

ANALYSIS OF NATIONAL INITIATIVES on DIGITISING EUROPEAN INDUSTRY ¹

LUXEMBOURG:

Digital4Industry

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¹ This report has been produced for DG CNECT by Jan Larosse, independent adviser (Vanguard Initiatives Consult&Creation).

The analysis is limited to the information available till September 2017 and the proposed analytical framework can be a basis for a more comprehensive policy documentation.

1. Context

Luxembourg ranks 5th out of the 28 EU Member States in the Digital Economy and Society Index 2017, and belongs to the high performing cluster of countries. Luxembourg has undertaken an ambitious economic diversification strategy in respect of the digital sector. This strategy is multidimensional, embracing education, economy, public services, and grouped under an umbrella initiative called Digital Lëtzebuerg. However, this good overall performance masks more diverse performance levels: it records excellent results (2nd rank in 2016) in terms of human capital, whether in use or in digital skills, but it is lagging behind in the integration of digital technologies by companies (22nd rank in 2016), whether for e-business or e-commerce. Similarly, it is lagging behind in digital public services (19th rank in 2016).

A relative specialisation in ICT activities has emerged in Luxembourg. In 2008, 11.4 % of added value (excluding financial activities) was in ICT, i.e. a first place in Europe² source:. Luxembourg is the OECD country with the highest proportion of ICT specialists in its working population at 4.7 %.

Outstanding ICT infrastructure, strong expertise in cybersecurity (i.e. Interdisciplinary Centre for Security, Reliability and Trust – SnT – at Luxembourg University), and the favourable business climate should attract digital business to Luxembourg.

Thanks to the prospecting and setting up of tailored connectivity and data centre infrastructures, Luxembourg has attracted many companies active in the ICT sector, particularly in the fields of electronic content distribution and data storage in a highly secure environment. There is a presence of and major investment by ICT companies (Amazon, eBay, Skype, iTunes, Paypal, Vodafone, Sony, ...) and gaming companies since the early 2000s.

1.1 Political changes; new policies

- The **government programme 2013-2018** identified the ‘diversification of the economy’ as one of its main axes, to diminish dependence on the financial sector (remaining the dominant economic pillar) with a strategy of ‘multi-specialisation’. This policy focuses on a few specific sectors that have future potential for Luxembourg, in particular specific niches in industry, ecotechnologies, logistics, health technologies and ICT.

The information and communications sector is therefore an integral part of the Government’s development and diversification policy to make Luxembourg attractive as a business location. The ICT sector is also a point of commonality between the various diversification sectors, because it is highly interconnected both with the eco-technology sector (e.g. smart grid and IT management), logistics (e.g. e-commerce), biotechnology (e.g. data archiving and management) and the industrial and financial sector (e.g. high-performance cloud computing).

<https://www.gouvernement.lu/3322796/Programme-gouvernemental.pdf>

- In April 2013 the ‘**Haut Comité pour le soutien, le développement et la promotion de l'Industrie au Luxembourg**’ has been launched by the government to support the industrial

² Eurostat, Relative specialisation by Member State in terms of value added, 2008

renewal. It is a consultation body for government with representatives from industry (chosen for their expertise and personal competence) that will develop in open end frequent debates diagnosis of strengths and weaknesses of Luxembourg industry and formulates recommendations for industrial policy (including research and innovation) and concrete action plans, identifies new niches and assesses national policies in view of the industrial challenges (as foreseen in the Government Programme). This Committee is presided by the Minister of Economy (and deputy prime-minister) Etienne Schneider.

<http://www.luxembourg.public.lu/fr/investir/secteurs-cles/industrie/comite-industrie/index.html>

- In 2014 “**Digital Lëtzebuerg**” was launched by the government as an incentive to stimulate cooperation between Government and private sector and a tool that identifies areas for further action. This strategy is multidimensional, embracing education, economy, public services. Under the umbrella of Digital Luxembourg, joint private-public ventures and projects find their place, each tackling a different aspect of digital development. This strategy positions Luxembourg as ‘smart country’, with significant investments in connectivity and highly secure data centres – “European Trusted Information Centre” - and deployment of a high speed Internet. The Project Management Office Digital Luxembourg coordinates the horizontal and project based horizontal approach for the Council of Ministers
<https://www.gouvernement.lu/4242265/digital-letzebuerg/4242280/intro>
<http://www.digital-luxembourg.public.lu/fr/index.html>
- In 2015 the minister of economy, together with the Chamber of Commerce initiated a **strategic study on the ‘Third Industrial Revolution’³**, inspired by the economist-prospectivist Jeremy Rifkin. According to his model the technologies for information and communication (such as IoT), for renewable energy and for sustainable transport are converging in one intelligent network that affects all daily-life activities. The ambition of this strategy for Luxembourg is to become the first country to make the transition to the third industrial revolution.

³ Note: What is the relation between ‘Third Industrial Revolution’ of Rifkin and the ‘Industry 4.0’ used in the context of nowadays policies for industrial transformation?

Rifkin makes the distinction between ‘energy regimes’, while the recent definitions for Industry 4.0 are more related to changes in ‘production regimes’.

Rifkin analyses secular industrial transformation as coinciding changes in energy sources and communication means: coal and steam engines leading to mechanisation, together with printing and mass literacy (1st); internal combustion and oil and electrification leading to mass-production, together with telephone (2nd); renewable resources and storage in hydrogen leading to decentralised production, together with internet-smart grids (3d). In the Industry4.0 framework, the third industrial revolution starts with the digital revolution in the seventies, leading to high-level automation, and the fourth revolution is the prolongation thanks to internet and the merger with other technologies (bio-nano-ICT) to a new cyber-physical systems: Internet of Things. For Rifkin the (digital) automation is still part of the second industrial revolution. Internet is becoming a game changer in the perspective of change in energy regimes (for a third industrial revolution), with distribution via smart grids. Industry 4.0 tends to include that not anymore energy but data has now become the new strategic resource in the economy.

Both paradigms are very complementary in driving industrial transformation policies.

In January 2016 the Ministry and the Chamber of Commerce and IMS⁴ started a participatory process over ten months in which 300 people were involved in nine working groups (among one on smart economy), in order to achieve a common vision. The results of the ‘Rifkin-study’, regarding the roadmap and the measures to prepare the country for achieving this process, were presented in November 2016.

(<http://www.luxembourg.public.lu/fr/actualites/2016/11/15-rifkin/index.html>).

Minister Schneider announced the first **nine measures** of implementation concerning the construction of a national smart energy grid; promotion of electromobility and mobility as a service; a light house project for smart, sustainable end circular quarters/cities; development of joint technology platforms for business and public research; promotion of circular economy through public procurement; a ‘Sustainable Development Finance Platform’; high performance computing infrastructure.

The **coordination** of the post-Rifkin process will be overseen by a national follow-up committee composed of representatives of the ministries responsible for the ‘Third Industrial Revolution’ and ‘Digital Lëtzebuerg’, as well as social partners.

1.2 Status of the general Digital Agenda

On 13 July 2017 the **Progress Report** of Digital Luxembourg, ‘Leading the way to a smart nation’, was published by the Ministry State Department of Media, Telecommunication and Digital Policy. This report illustrates the character of this programme as an umbrella initiative, with the objective to use digitalisation as a lever for transformation of the country.

The mission of Digital Luxembourg is developed in four steps: enable (facilitating all actors that use digitalisation) - kick-start (supporting innovative projects) – connect (bring together ministries, institutions, academia etc to create solutions) – inform (with an overview and mapping of progress made).

Under the 6 reported axes, several actions are important for digitising industry:

- Digital Skills: targeted approaches for education&youth, citizens, professionals and ICT specialists, with ‘makerspaces’ at 23 secondary schools and the ‘Luxembourg Tech School’ to educate 15-18 year old students to Future Digital Leaders (special certificates for Game, Big Data analytics and FinTech); or the FIT4Coding crash course to upskill people to become new developers for the ICT industry.
- Digital Innovation Ecosystem: providing strategic infrastructure such as the Digital Tech Fund for seed capital, and start-up support such as the FIT4Start incubator programme offering coaching and financing to tech start-ups.
- Fintech: in particular the LHoft incubator (Luxembourg House of financial echnology)
- Digital public services: developing e-government, for public procurement and open data (<https://data.public.lu/en/>)
- Data regulation: to ensure free flow of data, as well as privacy and protection; using RegTech (application of technology to solve regulation challenges)
- ICT infrastructure: a strategy for national coverage with ultra-high-speed broad band by 2020 and attractive infrastructure for high-tech companies such as the High-Performance Computer (1

⁴ IMS (Inspiring More Sustainability): the leading Luxembourg network for corporate social responsibility

petaflop per second) and the Infracchain (a cross-sector service platform for blockchain-as-a-service to kickstart cutting-edge projects)

http://www.digital-luxembourg.public.lu/en/actualites/about/2017/13072017_-_progrsreport/index.html

1.3 Role of ICT and of digitalisation of industry in the R&I policy and industrial policy of the country

Digital strategies play a key role for promoting Luxembourg as smart nation and first country to make the transition to a third industrial revolution. The information and communications sector is an integral part of the development and diversification policy: as a priority sector and also a transversal capacity between the various diversification sectors, e.g. to develop IT applications in the field of infomobility and collective mobility.

- Another policy channel for supporting digitising industry is cluster policy. The **Luxembourg Cluster Initiative**, managed through Luxinnovation, supports at present ten cluster organisations, among one dedicated at the ICT cluster.

The **Luxembourg ICT Cluster** brings together various actors in the field of ICT in Luxembourg (companies/private organisations; public research organisations; capital providers/service organisations; ...) with the goal of fostering new and sustainable business opportunities through collaborative research, development and innovation projects. It aims at optimising the uptake of ICT as an enabling technology for various sectors (collaborating with other clusters as technical enabler) and the further development of the existing ICT sector in Luxembourg by encouraging networking and collaboration between the private and public sectors. The cluster provides specific support activities and services to its members and offers a platform for networking, collaboration and exchange of experience.

Digitalisation is part of the programme of other clusters. E.g. the autumn conference of the cluster for logistics (C4L) is on 'Robotics and artificial intelligence change the logistics landscape'. **Logistics 4.0** case studies and demonstrations will give insights to evaluate the impact on companies' business. The Cluster for Logistics partnered with the Benelux Roundtable of Council of Supply Chain Management Professionals and Digital4Industry (D4I) to assemble an international panel of speakers.

- Luxembourg has merged its public research organisations in order to be a more effective partner for industry and increase. In 2015 the **Luxembourg Institute for Science and Technology (LIST)** was established as the RTO of the Luxembourg government with the mission to support the diversification of the economy through development and deployment of new technologies, software and services. The LIST (with more than 550 collaborators) is part of the City of Science - Belval Campus of the Luxembourg University that brings also together other major institutions in Luxembourg innovation ecosystem (FNR, Luxinnovation).

LIST has three technology departments: Environmental Research & Innovation (ERIN), Materials Research and Technology (MRT), **IT for Innovative Services (ITIS)**. This IT department is focussed on: business analytics (supporting acceleration of industry 4.0); decisional knowledge dynamics (e.g. human-machine interaction); trusted services (e.g. IT solutions to manage trusted service supply chains).

LIST works in a matrix organisation with a number of cross-sectoral corporate innovation programmes (Smart Nation) to provide integrated solutions in cooperation with business (Smart Manufacturing, Smart Cities, Smart Finance, Smart Space, ...) and generate business opportunities. **'Smart Manufacturing'** combines the advanced manufacturing technology (strengths in composites) with the digitalisation of industry to transform concept, production and use of new products and of processes, including energy use or management of the supply chain (data analytics is part of all big projects).

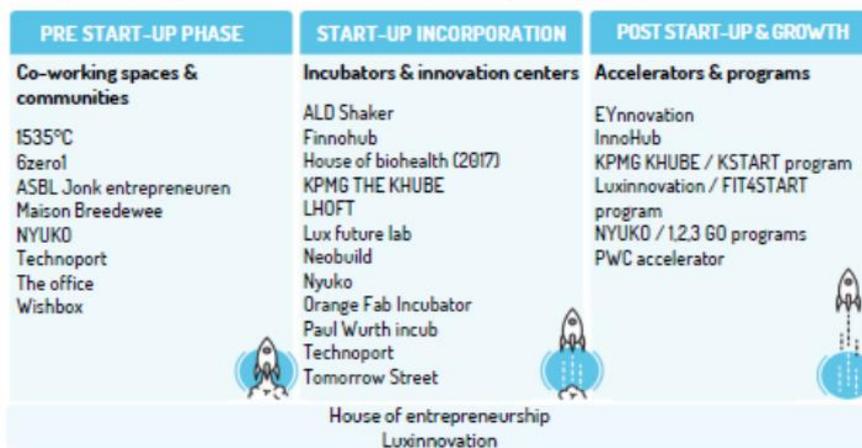
- The **University of Luxembourg** has 'Computational Science' (CS) one of the four strategic research priorities, targeted at developing new tools for modelling and simulation complex phenomena and systems. Computational Sciences are combining mathematical competences with computer science tools and algorithms, industrial application expertise from engineering, empirical software engineering, and empirical disciplines such as condensed matter physics, life sciences, geophysics, social sciences, psychology, finance and economics. The challenge is optimal data exploitation (e.g. as generated in self-sensing devices). The strategy of the **Luxembourg Centre for Scientific Computing** is to exploit the mathematical commonality between disciplines (for example, option pricing can be modelled using the same equation as that governing the flow of oil in reservoirs) to impact engineering solutions in different domains.

With the emergence of scalable High Performance Computing solutions and grid and cloud computing, CS are becoming feasible and reasonable for an exploding set of application domains. The development a powerful **High-Performance Computer** (HPC) facility at the University of Luxembourg (combining huge computing resources with extensive data storage facilities) is a strategic asset of the university and an important comparative advantage for the scientific and also economic competitiveness of Luxembourg. the upgrading of the facility to one petaflop by 2018 will position Luxembourg among the leading centres in the EU.

- Luxembourg was the initiator of an **Important Project of Common European Interest** on High-Performance Computing and Big Data applications (IPCEI-HPC-BDA), together with France, Italy, Spain. On 23 March 2017 a European HPC cooperation agreement was signed, also including Germany, Portugal and the Netherlands, to establish a network of facilities that will be a key asset to ensure strategic independence of the European digital industry in developing own value-chains. This initiative has also positioned Luxembourg in the core of European industrial policy. The initiative was initiated by LIST in cooperation with the ministries of Economy and of Higher-Education and Research, and Luxinnovation.
- The Luxembourg innovation and industrial policy for economic renewal is giving special attention to the facilitation of start-ups (with incubation and funding). In 2018 'The House of Start-ups' will open as a specialised entry-point for the different support services that have emerged in the last years.

<https://www.siliconluxembourg.lu/the-house-of-startups-to-open-its-doors-in-2018/>

Increasing number of start-up support structures



- Another focus point is the provision of innovation infrastructure of different types. Luxembourg is building research infrastructures (such as the HPC) but there is also space for industrial experimentation. The **Learning Factory** (focussed on energy performance) is a joint-venture of the Luxembourg state with leading companies to promote experiential learning in a real production environment (<http://www.learningfactory.lu/about-us/>)

2. Status of the National Initiative

The platform '**Digital4Industry**'⁵ has been launched in June 2016 by FEDIL – the Voice of Luxembourg's Industry, Luxinnovation – the National Agency for Innovation and Research, and the Luxembourg Ministry of the Economy. It is still in an early stage.

FEDIL is the business federation in Luxembourg, representing the Luxemburg industry interest at national and international level (also with a representation office in Brussels). It counts about 550 members from 37 sectors. Among its 19 associations there is FEDIL-ICT.

FEDIL-ICT asbl is the interest group of the digital technology industry in Luxembourg, representing the leading players. Subjects at the core of Fedil-ICT's political agenda include: the legal framework and competitiveness of communication networks; R&D and innovation in the field of ICT; initiatives linked to electronic governance and e-administration; training and education in the field of ICT; the uptake of new technological trends (dematerialization, outsourcing, cloud computing, software as a service...)

Current thematic working groups include green IT, IT governance, telecommunication infrastructure and legal framework, SAP user group and cloud computing (EuroCloud Luxembourg). Fedil-ICT elaborates position papers on major topics and maintains close ties with key political decision makers on a national and European level. Furthermore Fedil-ICT regularly organizes conferences and networking events on ICT subjects.

To serve its members, FEDIL is initiator of "Digital4Industry", an information, awareness raising, networking and promotion platform for companies concerning Industry 4. By taking this initiative FEDIL was able to involve Luxembourg from the beginning in the European Platform of European

⁵ See <http://digital4industry.lu/>

National Initiatives. This presence will enhance cross-border and intersectoral cooperation for Luxembourg companies and exploration of joint investments.

2.1 Political commitment

The Platform emerged at the initiative of FEDIL and was presented to the Haut Comité pour l'Industrie for political support. The objectives of FEDIL are to increase awareness and actions on the challenges of opportunities of the digital transformation in Luxembourg and to ensure a close connection with the European agenda on digitising industry on programmes and initiatives that are important for its members.

D4I is not a formal PPP. It's a cooperative initiative between these following partners: FEDIL; Luxinnovation; Ministry of the Economy; Chamber of Commerce; University of Luxembourg (Uni.lu); The Interdisciplinary Centre for Security, Reliability and Trust (SnT); LIST.

FEDIL is coordinating the Platform in collaboration with Luxinnovation. FEDIL and Luxinnovation organised a launch conference on 16 October 2016.

The Chamber of Commerce (CoC) also has an important role in operationalisation of support through the House of Enterprise, as one-stop-shop (<http://www.houseofentrepreneurship.lu/en/our-missions/>), and the House of Training – (<https://www.houseoftraining.lu/>) for vocational training on ICT.

The action plan and the events are validated by a steering committee composed of representatives from FEDIL, Luxinnovation, Ministry of Economy and 12 industrial company representatives.

2.2 Strategic roadmap / action plan

The Platform 'Digital4Industry' targets the local manufacturing industry, SME's as well as large enterprises.

Focusing on the above targeted group, it aims at the following **three objectives**:

1. Creating awareness and informing about the risks and opportunities related to the implementation as well as the non-implementation of industry 4.0; organising company visits and visits to international technology fairs
2. Identifying specific concerns and challenges by the local industry and working on solutions to enable early adoption of Industry 4.0 concepts;
3. Initiating collaborative pilot projects to showcase value creation by the implementation of practical Industry 4.0 solutions; information diffusion on national and international funding opportunities.

The **work programme in 2017** (agreed with the Steering Committee) contains following activities:

- Workshop "Collaborative Robots" at FANUC Europe Corporation (January 24):
- Visit to the Hannover Messe with guided tours on Industry 4.0 topics (April 27):
- Workshop "Internet of Things (IoT) and Industry 4.0" (May 30): Frédéric Jourdain, CEO Thingsplay presented examples of IoT in industrial environments: Collecting Production and Process data; Connected device; Waste management; Logistics Tracking
- The Platform/ FEDIL together with the Ministry organise two information sessions in August and September to offer the local manufacturing industry support and supervision to successfully participate in a 2018 call of H2020 for HPC and Big Data enabled Large-scale Test-beds and Applications (ICT-17-2018)

- Conference 'Digitisation – Shipbuilding and marine equipment – Opportunities for Luxembourg industries; organised by the Cluster Maritime Luxembourg and FEDIL (September 19)
- Visit of Flanders Make, organised by Luxembourg CoC
- Workshop on Industry 4.0 / Analytics in Manufacturing (in collaboration with LIST (October 24)
- Visit of SmartFactoryKL e.V. in Kaiserslautern (November 15)
- Autumn Conference Cluster for Logistics 'Robotics and AI change the Logistics Landscape (November 21)

Conference 'Industry 4.0 – Stepwise or never', in collaboration with the Hochschule für Technik und Wirtschaft des Saarlandes and Université de Luxembourg.

This will be the second Conference of D4I, after the kick-off in October 2016.

The conference will focus on actions for SMEs. FEDIL will explore with the Ministry the launch of an assessment instrument for digital transformation in SMEs (supported by vouchers) and the development of demonstration projects.

2.3 Implementation

There is no dedicated budget for D4I. Since the start of the initiative, FEDIL has covered the costs of the organisation of workshops, conferences etc. The annual conference in October 2017 will be co-financed by the Ministry of the Economy.

Projects will be part of existing schemes.

2.4 Evaluations/studies

Strategic Study 'Third Industrial Revolution': to prepare Luxembourg to become the first country to make the transition to Third Industrial Revolution.

<http://www.troisiemerevolutionindustrielle.lu/>

3. Other policy support to digitising industry

3.1 Boosting innovation

The Luxembourg government is committed to raising the R&D-intensity by 2020 up to 2,5% of GDP. The budget for public research has been boosted. Performance contracts were concluded for the period 2014-2017 between the Government on the one hand and research bodies, the National Research Fund, Luxinnovation (the national agency for innovation and research) and the new Luxembourg Institute for Science and Technology (2015-2017).

Direct and indirect support for leveraging private investments in RDI also increased. The Ministry of Economy provides investment aid and R&D grants.

In June 2016 of the new law on research, development and innovation (RDI) entered into force. This new law aligns national aid measures with EU policy. The Ministry of the Economy has chosen to implement all opportunities offered by the European framework in order to encourage companies to increase their R&D expenditures and enhance their innovation efforts as well as to stimulate partnerships between private companies and public research centres. The new law on RDI promotion includes the following measures that are already in use:

- aid for research and development projects and programmes

- aid for feasibility studies
- innovation aid for SMEs
- aid for young innovative enterprises
- aid for process and organisational innovation
- investment aid for research infrastructure
- investment aid for innovation clusters
- aid for the operation of innovative clusters

3.2 Skill development

Digital skills are at a high level already, but given the strain put on human resources for the digital transformation targeted efforts are further pursued under Digital Luxembourg: for education and youth (e.g. developing maker spaces in secondary schools); for lifelong learning opportunities for professionals (e.g. FIT4Coding to train unemployed, or training in cybersecurity); for developing ICT specialised profiles (e.g. in the Cybersecurity Competence Centre 3C).

FEDIL projects:

- **Hello Future** (<http://www.hellofuture.lu/>)
- Enquête « Les Qualifications de demain dans l'Industrie »
- Enquête « Les qualifications de demain dans le domaine des TIC »
- « Travail de demain » Project: Reflections on the development of a political position and practical recommendations with regards to digital transformation and labour markets
- **Skills Bridge Project** (early discussions): This project will consist in developing together with the Ministry of Labour a toolbox prototype for employee upskilling (including, inter alia, financing schemes, State pre-financed time-saving accounts, diagnostic tools to assess current skills and capabilities for upskilling, incentives, training curriculum).

Government key projects (see Digital Luxembourg Progress Report) :

- Luxembourg Tech School
- Digital 4 Education
- BEE creative
- Fit 4 Coding:
- Cyber Security Competence Center (C3): offers training and be a test tool available for new software

Other initiatives:

- Launch of the **Digital Skills and Jobs Coalition Lëtzebuerg (DSJC-L)** on 29 May 2017 : the DSJC-L is a multi stakeholder group with more than 40 Partners: <http://lidit.lu/partners/>
The objectives of the DSJC-L are
 - To substantially reduce the shortage of IT professionals, to improve the conditions for the private and public sector employees as well as all inhabitants to learn and continuously improve the necessary ICT skills for job, the establishment of IT business and development of the digital market
 - To attract more young people to choose ICT and other science studies and professions, to ensure the acquisition of digital skills also when learning other professions
 - To raise public awareness of the importance of digital skills and competences
- **Luxembourg Institute for Digital Training** (<http://lidit.lu/>)

- LIDIT is a nonprofit organization created in November 2015 by the House of Training, ISEC-Institut Supérieur de l'Économie, ICT Luxembourg and the Centre de Compétences Génie Techniques du Bâtiment.
- LIDIT is the founder and coordinator of the Digital Skills and Jobs Coalition Lëtzebuerg - <http://lidit.lu/digital-skills-coalition-letzebuerg/>
- **House of Training** – 655 vocational training programmes (<https://www.houseoftraining.lu/>)

3.3 Standardisation

Agence pour la Normalisation et L'Économie de la Connaissance (ANEC)

ILNAS (Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services), the national standards body, is tasked with implementing the national technical standardisation strategy, with a strong policy regarding the ICT sector.

Associated with research initiatives, a White Paper 'Digital Trust for Smart ICT' was published October 2016, to establish the foundations on which ILNAS will develop the necessary education about ICT technical standardization at national level. Within this framework, Luxembourg will continue to consider technical standardization as a real force multiplier for the economy, competitiveness, and the ICT sector in particular.

<https://portail-qualite.public.lu/content/dam/qualite/fr/publications/confiance-numerique/etudes-nationales/white-paper-digital-trust-october-2016/White-Paper-Digital-Trust-October-2016.pdf>

In July 2017 a new version of the 'Standards Analysis Smart ICT' was published as a synthesis on development of standards regarding Cloud Computing, Internet of Things, Big Data and related issues of trust. This publication specifies the technical standards that allow to strengthen digital trust for the technologies of Smart ICT. It highlights the strategic efforts of ILNAS to strengthen the competences regarding technical standards for Smart ICT, such as the 'certificat universitaire Smart ICT' for Business Innovation or the research programme initiated with the University of Luxembourg.

<https://portail-qualite.public.lu/content/dam/qualite/publications/normalisation/2017/standards-analysis-smart-ict-1-1.pdf>

3.4 Regulation Framework

- Adoption of the Law of 23 May 2016 on free access to public data - "open data", which allows the development of services by third-party providers;
- Adoption of the Law of 17 May 2017 on the renewal of research, development and innovation aid schemes: this will make it easier to obtain RDI aid, in particular for young innovative companies;
- Privacy and data protection (July 2017: New support tool for GDPR + draft bill on the implementation of GDPR);
- The General Data Protection Regulation will be applicable from 25 May 2018. The new legal framework will establish a single set of data protection rules in the EU and will replace the EU Directive of 1995 and the Luxembourg Data Protection Act of 2002.;
- Patent box regime announced for 2018: In April 2017, the Prime minister announced the introduction of a new intellectual property (IP) tax regime in 2018. This new IP (or patent box) regime would aim to reinforce research and development (R&D) activities in Luxembourg and stimulate the R&D spending of foreign investors in Luxembourg.

4. Investments

The regular investment and innovation aid is available for digital transformation projects:

- The Ministry of Economy provides **investment aid** (10% for medium enterprises; 20% for small enterprises) for tangible and intangible investments depreciated over three years or more.
- The SNCI provide **indirect development loans** (via authorised local banks) at medium or longer term (5 to 10 years) for these tangible and intangible investments of all companies, up to 40% of eligible costs, at favourable interest rates.
- The Ministry of Economy provides **grants for R&D and innovation** (including for organisational innovation in the service industry for ICT related costs) according the bottom-up principle (all thematic areas), with different funding rates depending on firm-size. With collaboration bonus small companies can receive up to 80% subsidies for industrial research.
- The SNCI also offers **direct loans for R&I** to SMEs at mid- and long-term, up to 40% of eligible costs and not greater than 250.000 euro at a favourable interest rate.
- Luxinnovation has joined the **Manunet III consortium** 2016-2020 (a consortium of regional and national agencies to fund transnational R&D and demonstration projects): this offers opportunities for collaborative research in all fields of manufacturing, including ICT.
- The FNR supports aid schemes for **public-private R&D cooperation**: AFR-PPP (for PHD students and Post-Doc) or Core-PPP (for industrial research).
- Luxinnovation provides **support** services for structuring projects and identifying relevant financial support, also for H 2020 calls.

In addition more dedicated funding instruments and priorities have been created

- **Luxembourg Future Fund**, created in April 2015 by SNCI and EIF, to develop the VC system in Luxembourg and support economic diversification. This **EUR 150m fund**, to which EIF contributes EUR 30m and SNCI EUR 120m, will be deployed over a five year period and will focus on innovative European SMEs, attracting foreign entrepreneurs and early to later stage innovative businesses into various Luxembourg high-tech sectors, including ICT and cleantech.
- **Digital Tech Fund**, established by the Ministry of Economy in 2016, is a seed fund created together with a group of private investors to support the funding and development of start-up companies in the field of information and communication technologies (ICT). This fund is part of the strategy 'Digital Lëtzebuerg', to support start-up ICT companies, and complete the national ecosystem favourable to the development of young innovative companies in the field of ICT. The state participates in the fund with a budget of **€ 5 million**; other investors contribute a total of **€ 15.33 million**, of which 3 million are from the National Credit and Investment Company (SNCI) and one million euros from the University of Luxembourg.

The first investment projects have been announced in August 2017

- The Luxembourg **Smart Specialisation Strategy** has indicated broad priorities for using the (limited) ERDF for research and innovation
ERDF supported in 2016 the start of the **Digital Analytics Platform (DAP)**
- The government agencies (FNR and Luxinnovation) also deal with **prioritisation** as Luxembourg is too small to do everything at a competitive level.

5. Good practices

(illustrative)

- Services to companies

LIST-Business Analytics

Given the impact brought by Business Analytics and the aim of sharing hands-on expertise, LIST has formed a new team covering related ground for different applications of Business Analytics in Luxembourg, including Regulatory Compliance Technologies. The new Unit is devoting all its resources to conducting applied research work with industry partners. These partnerships range from growth initiatives to assessing the quality of business processes and services.

Specific areas of activity:

- Financial services
- Acceleration of Industry 4.0 through digital transformation
- Regulatory compliance technologies
- Governance and process quality improvement

- Pilots and demonstration

Joint Ventures (Learning Factory)

Service Platform Infratech (software as a service)

S3 (Cybersecurity)

- Promotion of standardisation

INLA White Paper (see above)

6. Contribution to European priorities

6.1 Investments in key-technologies:

HPC:

- Luxembourg will develop by 2018 a HPC (High Performance Computer) with the power of one petaflop/second
- The project is part of the European cooperation in the context of “High Performance Computing”
- Its aim is to complement the European supercomputing network to the benefit of industry 4.0, i.e. the digitisation of business and production processes, and research.
- As part of this project, applications will be developed in favour of the concept of a 'smart nation': the idea is that HPC capacities can be used to improve everyday life and boost the economy. The areas under consideration are fintech, space management, mobility, energy, construction, water management, urban management, agriculture, and fourth-generation industrial production.
- The Ministry of the Economy, Luxinnovation and the Luxembourg Institute for Science and Technology (LIST) have the lead on this project

6.2 Development and networking of Digital Innovation Hubs

- Innovation Infrastructure in LIST and Lu University
- <https://infrachain.com/>: cross-industry initiative to provide infrastructure for exploration of possibilities and build a cross-industry community Block-chain-as-a-service platform.

- **National high performance computing (HPC), big data competence centre.**

The centre will give access to state-of-the-art HPC, big data infrastructure. It will deliver advanced and deep technical expertise to help companies leverage HPC effectively. It will also co-develop customer-specific algorithms and software applications, as well as industry training programs.

6.3 Participation in industrial platforms

- **Cooperation on connected and automated mobility**

March 2017: Luxembourg signed a letter of Intent to intensify cooperation on testing of automated road transport in cross border test sites (with 29 other MS)

- **Government exploring setting up a 5G technology testbed in Luxembourg**

Luxembourg wants to create “a 25km-long testbed” along Luxembourg motorways in order to start testing self-driving cars.

- **Automotive campus:**

The future Luxembourg Automotive Campus will house the research and development departments of several automotive sector companies. The project includes plans for shared infrastructure, such as research labs and buildings, conference rooms, catering areas and exhibition spaces. With its proximity to the Goodyear test circuit, the site offers great potential for synergies in logistics, training and education, as well as testing and validating prototypes. The campus will also foster 'open innovation' and the exchange of technologies.

- **GER – FR Cross-border test bed for automated driving**

In February 2017, the federal Minister of Transport Alexander Dobrindt and his French colleague Alain Vidalies have agreed to set up a German-French digital test bed. The test track will start in Merzig / Saarland and lead across Saarbrücken to Metz. In particular, the communication of vehicles will be tested. In addition, computer-assisted overtaking as well as threading and braking will be precisely tested. Consistent traffic warning services and the cross-border operation of the eCall emergency call system are also the focus of the test. The Luxembourgish Government is currently working on joining this project.