity of small and medium-sized manufacturing and processing companies. After the project, companies must have gained insight and knowledge of the meaning and importance of Industry 4.0 as well as gained insight into other industries; which can create new business *opportunities* and constellations. This project is founded by the European Regional Fund.

4.3.2. Communication and dissemination directed to workers and public opinion

Smart Factories

Smart Factories is a collaboration between school and business supported by IF Metall as an active partner (Smarta fabriker, 2018). The purpose of the project is to create a platform to disseminate industrial digitalization knowledge to increase the attractiveness of technical studies and attract young people to want to work in industry. Students and industry work together to construct and build two demonstrators (mini-factories) to use for skill development and skill dissemination in industrial digitization.

4.3.3. Lobbying towards public institutions

IF Metall has a comprehensive network within politics, authorities and companies and actively use it to influence Swedish industrial policy. IF Metall has a long tradition of supporting industrial structural changes based on active industrial policy and a well-developed labour market policy. Industry 4.0 and the Swedish program *Smart industry – a strategy for new industrialisation for Sweden* fits well in to that tradition. IF Metall has actively participated and to some extent initiated the development of the programme.

4.3.4. Training activities targeted to workers' representatives

The level of knowledge about Industry 4.0 is high in IF Metall at central level. However, there still remains work to bring knowledge to the local clubs.

4.3.5. Collective bargaining

Industry 4.0 is not explicitly mentioned in the central collective agreement between IF Metall and the *Association of Swedish Engineering Industries* (Teknikavtalet, 2017), but the central collective agreement does include a competence development agreement that is of major relevance to the introduction of Industry 4.0. Stating that

> The company has a fundamental responsibility for continuously meeting its needs for the skills of its employees. Likewise, employees have their own responsibility for developing their skills in accordance with the requirements of the company's business"

The agreement is based on an obligation for dialogue if either of the parties consider that there is a need for competence development. The agreement contains a framework for how such dialogues are to be conducted.

4.3.6. Other initiatives

Technology College

IF Metall took initiative for what has been developed into today's Technology College (TC). TC now includes nearly 150 education agencies across the country with about 16,000 students in industrial-oriented upper secondary education. TC

has built up a supportive network of about 3,000 industrial companies. From an industrial policy point of view, the TC is an expression of the industry's overall interest in a good level of competence while at the same time providing a platform for the company's practical cooperation regarding this need. IF Metall has together with the employers' organisation Teknikföretagen played a decisive role in the development and continued development of TC.

Validation

IF Metall has together with the engineering industry developed a system for validating the industry's various basic and professional competencies. The system consists of two types of validation concepts, a basic concept that is general for the entire industry and a number of branch concepts that are unique to each industry.
The basic concept ensures the skills required for work content that is found in all sectors and where the requirement for skills to handle the job is the same regardless of industry. The basic concept consists of three areas; industrial engineering, automation and maintenance. Validation of Industrial engineering include basic skills for work in industry regardless of duties and industry. Validation of automation include basic skills for machine and process operators that handle automated systems and applications in their daily work. Validation of maintenance include basic skills for operators with increased maintenance responsibility.
Branch Concept validates industry-specific skills requirements such as CNC Technology. Further examples can be process operators in the chemical industry, licensed welders and maintenance mechanics.
The validation is performed by an accredited validation centre of which there are 94 spread across the country. A validation centre may consist of educational companies, larger companies with their own educational units as well as high schools or colleges.
At a validation centre, companies, professionals or students can carry out the theoretical and practical tests needed to validate and certify the required level of competence. Upon completion of a test, a certificate of competence that works in companies in all sectors will be issued.

Conclusions

In order to understand Swedish trade unions, and especially the relationship of IF Metall to Industry 4.0, it is necessary to know Swedish labour market traditions, known as the "Swedish labour market model".

The Swedish labour market model rests on an agreement (often referred to as "The Saltsjöbad agreement") between the social partners that was made in 1938 and, in principle, still applies today. The agreement governs the relationship between the social partners, where the main rule is that there is a ban on strikes during periods in which there is a collective agreement is in place. One basic idea is that the State should remain neutral in relation to the parties and not affect the negotiations.

The ability of the State to influence labour market policy is mainly through a set of labour laws that includes areas such as labour representation in company boards, work environment, participation in decision-making at the workplace, and employment security. Most laws have been implemented under a social-democratic government, but the labour market policy in Sweden is extremely stable and has a high degree of social acceptance that it has not been changed, at least not in the short term, under a conservative/liberal government.

Employers are represented on two levels; *The Confederation of Swedish Enterprise* (*Svenskt näringsliv*), representing the highest level that primarily attempts to influence political power at the national level, and *The Association of Swedish Engineering Industries* (*Teknikföretagen*), that is the direct counterpart to IF Metall, when collective agreements are to be negotiated and signed. A commonality shared by these two organisations is that they cannot represent companies in relation to the strategic application of Industry 4.0 in practice. Instead, the initiative is that individual companies use Industry 4.0 to win competitive advantages over one another. Alternatively, employers' organisations can concentrate on competition-neutral issues that create good conditions for implementing Industry 4.0, such as skills supply, labour market legislation, etc. The employers have also initiated a number of projects that can serve as general role models for how Industry 4.0 can help develop Swedish industry, often in collaboration with IF Metall.

Based on this background, IF Metall's relationship with Industry 4.0 can be analysed and understood. The Swedish labour market model, combined with the

large number of union members, gives IF Metall a very high degree of legitimacy as a negotiating partner. The good relations enjoyed by IF Metall with the current government further strengthen its position. Unlike their counterparts (the companies, the employers), the local union clubs do not compete with one another, instead they benefit from cooperation; a collaboration that has resulted in a common strategy for how to meet Industry 4.0. This means that there is an asymmetry in respect to the legitimacy of the labour market parties to regard to discussing Industry 4.0.

As noted above, the influence of the State on the relations between the parties in the labour market is restricted by the Saltsjöbad agreement. However, on the other hand, the state has great opportunities to pursue an offensive business policy. Here the current government pursue a strategy that is very close to the concept described by the German concept Industry 4.0. The Swedish strategy *Smart Industry – a strategy for new industrialization for Swede*n was developed in a broad collaborative process where IF Metall has been one of many active parties. In Sweden there is a generally positive view of the opportunities offered by Industry 4.0. Yet at the same time it needs to be noted that there is lacking a national critical discourse in relation to Industry 4.0 and new technology.

In summation of IF Metall's position in the context described above, existing institutional frameworks of legislation and collective agreements provide IF Metall with a strong negotiating position. The employers' organisations do not have the corresponding legitimacy when it comes to negotiating the actual implementation of Industry 4.0, why the actual work must be done locally. IF Metall has gained a head start by formulating a national strategy for meeting the new technology, but that strategy must be made real in local collaboration and local negotiations. One problem may be that at local workplaces the level of knowledge about Industry 4.0 among IF Metall members is not so high. Successful implementation requires extensive work at the local level.

References

Arbetsmarknadsdepartementet (2018), *Goals and visions of labour law and work environment policy*, Presentation available at http://www.government.se/government-policy/labour-law-and-work-environment/goals-and-visions-of-labour-law-and-work-environment/

Dombrowski, U., Wagner, T. (2014). *Mental strain as field of action in the 4th industrial revolution*, in *Procedia CIRP*, Vol. 17, pp. 100-105

Finfa (2017), *Statutory and collective insurance schemes for the Swedish labour market 2017*

Gill S. (2013), *Industry prepares for the next industrial revolution*, in *Control Engineering*, June 27

IF Metall (2017), *Program för framtidens industriarbete*

Kagermann, H., Wahlster, W., Helbig, J. (2013), *Securing the future of German manufacturing industry. Recommendations for implementing the strategic initiative Industrie 4.0. Final report of the Industrie 4.0 Working Group*, Forschungsunion, Acatech

Kopacek, P. (2015), *Automation and TECIS*, in *IFAC-Papers-OnLine*, Vol. 48, No. 24, pp. 21-27

Lasi, H., Fettke, P.D.P., Kemper, H.G., Feld, D.I.T., Hoffmann, D.H.M. (2014), Industry 4.0, in *Business & Information Systems Engineering*, Vol. 6, No. 4, pp. 239-242

Lee, J., Kao, H.A., Yang, S. (2014), *Service innovation and smart analytics for Industry 4.0 and big data environment*, in *Procedia CIRP*, Vol. 16, pp. 3-8

Produktion2030 (2017), *Make in Sweden 2030*, http://produktion2030.se/wp-content/uploads/Prod2030_agenda_eng_1702151.pdf

Produktionslyftet (2018), *Produktionslyftet*, Presentation available at http://www.produktionslyftet.se

Regeringskansliet (2016), *Smart Industry – a strategy for new industrialisation for Sweden*

Region Blekinge (2018), *Smart production*, Presentation available at http://www.regionblekinge.se/om-oss

Smarta fabriker (2018), *Smarta fabriker*, Presentation available at http://www.smartafabriker.se

Stock, T., Seliger, G. (2016), *Opportunities of Sustainable Manufacturing in Industry 4.0*, in *Procedia CIRP*, Vol. 40, pp. 536-541

Stocker, A., Brandl, P., Rosenberg, M., Michalczuk, R. (2014), *Mensch-zentrierte IKT-Lösungen in einer Smart Factory*, in *Elektrotechnik und informationstrchnik*, Vol. 181, No. 7, pp. 207-211

Teknikavtalet (2017), *Kollektivavtal – Teknikavtalet IF Metall*, IF Metall

Teknikföretagen (2012), *A Short Introduction to Swedish Labour Law*

Teknikföretagen (2017), *Position Paper: Industrial production*

Yao X., Jin, H., Zhang, J. (2015), *Towards a wisdom manufacturing vision*, in *International Journal of Computer Integrated Manufacturing*, Vol. 28, No. 12, pp. 1291-1312