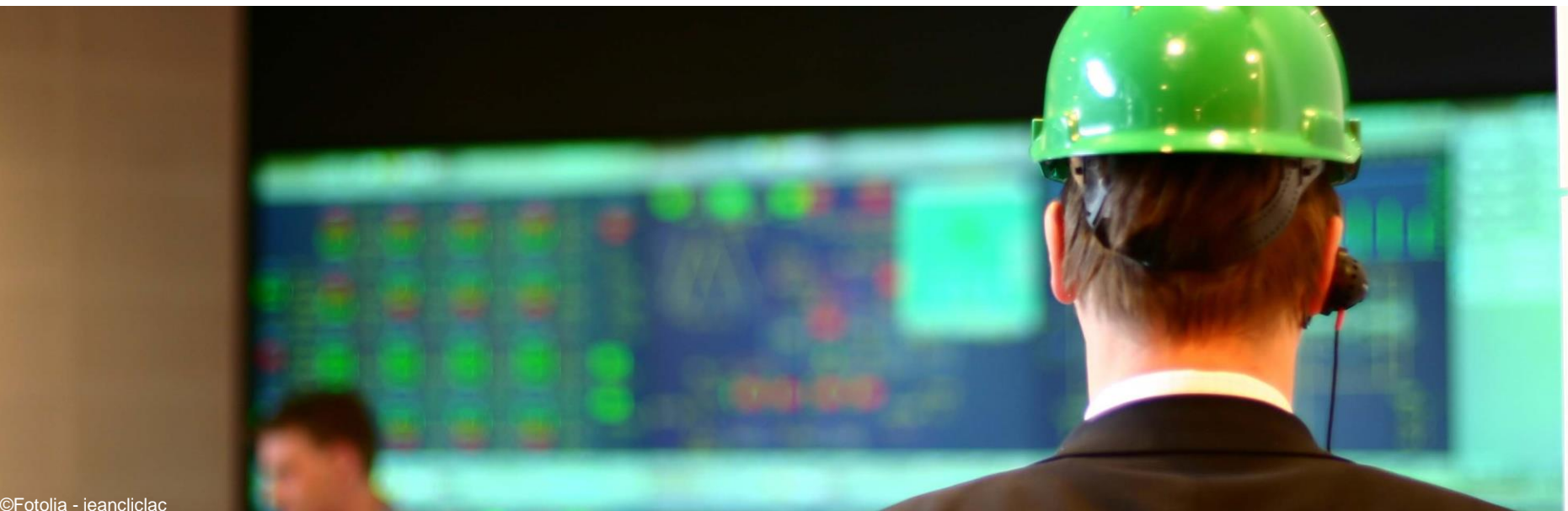*Project Application VS/2017/0358*

Digital transformation in the workplace

A sector-specific study of the European chemical, pharmaceutical, rubber and plastics industry

Dr. Jan-Philipp Kramer
Brussels
14.03.2018

Agenda

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The Prognos AG - providing orientation since 1959

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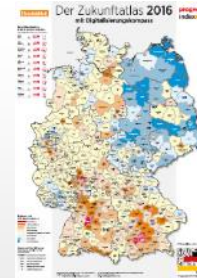Wir geben Orientierung.

About us

Prognos analyses long term developments …

- Prognos Economic Outlook®
- German Economy Report 2040
- Working Landscapes 2040

… and current trends,

Prognos Future Atlas & Digitalisation Compass

Digital labour market
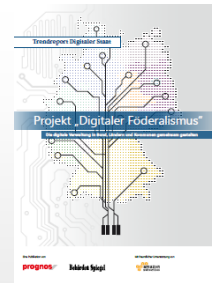
Trend Report „Digital State"

develops and evaluates strategies…

- Future policy frameworks
- S3-strategies
- Sector strategies (green economy, chemicals…)
- Scientific support for open social dialogues

… for clients across Europe.

- approximately 150 experts at 8 locations
- …founded in Basel in 1959,
- ..with Berlin being our centre at Federal level,
- …and Brussels being our "gateway" to Europe

Bremen Berlin
Brüssel Düsseldorf
Stuttgart München
Basel

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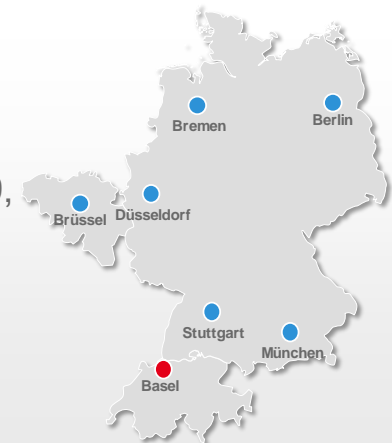
Two major objectives:

1. Analysis of the **level of awareness** and **identification of sector-specific challenges** for the chemicals, the pharmaceuticals and the rubber and plastics sectors.

2. Identification and interpretation of evidence of the **concrete impact** of innovation and digital transformation on three domains:
    skills, working patterns, health & safety.

Anticipating, preparing and managing the digital transformation in the workplace is a decisive task in which we would like to support you.

The project approach

Overview of our project approach

Work Package	Results	Methods
1 **WP1: Desk research on the state-of-play of digital transformation and innovation in the chemical industry**	Establishment of a working definition of „digital transformation", Exploration of a "digital matureness" parameter, review of future development scenarios.	Desk research, STEEP- & trendanalysis
2 **WP2: Online survey & interviews on the digital transformation and innovation in the chemical industry**	Provision of in-depth insights into the level of awareness, sector-specific transformational plays and the transformation of work through digitalization in the countries analysed.	Online-survey, expert interviews, statistical analysis
3 **WP3: Triangulation of findings and reporting**	Validation of key results results through comparing the data gathered by desk rearch, survey and interviews; internal workshop for final validation; summary of results in the final report.	Triangulation (incl. Workshop)

Work package 1

Desk research on the state-of-play of digital transformation and innovation in the chemical industry

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Objective & Approach

Key elements of the Digital Transformation in the Chemical Industry

Objective

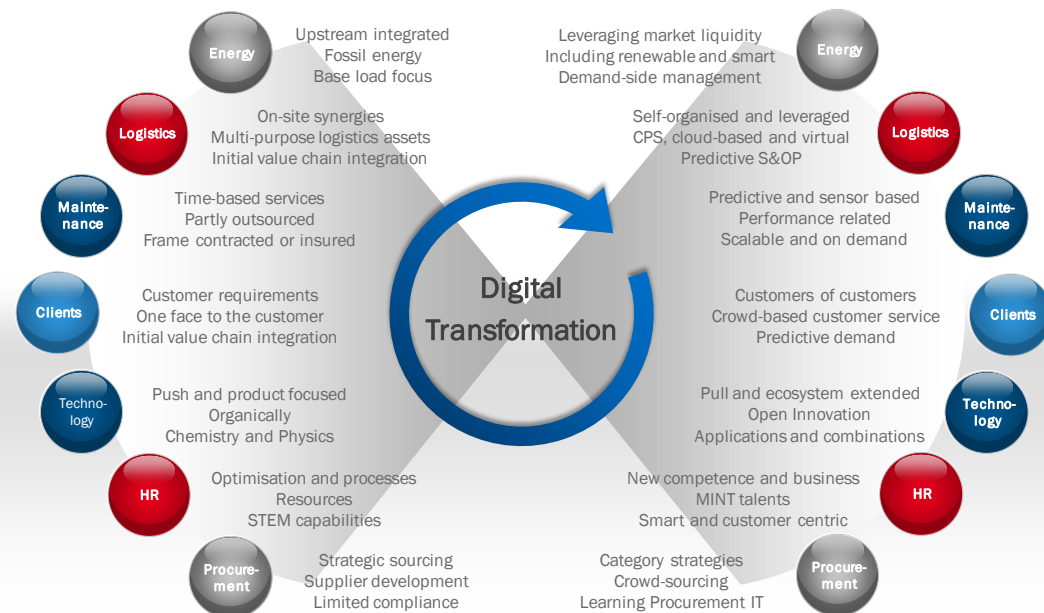- Definition & description of the digital transformation process in the chemical industry
- Identify key elements & dimensions for the assessment of digital maturity

Approach

- In-depth desk research & literature review addressing the digital transformation

Prognos (2018) based on Wehberg, G. (2015). Chemicals 4.0 Industry digitization from a business-strategic angle. Königswinter: Deloitte Consulting GmbH..

Objective & Approach

Objective

- Development of the concept and parameters for "digital matureness"
- Development of a concept to compare the digital awareness and transformation of the sector

Approach

- Conceptualisation of different digitalisation levels by an ordinal scaling system
- Operationalisation of the scaling system by the survey to assess the digital awareness & the digital maturity

Digital maturity levels

Industry 3.0
Computerised company
Use of the internet to support or design business processes

No data-driven business models

Industry 4.0
Digitalised company
Virtual mapping of processes and products

Partially autonomous / autonomous systems

Data-based business models

high

Autonomous computerisation
Level 4

Partially autonomous computerisation
Level 3

Controlling computerisation
Level 2

Supporting computerisation
Level 1

Degree of Digitalisation

low

Offline
Level 0

| Digitally blind | See digitally | Act digitally | Illustrate Digitally | Decide Digitally |

Prognos (2018)

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Objective & Approach

Objective

▪ Analysis and assessment of the latest market and technology trends

▪ Review of future development scenarios in the chemical industry with focus on the working environment

Approach

▪ In-depth desk research summarised by STEEP framework

▪ Review of portfolio of scenarios by mean of an uncertainty analysis

The STEEP Approach

Central drivers are derived inductively as well as deductively
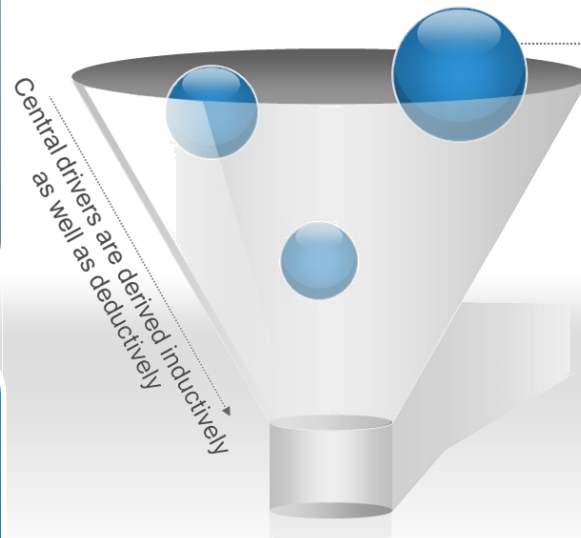
Creating a basis for assessing the future

▪ Collection of foresight studies, trend reports forecasts, scientific articles, etc.

▪ The identified trends are categorized according to the STEEP-approach:

SOCIAL
TECHNOLOGICAL
ENVIRONMENTAL
ECONOMIC
POLITICAL

▪ Thus, the STEEP-approach provides a valuable heuristic to structure a complex set of trends and drivers and to break them down into different categories central to the future development of the European MNE industry

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Example: Trend & uncertainty analysis for the chemical sector through 2030

Predetermined Drivers

- Competitive disadvantage due to higher feedstock costs and shale gas revolution
- High energy costs due to European energy policy
- Increased competition from emerging economies
- Growing demand for chemicals in emerging countries
- Increasing (freigth) traffic / capacity problems
- Electrification of the chemical industry
- Protectionism & free trade
- US energy and climate policy regulation
- Circular Economy
- Low GDP growth in the EU
- Increasing RDI expenditures in Asia-Pacific region
- renewable feedstocks / biobased chemicals
- Increasing chemical intensity in customer industries + demand for high-value chemicals
- Consumers' awareness of sustainability
- Big Data and global real-time process monitoring
- Digitisation / modularisation and distributed production
- Growth of the global health market
- world trade slowing down
- Low euro/dollar exchange rate
- Lack of skilled labour and impact of industry 4.0
- Cross-sectoral collaboration between chemical and other industries
- State support for chemical companies in emerging markets
- Reindustrialisation
- NIMBY-mentality
- Image of the chemical Industry
- Global stock markets' short-term investment strategy

Secondary elements

Key Uncertainties

Trend Category
- Social
- Technological
- Economic
- Environmental
- Political

Potential Impact — High / Low

Uncertainty — Low / High

Predetermined Drivers
Predictable factors with high impact on a successful future development. Direct actions are needed to tackle the threats and grasp the opportunities.

Key Uncertainties
Future development of factors is uncertain with high impact upon successful future development. A need for creation of preparatory

Secondary elements
Have a certain impact on trilateral chemical industry, however are less relevant for the future development compared to other factors.
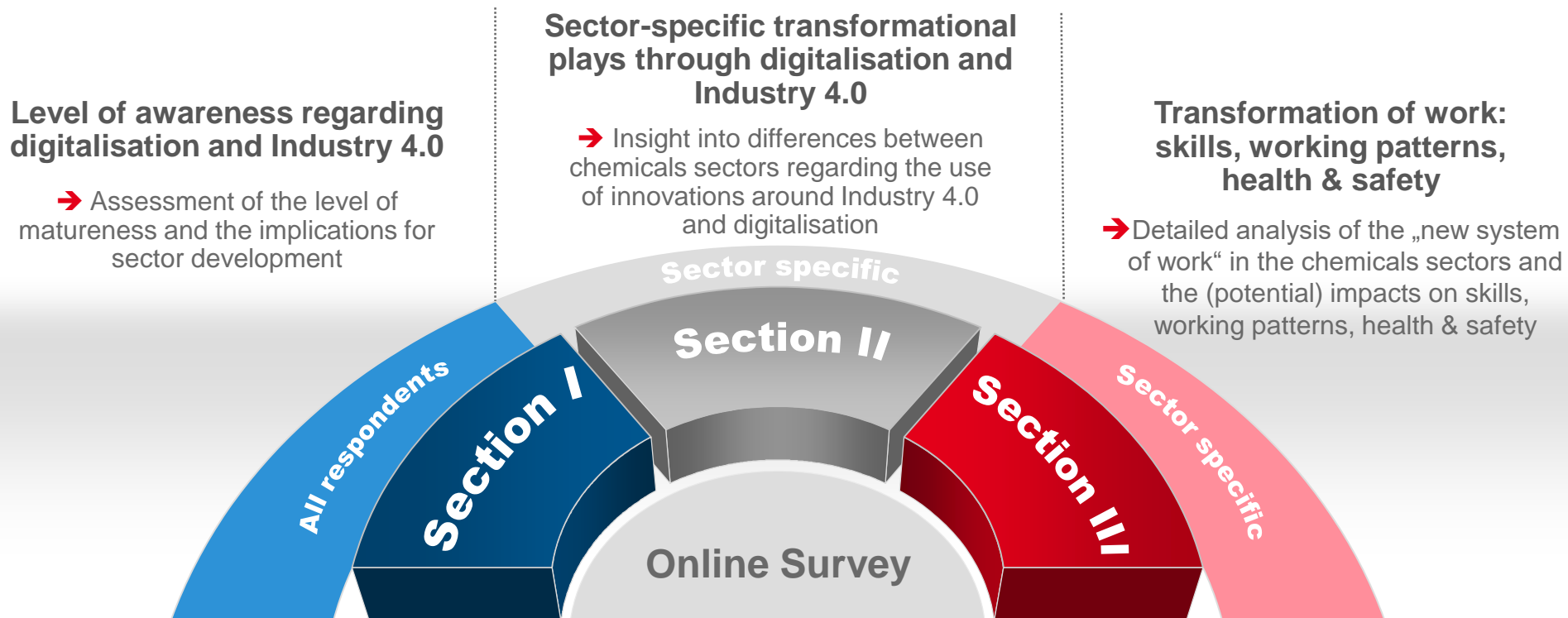
Prognos (2017) based on own desk research & interviews.

Work package 2

Online survey & interviews on the digital transformation and innovation in the chemical industry

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The survey will consist of at least three thematic blocks

Level of awareness regarding digitalisation and Industry 4.0

➜ Assessment of the level of matureness and the implications for sector development

Sector-specific transformational plays through digitalisation and Industry 4.0

➜ Insight into differences between chemicals sectors regarding the use of innovations around Industry 4.0 and digitalisation

Transformation of work: skills, working patterns, health & safety

➜ Detailed analysis of the „new system of work" in the chemicals sectors and the (potential) impacts on skills, working patterns, health & safety

Sector specific

Section II

All respondents

Section I

Section III

Sector specific

Online Survey

Objective & Approach

Objective
- Provide a concrete description of the digital transformation in the chemicals sector
- Gather in-depth information on the mechanisms of implementation
- Identification of success factors

Approach
- Carrying out of around 30 in-depth key-informant interviews
- Semi-structured approach with a standard list of questions & specific questions related to the subject matter

Relevant topics to be discussed

Smart Production
- Predictive asset management
- Predictive maintenance
- Production simulation
- Demand forecasting
- 3D-Printing

Modularisation of production
- Use of small & potentially mobile plants for temporally production at customer sites

Skill set of workers
- Anticipation of new skill sets required
- Life long learning / training & the role of social partners
  - Good practices for increasing digital skills

Transformational plays

Logistics & procurement
- Use of RFID-chip or clud-supported tools for planning commoditiy flows
- optimisation of steering of vehicles (e.g. regarding the access to resources)

New working patterns
- Impact on: work organisation, empl. relationships, personal responsibility, etc.

Health & safety
- Impact on workers' health, especially psycho-social risks
- Prevention of working culture
- Importance of demographic change & aging workforce

Work package 3

Triangulation of findings and reporting

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Objective & Approach

Objective
- Cross-checking of the multiple sources and methodological approaches used to validate the results
- Summary of the results in the final report; in text and an attractive graphical form
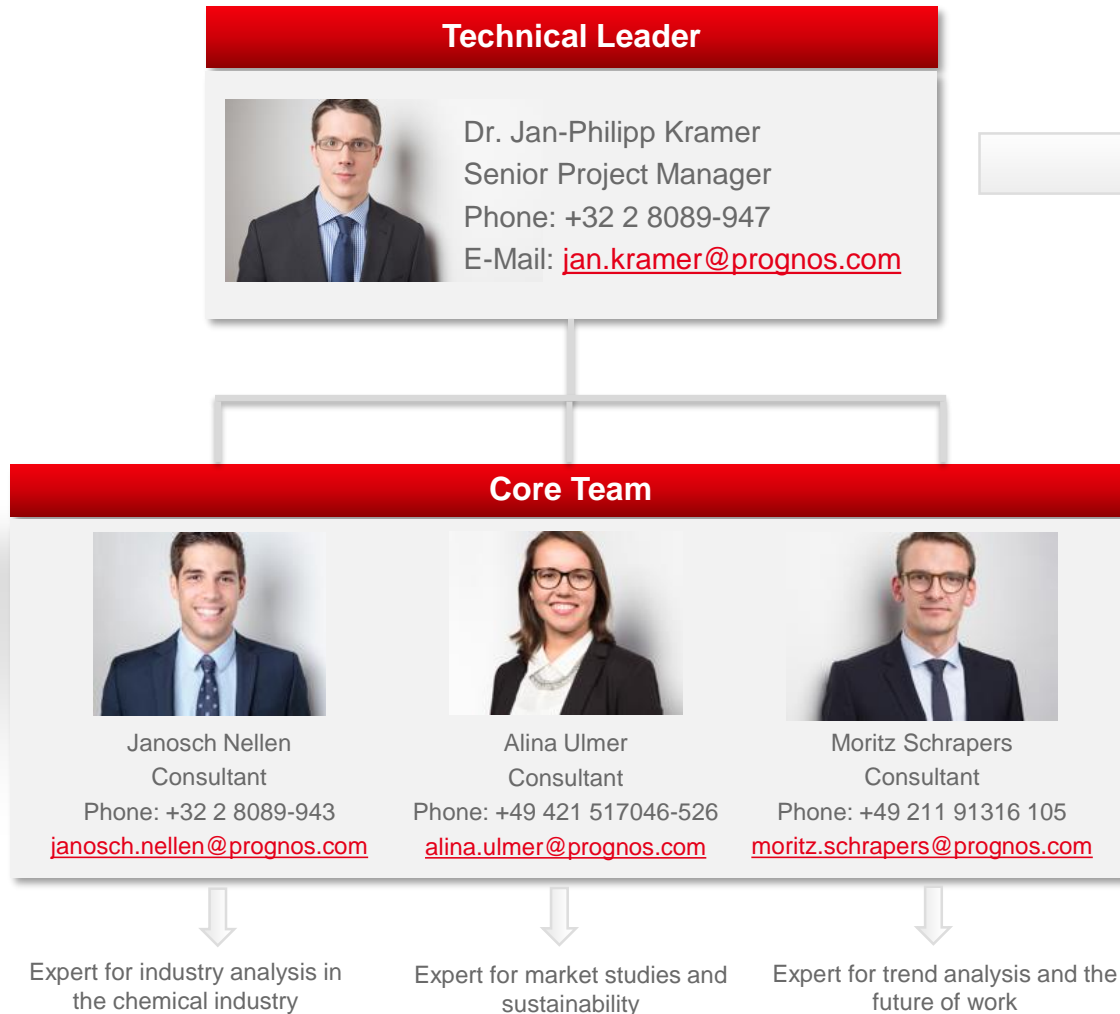
Approach
- Check how each data source can support the different arguments
- Internal workshop with ECEG & industriALL (and stakeholders if wanted
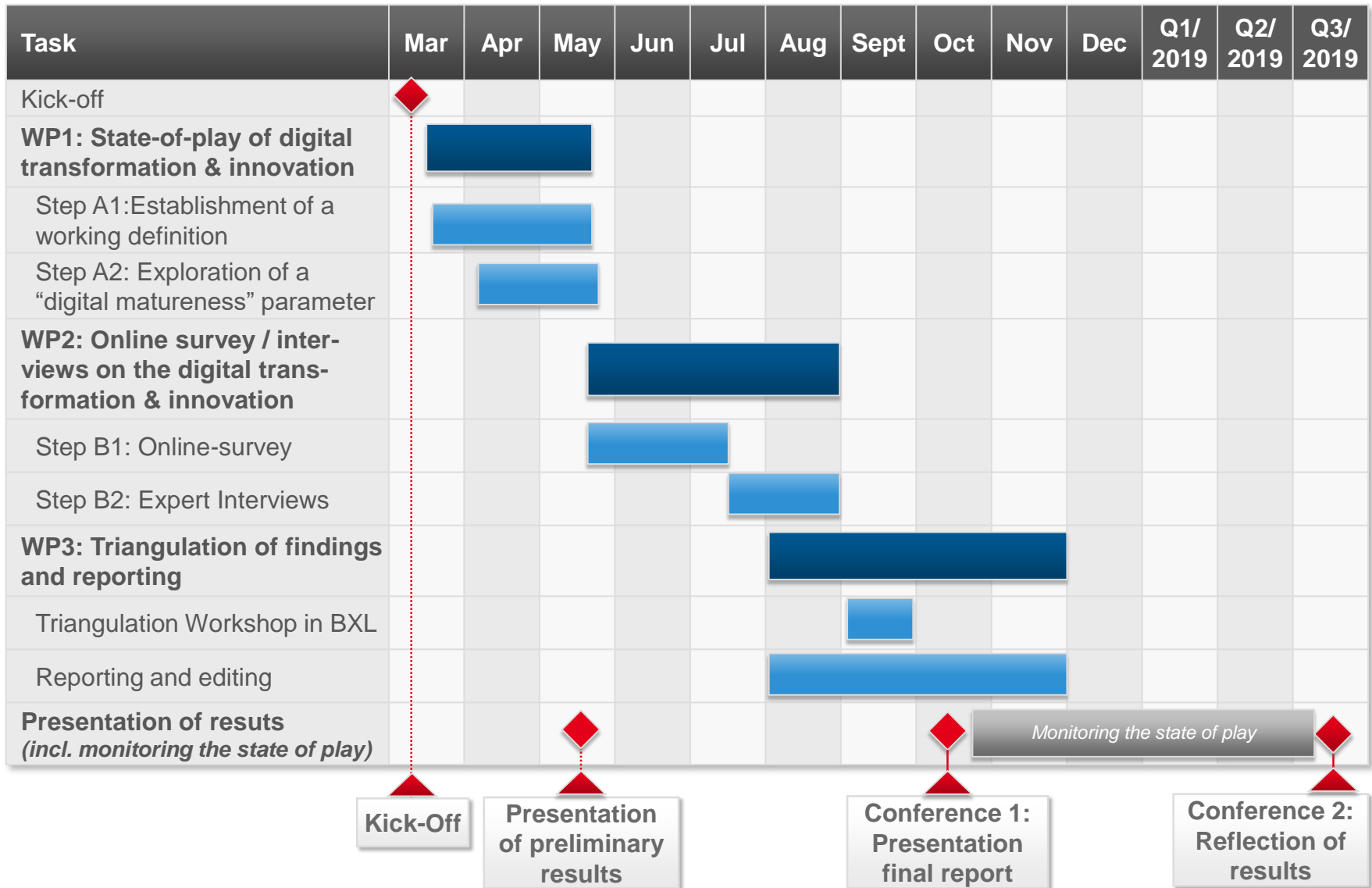
The triangulation approach

To which extend do the interview partners agree with the identified trends?

Did the interview partners confirm the results of the survey? If no, why?

VALIDATION OF FINDINGS

Are the results of the trend analysis reflected by the survey results?

Project organisation & timing

Our project team for you

Technical Leader

Dr. Jan-Philipp Kramer
Senior Project Manager
Phone: +32 2 8089-947
E-Mail: jan.kramer@prognos.com

Responsible for:

- planning work,
- overseeing project delivery
- ensuring quality of services at senior level
- accountable for the overall smooth delivery of the project
- etc.

Core Team

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Phone: +49 211 91316 105
moritz.schrapers@prognos.com

Expert for industry analysis in the chemical industry

Expert for market studies and sustainability

Expert for trend analysis and the future of work

Task	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Q1/2019	Q2/2019	Q3/2019
Kick-off	◆												
WP1: State-of-play of digital transformation & innovation		▰	▰										
Step A1:Establishment of a working definition		▰	▰										
Step A2: Exploration of a "digital matureness" parameter			▰										
WP2: Online survey / inter-views on the digital trans-formation & innovation				▰	▰	▰							
Step B1: Online-survey				▰	▰								
Step B2: Expert Interviews					▰	▰							
WP3: Triangulation of findings and reporting						▰	▰	▰	▰				
Triangulation Workshop in BXL							▰						
Reporting and editing						▰	▰	▰	▰				
Presentation of resuts *(incl. monitoring the state of play)*			◆					◆	*Monitoring the state of play*				◆

Kick-Off

Presentation of preliminary results

Conference 1: Presentation final report

Conference 2: Reflection of results

Thank you very much for your interest!

prognos │ **Rue de la Loi 155** │ **1040 Brussels**

Dr. Jan-Philipp Kramer

Head of Brussels Office

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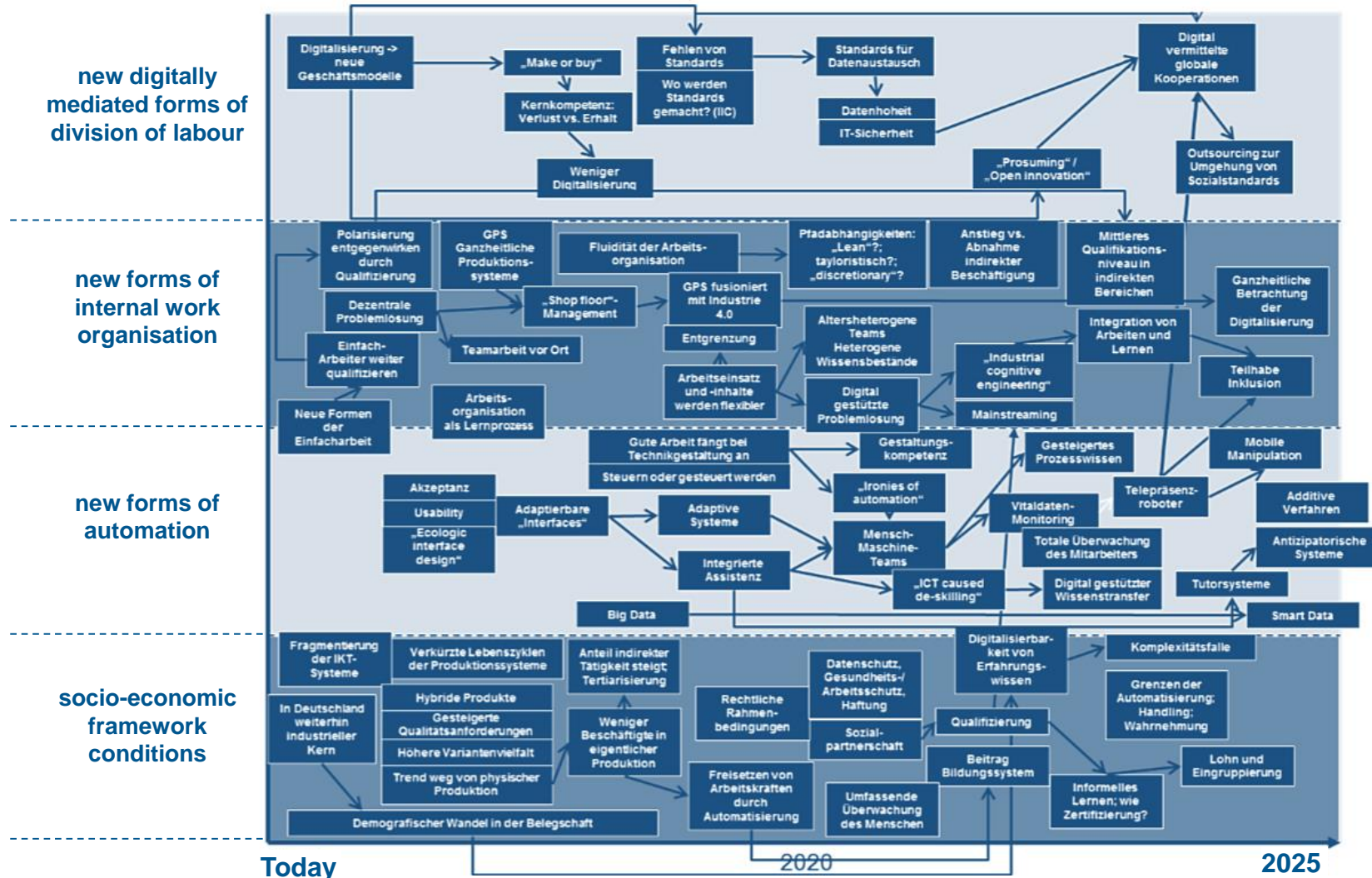
Back-Up

Digital Roadmap for the manufacturing sector

Prognos (2018) based on BMAS (2016). Foresight-Study "Digital World of Work".

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Table 2.3: Models or clusters of industrial relations

		Years	North Organised Corporatism	Centre Social partnership	South State-centred	West Liberal	Transit Mixed
1	Union density	2000–06	74.7	35.4	20.2	33.9 (*)	22.8
	Union authority	2000–06	0.500	0.474	0.357	0.243	0.251
	Union concentration	2000–06	0.375	0.344	0.217	0.413	0.276
	Centralisation	2000–06	0.476	0.538	0.378	0.370	0.318
2	Bargaining coverage	2000–06	86.8	82.8	75.4	35.3 (**)	34.5
	Employer density	2001–02	58.0	72.7	65.8	47.5 (*)	28.4
	Sectoral organisation	2000–07	2.0	1.8	1.2	0.5	0.7
3	Employee representation	1999–01	2.00	2.00	1.60	0	0.48
		2005–07	2.00	2.00	1.60	0.83	0.93
4	Concertation	2000–07	1.33	1.44	1.00	0.50	0.81
	Averages of:		Denmark Finland Sweden	Belgium Germany Luxembourg Netherlands Austria Slovenia	Greece Spain France Italy Portugal	Ireland Cyprus Malta United Kingdom	Bulgaria Czech Republic Estonia Latvia Lithuania Hungary Poland Romania Slovakia

Source: Averages calculated from ICTWSS database.
(*)   Without Cyprus and Malta.
(**)   UK only (coverage rate in Ireland is unknown).
For measurement and data issues, see Chapter 1. Union authority and concentration are the main determinants of centralisation (see box 1.2).

Regional benchmarks of selected European chemical regions in terms of number of persons employed, 2010–2014

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	Chemical Industry	Pharmaceutical Industry	Rubber & Plastics Industry	Total Chemical Industry	
	Change 2010–2014 in %			Employment, 2014	Change 2010–2014 in %
EU-28	-2.1	2.4	1.6	3,393,000	0.4
Trilateral region	-0.3	-8.4	4.1	354,600	0.4
Upper Bavaria	2.9	12.0	9.1	54,900	5.2
Hesse	0.6	4.5	5.1	109,900	3.1
Rhineland-Palatinate	8.3	17.0	3,8	96,100	8.0
Catalonia	-6.7	-6.1	-15.5	70,000	-9.3
Southern France*	-0.4	23.0	-3.5	37,500*	1.6
Rhône-Alpes*	-21.4	18.5	-31.5	54,000*	-15.8
Lombardy	-1.7	-15.9	-2.4	123,600	-4.8
Masovia	-0.3	-14.2	-2.1	41,100	-3.6
North West England	-10.0	33.5	35.5	56,000	14.7

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Scientific support for the creation of the master plan "Future of Work" Rhineland-Palatinate

Content & Tasks

Content

- The state government of Rhineland-Palatinate wants to develop a master plan for the "future of work" in order to **exploit and minimize** the **opportunities and risks** that companies and employees face through **digitisation and mechanisation**

Tasks

- As part of the project, **Prognos prepares and places the state government's dialogue** and strategy on a science-based, action-oriented and solid foundation.

- This includes a **comprehensive evaluation and summary of existing studies** on topics like flexibilisation of working hours, places and forms of employment through digitisation, structures for lifelong learning, etc.

- Furthermore, Prognos **supports the conception and implementation of the regional events** and workshops, summarises their results and prepares them for the preparation of the master plan.

Smart Country – Connceted.Intelligent.Digital
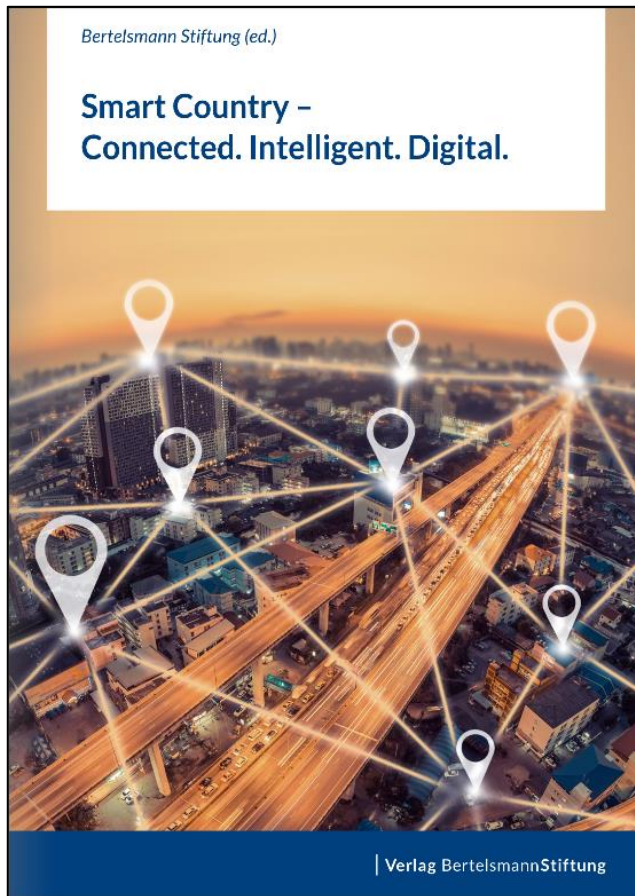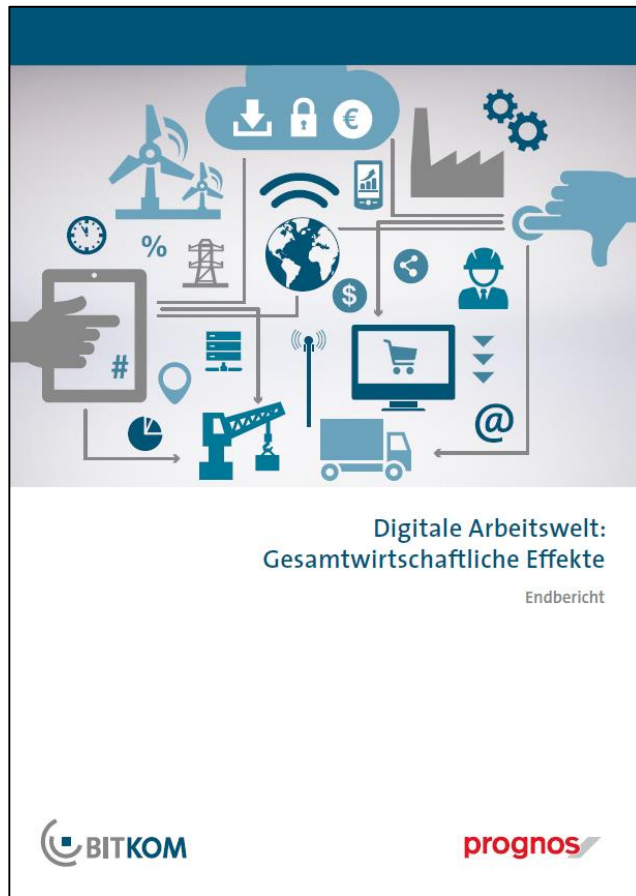

Content & Tasks

Content

- The Reinhard Mohn Prizes' study "Smart Country – Connected. Intelligent. Digital." highlights **digital solutions that strengthen social inclusion and the quality of life across regions and socioeconomic groups**. The study analyses international good practices in the areas of health and care, mobility and logistics, public administration, and learning as well as information policy.

Tasks

- On behalf of Bertelsmann Stiftung, Prognos carried out an **international good-practice research**.

- **Prongos' experts searched for countries (Estonia, Sweden, Israel & Austria)** in which digitisation was successful enough to benefit society as a whole.

- Prognos has been accompanying Reinhard Mohn Prizes through international research for the past eight years.

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Digital labour market: macroeconomic effects

Digitale Arbeitswelt:
Gesamtwirtschaftliche Effekte

Endbericht

BITKOM   prognos

Content & Tasks

Content

- The study **examines the impacts of digitalisation** on the German domestic value chain and the export industry. Furthermore, **effects on employment** are investigated.

Tasks

- Based on **a time series and patent analysis**, Prognos analysed the contribution of digitalisation on:
    - **value-added,**
    - **export activity,**
    - And the **development of the labour force**.
- The analyses was carried out for **63 sectors** of the economy (including the **pharmaceutical and chemical industry**) over a period of 15 years (1998 - 2012).