Round Table by Commissioner Oettinger with Leaders of Business and Research Organisations on Industrial Data Platforms

17 February 2016

Centre Borschette, Rue Froissart 36, Room AB-5B, 1040 Brussels

The report was prepared by:
Oscar Lazaro

1 – Introduction

At the Hannover Fair in 2015 Commissioner Oettinger expressed his ambition to develop a strategy to enable European industry to benefit from digital technologies such as big data, cloud computing, simulation, 3D printing, Internet of Things (IoT), robotics and cyber-physical systems. These technologies are the key enablers of new business models, innovative products and connected production processes. Shaping their development and making best use of them is essential for industry in Europe to remain competitive.

The Commission has presented four lines of concrete policy actions that form the basis of a draft EU wide strategy in this domain and has showed how these would link to the policy priority of the EU on the Digital Single Market and to national initiatives such as Industrie 4.0 (DE, AT), Industrie du Futur (FR), Catapults (UK), Industria Concetada 4.0 (ES) and Smart Industry (NL).

The Round Table held on 17th February 2016 was the fourth of a series of meetings organised by the Commissioner in order to gather inputs from stakeholders on the development of the strategy and its implementation. In particular, the meeting addressed the role of industrial data platforms and infrastructure as a key element in the development of the European Leadership in Digital Manufacturing Platform pillar.

The Round Table is to be seen in the context of the "Leadership in digital platforms for industry" as well as conducive to the creation of data ecosystems outlined in the Commission's Communication 'Towards a Thriving Data-Driven Technology' of 2014.
The Round Table solicited views notably from the wider user industry (automotive, chemical, energy, home appliances, logistics, transport, etc.) as well as from research and technology organisations and the digital supply side including SMEs and representatives of Public Private Partnerships established to support the mainstreaming of digital innovations in industry. The following elements were discussed:

- Need for industrial data platforms, including appropriate eco-systems and reference architectures to drive standardisation
- Stock taking of existing industrial data platform initiatives on the national and European levels
- The emerging business models based on data, such as data brokerage and its potential impact on the European industry
- Role of use cases and reference implementations for experimentation, testing and validation
- Stimulating alliance building across all relevant groups of market actors

This report summarises the findings of the Round Table on the development of European measures for the digitisation of European industrial data platforms.

A group of Round Table stakeholders started making some position statements on challenges and opportunities of industrial data platforms and ongoing platform activities. Then, stakeholders were invited to complement and enrich such position statements with additional perspectives and insights, which substantiated the opening statements.

2 – Opening Presentations

The boundaries and logic of businesses are changing and expand value chains across companies and countries with companies of any size. New business architectures are being architected around data. Over the last years, a number of national initiatives have been announced by the public and private sector globally dealing with the development of key European digital manufacturing assets for effective data sharing and value added industrial service creation; e.g.

Industrial Data Space[1] in Germany, Mindsphere by SIEMENS[2] built in collaboration with the HANA platform services from SAP, Industrial Ring 4.0 in Spain[3], Digital Manufacturing Commons (DMC) initiative in US by GE and UI Labs - DMDII[4] or the Midwest Manufacturing Spoke (MMS)[5] for Big Data also led by UI Labs.

Industrial data platforms in principle provide the necessary elements to enable an EU strategy capable of combining both an evolutionary approach for industry 4.0 to achieve higher productivity, flexibility, and shorter time to market, with a revolutionary approach in the way industry shares and exploits data for new business model and service optimisation.

The Industrial Data Space initiative is a German initiative driven forward by **Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V** together with key industrial players (such as ATOS, Bayer, Boehringer Ingelheim, KOMSA, PricewaterhouseCoopers, REWE, Salzgitter, SICK, Thyssen-Krupp, TÜV Nord, Volkswagen and ZVEI). The Industrial Data Space is built around basic principles (trust, decentralisation, sovereignty, security, governance, ecosystem, user driven data architecture, scalability, openness) that form the framework for the technological concept of the Industrial Data Space (1) securely sharing data along the entire data supply chain and easily combining own data with publicly available data (such as weather and traffic information, geo-data, etc.) and semi-public data, such as from a specific value chain. (2) Sovereignty over data – that is, control over who has what rights in what context – is just as important as legal certainty, to be ensured by certifying participants, data sources and data services. The reference architecture model should be seen as a blueprint for secure data exchange and efficient data combination. Data is to be shared between certified partners only when it is truly required by the user of that data for a value-added service. Further, the data services of the Industrial Data Space will help companies develop their own value-added services.
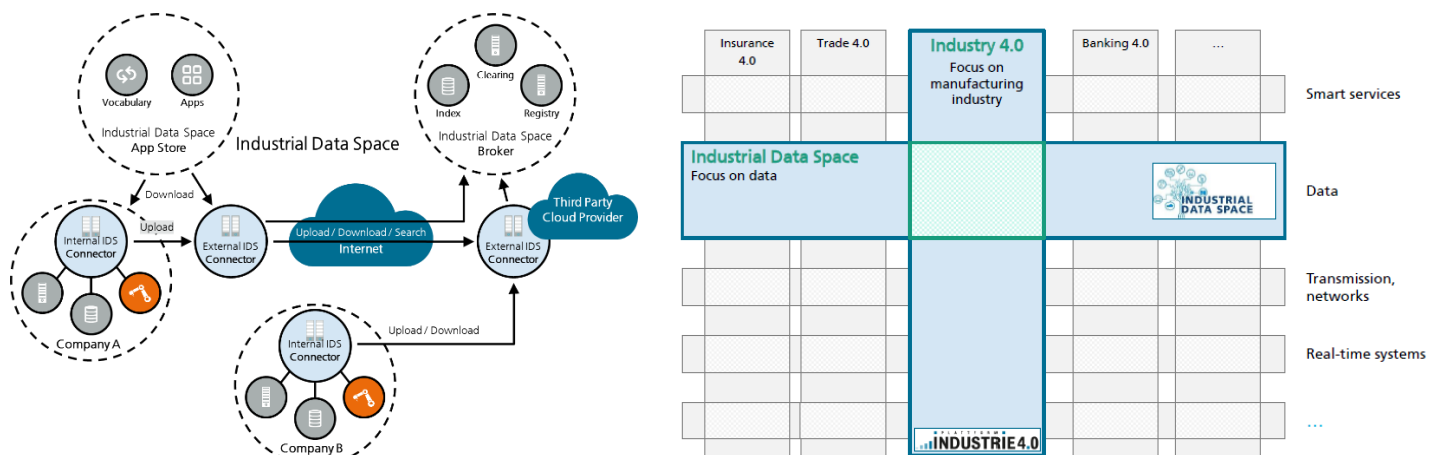

Figure 1and 2 – German Industrial Data Space initiative and Industry 4.0-IDS alignment

PwC underlined the importance of Fraunhofer Industrial Data Space for future business models based on the information available in this data space.

---

[1] http://www.industrialdataspace.de/

[2] SIEMENS Midsphere, 17 Nov. 2015 https://www.siemens.com/customer-magazine/en/home/industry/digitalization-in-machine-building/mindsphere-siemens-cloud-for-industry.html

[3] 17th July 2015 Announcement & road2cps presentation http://road2cps.eu/events/wp-content/uploads/2015/10/PANEL1_6_Industrial_Ring_4.0-Torino_final_sergi_figuerola.pdf

[4] 21st July 2015 http://dmdii.uilabs.org/press-releases/dmdii-announces-public-kickoff-of-digital-manufacturing-open-source-software-project

[5] http://www.nsf.gov/pubs/2016/nsf16510/nsf16510.htm

ATOS stated that there will be a series of Digital Shockwaves over the next 5 years, as businesses are forced into radical transformations to deliver the flexibility, agility and configurability demanded by their customers and their customers' customers. This will drive new levels of automation, optimization, interconnection and even artificial intelligence that will propagate through businesses' operational processes and out into their extended supply eco-system.

The Internet of Things and cyber-physical systems combine with data analytics to bring insight, automation and intelligence to a new breed of production processes and service providers. Contextual interaction between physical and virtual objects and sensors, including connected people and their digital personas, will start to influence all stages of product and service supply chains from concept to consumption. The speed at which changes are occurring in the digital marketplace are unprecedented. These changes have a threefold impact:

- Context: Businesses need to be able to react quickly to the situation and context of their customers if they are to take advantage of "Transient Business Moments".
- Contracts: with services evolving at such a rate, consumers are increasingly reluctant to lock themselves into long term contracts. "As a service" becomes the new contracting norm.
- Competitiveness: Businesses need to ensure they remain competitive. This means responding quickly and flexibly to changes in the market and in supply chains.

The hyper connected world means that now it is possible for businesses to create shared platforms with their major customers and partners, bringing together data that reflects the entire end to end supply chain. Just as the Economy of Data has driven much of the digital revolution in B2C markets, it will be even more significant in the B2B world since the investments required to deliver the vision will be considerable. The inherent value of the data exchanges, made possible through collaboration networks and platforms, must be fully understood and fully exploited. In order to achieve that, EU funded projects with precompetitive content could be useful.

TNO emphasised that industrial data platforms are key elements in the vision towards urban manufacturing and the capability of the manufacturing industry to produce lot size one products for the price of mass produced ones. Central to this vision is the development of a network of manufacturing ecosystems with a common and open industrial data space. For effective implementation of promising use cases like zero defect with big data, zero programming robots and development of strong manufacturing ecosystems, it is mandatory that lengthy contract negotiations between large and small enterprises are accelerated. Moreover, programmes and models are exchanged with security and trust anywhere in the EU and worldwide. All these needs to be accessible to SMEs and be performed cost-effectively and ensuring that only reliable equipment is connected to the industrial data platforms. Blockchain technology could play a key role in the development of new business models.

Industrial data platforms aim both at the aggregation and processing of large amounts of data within an organization and the trusted exchange of data between different organizations along supply or value chains. In this context, the emergence of new technologies such as blockchain and distributed ledgers as a catalyst and business game changer for the creation of decentralized applications promise to disrupt the way in which business transactions are performed over the internet. Internet revolutionised society, but the mechanisms on how businesses and industry interact with each other have not been updated. Blockchain is a technology for a new generation of transactional applications that establishes trust, accountability and transparency while streamlining business processes. Distributed ledger technology can be regarded as an *operating system for interactions* with the potential to vastly reduce the cost and complexity of getting things done. With blockchain technology, anything of value can be traced and traded. At its essence, blockchain is a distributed ledger shared via a peer-to-peer network. Each participant has a copy of the ledger's data, and additions or changes to the chain are propagated throughout the network—but only after the parties in the transaction agree on it, which accelerates the time and reduces the costs to complete transactions. For developers, the blockchain concept

represents a paradigm shift in how software engineers will write software applications in the future. This new computing paradigm relies on five key interrelated concepts: the blockchain, decentralized consensus, trusted computing, smart contracts, and proof of work/stake.

3 – Main findings

Participants stressed the absolute timeliness to start this dialogue and definition of an action plan on industrial data platforms as part of the European industrial digitalisation strategy, which can scale up and align at European level public-private and national efforts. It was stressed the need for complementary and precompetitive approaches. Europe's competitors, including the United States and China, are giving a high priority to this topic, necessitating a coordinated European response. Collective action, so as to combine capabilities, resources and funding, is essential for Europe to remain a global player and to propose a European approach and policy framework to data economy. Priority should be given to coordination, enrichment and support of ongoing activities, such as I4MS (ICT Innovation for Manufacturing SMEs) to enable manufacturing SME digitisation rather than building new ones.

3.1 - Capitalising on the economy of data

Stakeholders made a clear statement in terms of the business opportunity that the economy of data (the convergence between Cloud, Big Data and High Performance Computing) could potentially leverage in the very near future. The participants highlighted the need for strong an intense collaboration across stakeholders for the swift development of a solid and attractive response by European industry, since Europe holds a unique opportunity that cannot be further delayed
- to establish better data management to stay competitive,
- to bring data together and develop reference implementations and pilots based on solid use cases,
- to set-up pan-European competence centres and innovation hubs for industrial data-centric service and business innovation.

The European actions needed hold clear challenges that were made visible during the Round Table, which can be summarized as follows:

- Europe to lead the development of multi-sided industrial data-driven ecosystems. Participants agreed that it is of utterly importance to establish promptly solid, transparent, effective and inclusive EU policies and an action plan that allows scaling up and connecting at European level national, public and private initiatives in the industrial big data domain. SMEs are key actors in EU economy and data-driven multi-sided ecosystems should be environments that SMEs can trust based on open source, open platforms and interoperability for business operation extensions.

- Build industrial data platforms on top of European industrial strengths. Europe has strong competencies and a global privileged position in the embedded and industrial market for devices, tools and services. The European strength is to bring engineering excellence in the digital world and industrial data platforms should build on that. However, Europe is in danger of lagging behind US competitors which hold leading positions and accepted platforms in the big data and cloud consumer markets. EU smart data management approach has physical assets to capitalise the digital fabric upon as opposed to pure digitally native enterprises.

- Multiply the synergetic effect across best-of-breed European industrial data platform initiatives. Participants highlighted the importance to build synergies, align and multiply the effect of existing initiatives at European level such as the Big Data Value Association, the

FIWARE Foundation and assets, I4MS Competence Centres or the Factories of the Future and SPIRE Programmes. Data economy is an intrinsic multi-disciplinary domain. As a consequence, there is a need to bring together best practices from all domains to develop a successful European set of measures on industrial data platforms that harmonise and build complementary and precompetitive approaches across digital assets with industrial impact. In this respect, the participants should react to the ongoing H2020 calls for proposals for research and innovation actions that (i) showcase industrial applications of (big) data analytics in large-scale pilots ("lighthouse projects"), or (ii) build data experimentation and integration incubators.

- Transform open multi-sided platforms and ecosystems in key assets of the European strategy for industrial data monetization. Industrial data driven digital business models will be affected by the emergence of smart, connected and collaborative objects. Stakeholders identified three distinct types of data platforms. Proprietary platforms (e.g. Sinalytics from SIEMENS, Predix from GE). Open data platforms organised by markets (e.g. automotive, aeronautics) and Open Industrial Platforms like FIWARE or IDS which can act as Data Platform enablers for industry 4.0. It was highlighted that the three types of platforms and ecosystems are needed to avoid monopolies and limiting the impact of digital revolution facilitated by the network effect provided by multi-sided platforms. Since data monetization will be done in B2B ecosystems through multisided platforms, it is important that industrial data platforms exhibit clear Return of Investment (RoI) and they are adapted to B2B markets and life-cycle of data.

- Alleviate the industrial data multi-homing effect. Interoperability and multi-homing (where the data will reside) across the diversity of industrial data platforms employed by manufacturing industry in the future is critical to ensure a competitive and attractive solution towards industrial customers.

- Smart regulation key for new business models, prescriptive analytics and data-driven innovative business architectures. Need for European data governance models participants highlighted benefits for data being stored and processed in EU but equally argue the need for suitable means for more global exchange for the inherent global structure of the manufacturing industry. Manufacturing related data is captured across the full economic life cycle of industrial data; from production data with industry 4.0 systems, usage data through IoT solutions and consumer data from the social network data. Suitable smart regulation is necessary for the full value of prescriptive analytics to emerge in the industrial domain.

3.2 - Leading the global data-driven manufacturing transformation through European industrial data platforms

The participants welcomed the progress made in relation to opening this relevant debate of industrial data platforms. Industrial data platforms, as the next step in the digital economy, were recognized as key strategic elements in the development of the EU industrial digitalisation strategy in general and in the digital manufacturing platform leadership in particular. The EU set of measures should make sure that SMEs are able to leverage on these data platforms. Participants reiterated their willingness to work together with the European Commission to articulate a concrete action plan once this first Round Table has served to identify a set of well-defined issues to be addressed to ensure a sustainable and successful operation of industrial data platforms. High level issues and primary lines of technological development would include:

1. Foster open interoperable reference architectures to deal with data multi-homing and to build on top of European open digital assets. Industrial data platform strategy demands avoiding monopolies and unlocking user driven European reference architectures through blueprints for virtual data spaces valid at global scale. Reference architectures should comply and respect industry specific regulations and data protection laws and directives.

Single European Digital Market initiative is key to harmonize across borders and lower the barriers for data-driven services and products.

2. Capitalise the value of competence centres as facilitators of SME data-driven digital transformation. Participants highlighted the need to develop reference models and validation models in Laboratories and pan-European Competence Centres to collaborate with SMEs and drive business innovation. They could act as domain knowledge attractors and bring together and combine structured and unstructured data for the benefit of Europe and emergence of digital services in EU.

3. Ensure industrial digital platform coexistence and standards. Platforms cannot be imposed and Europe needs to allow competition but also interoperability is key for platform coexistence. IDS and FIWARE open, cloud-based platforms with open APIs offer equal opportunities to all participants and could become reference platforms based on open standards allowing trusted sharing of data in multiple formats across machines, borders, enterprises. The development of global standards to represent objects and for interoperability across components, systems and software was pointed as critical technical element.

4. Guarantee digital trust and data sovereignty. Participants highlighted the importance to couple openness in industrial data platforms with preservation of IPR, incorporate security by design in scalable infrastructure and ensure that data in transit and at rest is secured at all times. As highlighted by key IT industrial players and leaders in the development of reference industrial data platforms such as IDS or Smart Industry, the ability to merge data at the right time from trusted equipment, things and services connect to the Industrial Data Space is a key competitive advantage and productivity factor. Industrial data platforms should strive to make aggregated data, analytics available in a secure and privacy preserving context. Industry and academia highlighted the key role that blockchain and distributed ledger technology will play for building trust across data-driven global transactions and avoid monopolies. Europe is already playing a significant and very visible role in the HyperLedger open source project promoted by the global Linux Foundation that needs to be capitalised by industrial data domain. At European level, it is important to enable that blockchain applications remain interoperable and that are compliant with industrial standards. The open source approach is appropriate to join forces and a very promising approach to realise this. Moreover, participants highlighted the importance that industrial users hold and retain the right to decide where data needs to be stored; with not strong mandates on location but instead on security and Privacy by Design requirements.

5. Facilitate broadband, high speed network for low latency and interaction with data and services in the cloud. Industrial participants highlighted the need to couple the development of the industrial data platforms with suitable developments of the broadband infrastructure which cannot and should not be neglected.

4 – Conclusions

Commissioner Oettinger thanked all participants for their attendance and contributions and welcomed their ongoing support as work continues towards key milestones. The Commissioner plans to announce details of the Action Plan for Digitising European Industry in a Communication to Council and Parliament in April 2016, which will be further discussed with industry at a high level conference on 25 April 2016 at Hannover Fair 2016. Commissioner Oettinger proposed to continue the Round Table debate with Industry in a second round in May with a more in depth discussion on elaborating the European dimension added value of the industrial data platforms for the next meeting.

Commissioner Oettinger thanked all the participants for the valuable contributions that are very helpful in setting up an orientation debate to establish the concrete points and elements that need to be addressed so the right instruments and resources can be effectively activated. The Round

Table has made clear the importance of an inclusive approach that incorporates all stakeholders in the process (SMEs, multipliers, entrepreneurs). This will be instrumental in leveraging multi-sided ecosystems and interoperable data-driven platforms across public and private initiatives and with full data economy life cycle support for effective data monetization. Synergies and coexistence should be worked out across European digital assets and ecosystems such as FIWARE, IDS and private initiatives in the industrial data platform domain to provide a harmonised and best value proposition from each open solution at the right place of the digital value chain, where their business impact can be maximised. Security, distributed trust, clear and smart contracts, transparency, control and accountability in a scalable manner are key elements for building solid European industrial data platforms that will foster a rich European data-driven service economy in the manufacturing domain.

Commissioner Oettinger invited the stakeholders to take advantage of the current open calls available under the ongoing Work Programmes of Horizon 2020 to start addressing the issues highlighted during the Round Table and also invited the stakeholders to actively participate in the design of the upcoming Work Programme so these issues are addressed timely and effectively.

Annex I: Round Table Agenda

AGENDA
Round Table with Leaders of Business and Research Organisations
on Industrial Data Platforms

Wednesday, 17ᵗʰ February 2016, 17:30 to 19:30

Centre Borschette, Rue Froissart 36, Room AB-5B, 1040 Brussels

17:30 – 17:40   Welcome and introduction, Commissioner Oettinger

17:40 – 18:25   Challenges and opportunities of Industrial Data Platforms and ongoing platform activities (10 min. presentations by 4 high-level participants)

Mr Reimund Neugebauer, President, Fraunhofer-Gesellschaft

Mr Norbert Winkeljohann, CEO and Senior Partner, PwC Europe

Mr Hubert Tardieu, Advisor to the CEO, ATOS

Mr Paul De Krom, Chairman of the Executive Board, Chief Executive Officer, TNO

18:25 – 19:00   Views on industrial data platforms (4 min. presentations by 7 participants)

Mr Edward Curry, Vice President of the Big Data Value Association, BDVA

Mr Thomas Hahn, Chief Expert Software, Siemens AG

Mr Nikolay Kolev, Co-Founder & Managing Director Deloitte Digital GmbH, Deloitte

Mr Dirk Wittkopp, IBM Vice President Development, IBM Germany Research & Development GmbH

Mr Jesús Ruiz, Director of Open Innovation in Santander Bank Corporate Technology, Banco Santander

Mr Frédéric Pivetta, Managing Partner, Real Impact Analytics

Mr Marc Vancoppenolle, Vice-Chair of the Digital Economy Taskforce, BusinessEurope

19:00 – 19:20   Short interventions (up to 2 min.)

19:20 – 19:30   Conclusions and next steps, Commissioner Oettinger

Note: Additional written statements beyond the statements made during the Round Table have been received from:

1. *Dr.-Ing Ursula Frank (Beckhoff Automation GmbH & Co. KG).*
2. *Juan José Hierro (Telefonica)*
3. *Paul van Vuren (Shell Global Solutions International & SMART Foundation Platform)*

Annex II: Attendance List of Round Table

	NAME	REPRESENTING
1	Robert Bauer	SICK AG
2	Oliver Blank	ZVEI
3	André Brose	PwC
4	Marco Conti	CNR
5	Edward Curry	Big Data Value Association
6	Julian Davis	Shell
7	Paul De Krom	TNO
8	Paul Francis	Aircloak
9	Ursula Frank	Beckhoff
10	Thomas Hahn	Siemens AG
11	Juan Jose Hierro	Telefónica
12	Sophie Ulrike Hippmann	Fraunhofer-Gesellschaft
13	Nicholas Hodac	IBM
14	Joseba Laka	Tecnalia
15	Nikolay Kolev	Deloitte
16	Ernst Kristiansen	SINTEF
17	Holger Kunze	VDMA
18	Eberhard Kurz	Deutsche Bahn
19	Benoît Larielle	European Round Table of Industrialists
20	Loïc Lespagnol	Rolls Royce
21	Ludovic Lévy	Orange

22	Guido Lobrano	Business Europe
23	Werner Lübberink	Deutsche Bahn
24	Klaus Mittelbach	ZVEI
25	Karsten Muthreich	Nestlé
26	Reimund Neugebauer	Fraunhofer-Gesellschaft
27	Barry O'Sullivan	Insight Centre for Data Analytics, University College Cork
28	Borris Otto	Fraunhofer-Institut für Materialfluss und Logistik IML
29	Frédéric Pivetta	Real Impact Analytics
30	Rainer Rauh	Airbus
31	Jesus Ruiz	Banco Santander
32	Raimund Schmolze-Krahn	Deutsche Telekom
33	Stiller Julia	Deloitte
34	Hubert Tardieu	ATOS
35	Fabien Terraillot	Ministère de l'Economie, de l'Industrie et du Numérique
36	Thanh Nguyen	Orange
37	Marc Vancoppenolle	BUSINESSEUROPE
38	Antti Vasara	VTT Technical Research Centre of Finland
39	Philippe Vanrie	EBN
40	Markus Vehlow	PWC
41	Norbert Winkeljohann	PwC
42	Dirk Wittkopp	IBM Germany Research & Development GmbH
43	Zeisel Herbert	Bundesministerium für Bildung und Forschung

	European Commission	
	Günther H. Oettinger	Commissioner
	Kilian Gross	Cabinet Commissioner Oettinger
	Markus Schulte	Cabinet Commissioner Oettinger
	Khalil Rouhana	CNECT A
	Max Lemke	CNECT A
	Bjoern Juretzki	CNECT A
	Clemens Zielonka	CNECT A
	Marta Nagy-Rothengass	CNECT G
	Jiri Pilar	CNECT G
	Oskar Lazaro	Innovalia