



In4act

IN4ACT

Research and Stakeholder Engagement Strategy

Takis Damaskopoulos
ERA Chair

Industry 4.0 impact on management practices and economics (IN4ACT)

Introduction: Industry 4.0 in historical perspective: Charting the ‘field’

| Method: a ‘novel optic’

Part I: Thematic structure and research priorities

| *Module I:* Micro-level – Industry 4.0 at the level of the firm, functions and phases of production

| *Module II:* Meso-level – Industry 4.0 at the level of regional economic and innovation ecosystems

| *Module III:* Macro-level – Industry 4.0 at the level of governance systems and innovation strategy

Part II: National/EU/International operational and engagement plan

| Universities / research centers: interdisciplinary

| Business community / civil society

| Policy /regulatory organs: National, EU...

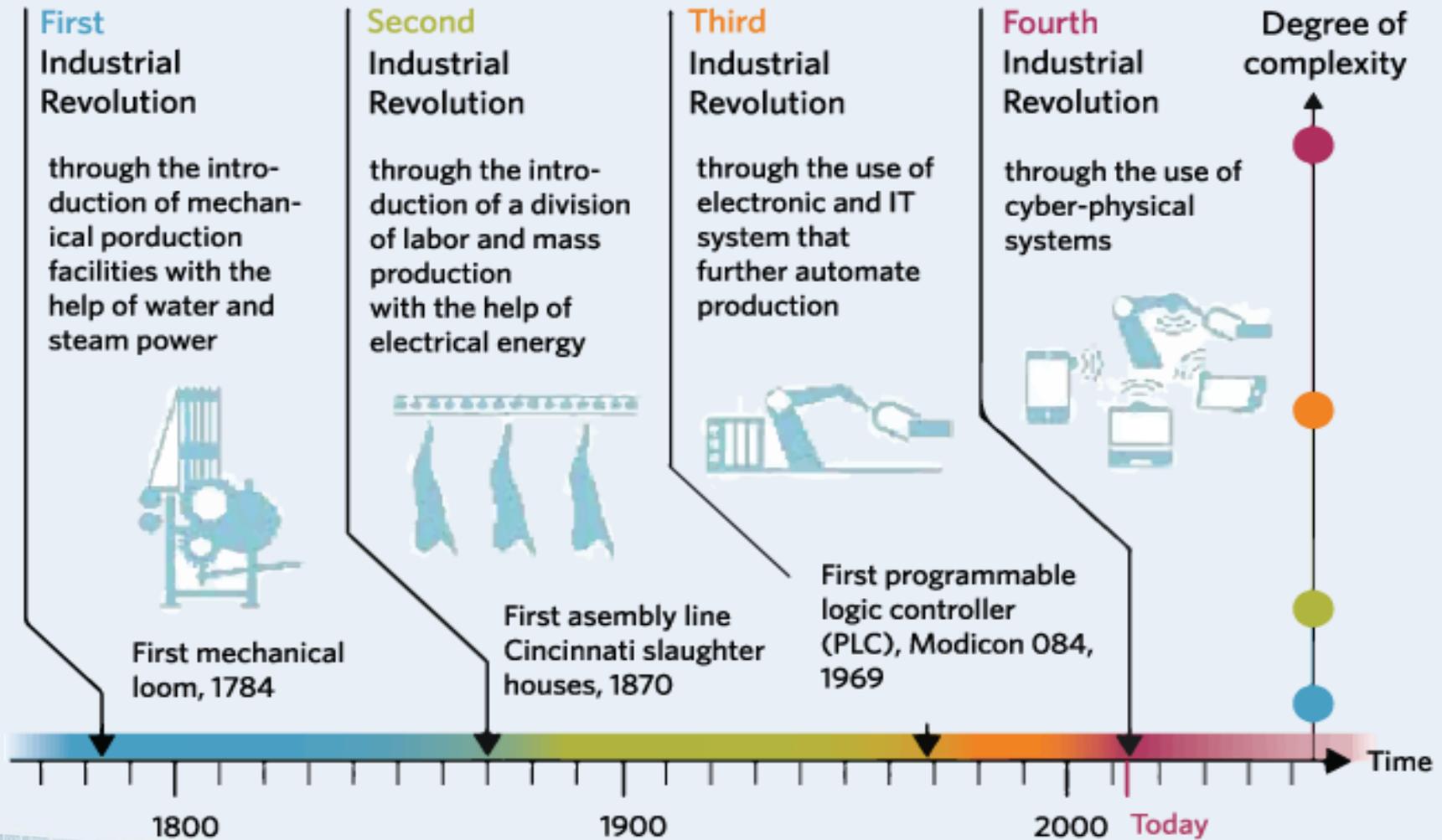
| Conference plan

| Publications plan

| Industry 4.0 Observatory

Part III: ERA Chair Team job descriptions and advertisements

Method: Industry 4.0 in historical perspective: charting the 'field'



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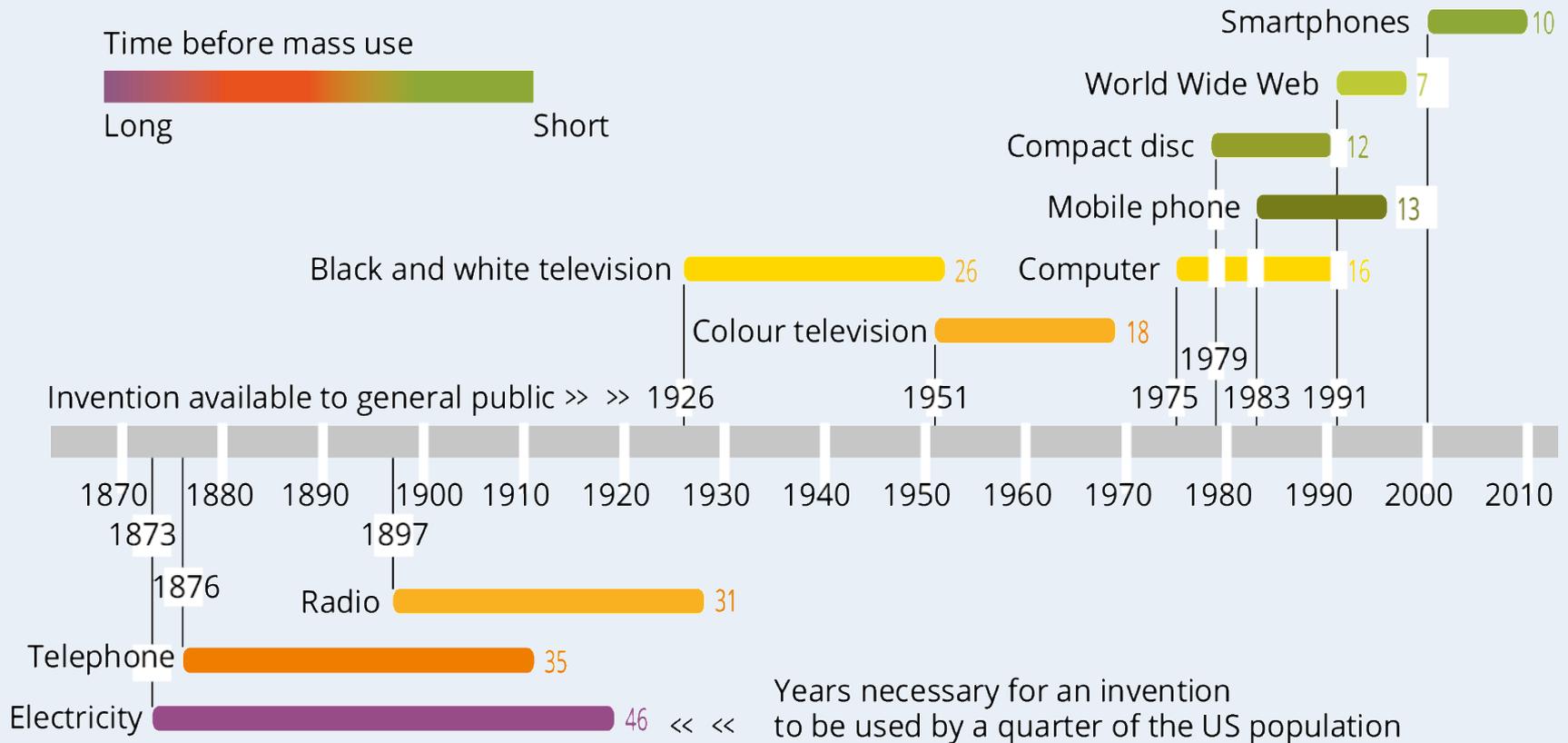
Why a “Fourth Industrial Revolution”? Impacts and implications

The origins of the 4IR can be traced to the beginning of this century and builds on and amplifies the impact of the digital revolution. So why not call it a more intense phase, a phase of maturation, of the computer or digital revolution? There are mainly three reasons why not:

- **Velocity and scale:** In contrast to the previous industrial revolutions, the Fourth Industrial Revolution has the potential to evolve at an exponential rather than linear pace;
- **Breadth and depth:** the Fourth Industrial Revolution builds on the digital revolution and combines multiple technologies from across various fields that have the potential to lead to unprecedented paradigm shifts in established practices in the domains of business, the economy, and society;
- **Systemic Impact:** the Fourth Industrial Revolution presents the real possibility of transforming entire systems, across and within countries, companies, industries and civil society as a whole and the structures of the state.

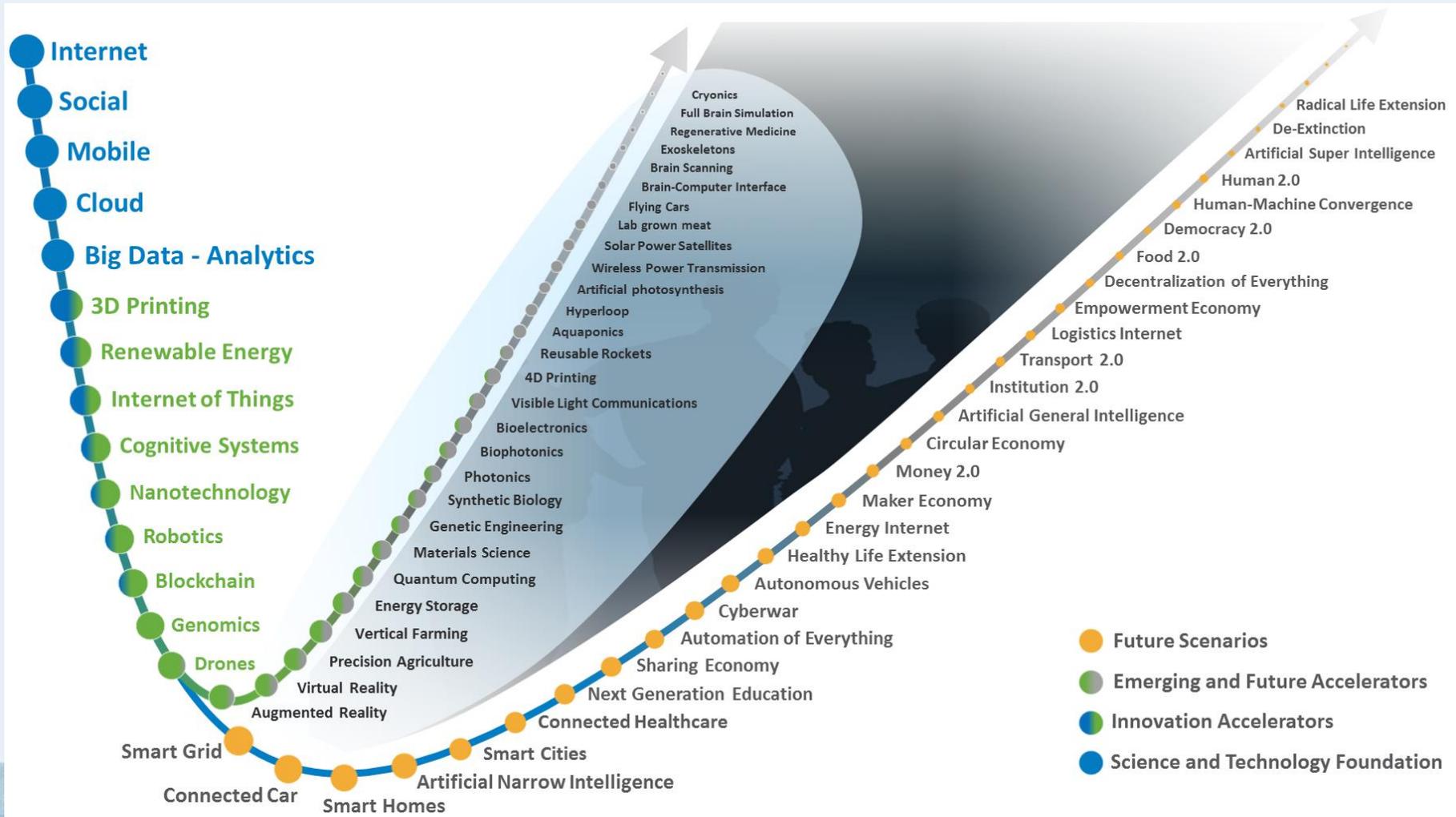
Method: Industry 4.0 in historical perspective: charting the 'field'

Velocity: Shortening Time Lapse before Mass Adoption of New Technologies



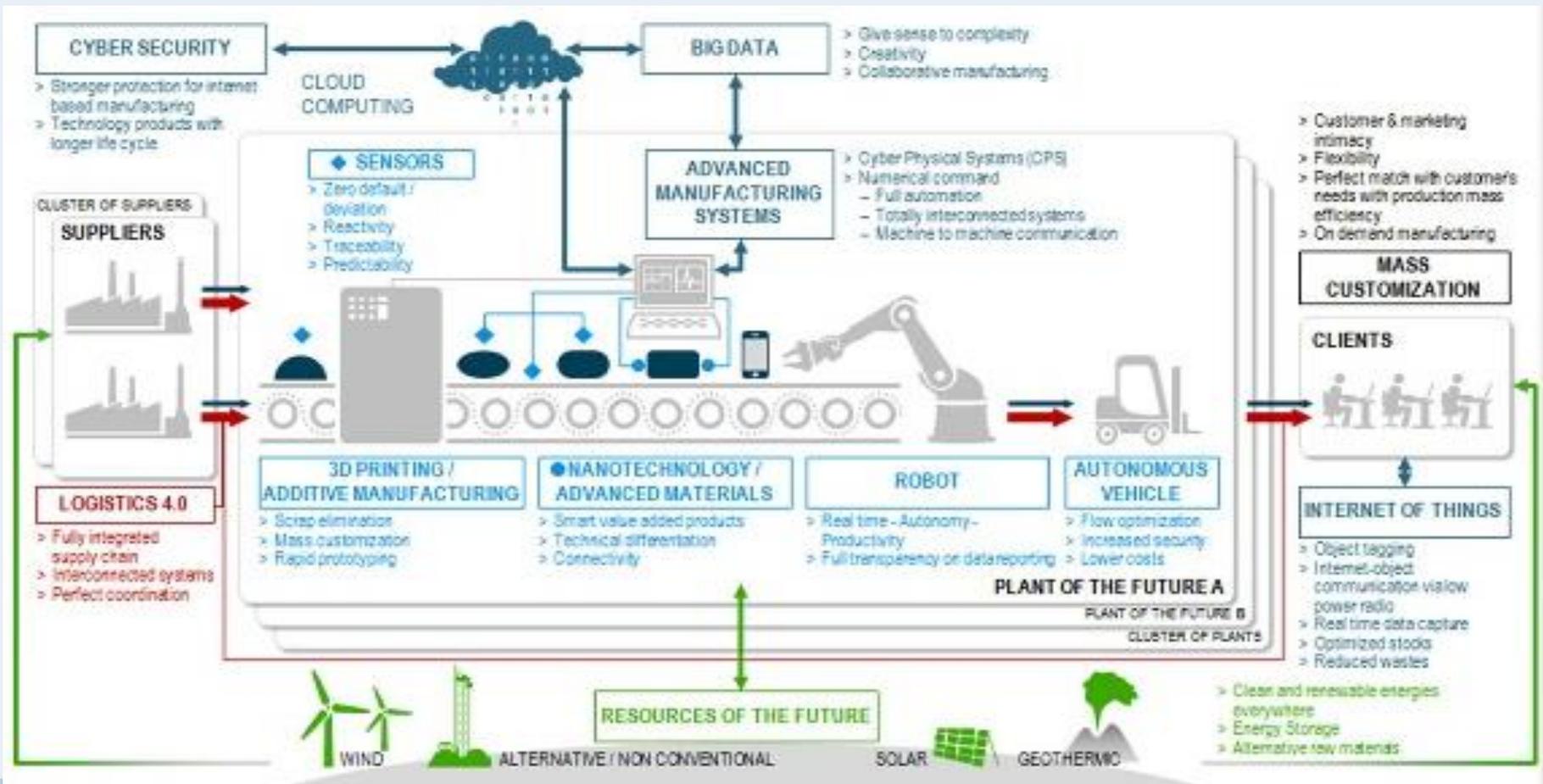
Method: Industry 4.0 in historical perspective: charting the 'field'

Breadth and depth: systemic impact



Method: Industry 4.0 in historical perspective: charting the 'field'

The technological ecosystem of Industry 4.0



Module I: Micro-level: Industry 4.0 in the level of the firm, functions and phases of production:

| I. 1: *The decomposition/re-composition of production and the changing value composition of Global Value Chains:*

- *Focus area:* the changing calculus of opportunities and threats of specific business profiles and value propositions

| I. 2: *AI: the cloud, big data, algorithmic models, and the Internet of Everything:*

- *Focus areas:* the functions and uses of predictive analytics, ‘smart factories’, implications for different business activities such as knowledge management, marketing and human resources

| I. 3: *The platform economy, its typology and emerging business models:*

- *Focus areas:* types of platforms, direct and indirect network effects, two-sided networks and the economics of multisided platforms; transitions from product-centricity to platforms, from value chains to ecosystems, from physical assets to digital and intangible assets and innovation capital

| I. 4 *Industry 4.0. as a matrix of risk and opportunity (with added emphasis on SMEs):*

- *Focus areas:* technological, organizational, and strategic management challenges, business model (re)design, skills development, challenges concerning security and protection of know-how, risks of loss of control, reduced independence, flexibility and adaptability, performance measurement methodologies

Module II: Meso-level: Industry 4.0 on the level of regions and regional innovation ecosystems:

II. 1. Centralization vs. decentralization in Industry 4.0:

- *Focus areas:* the dynamics of centralization vs. decentralization of economic capacities; management challenges in the context of existing as well as emerging industries and the regional business ecosystems in which they operate

II. 2. The changing economic geography and its implications for regional economic ecosystems:

- *Focus areas:* the dynamics of concentration of economic capacities few economic centers and the implications for management in regional business ecosystems (e.g., clusters etc.)

II. 3. Commoditization and “smart specialization”:

- *Focus areas:* Industry 4.0 and the reinforcement of dynamics of commoditization of business value propositions and business attractiveness of regional economic ecosystems, critical review of “smart specialization” theory and strategies especially concerning the ability of such strategies to provide a sustainable counterweight to the spatial centralization and commoditization that leading research identifies as key characteristics of Industry 4.0

II. 4. Symbiotic vs. parasitic ecosystems:

- *Focus areas:* critical perspectives on ‘smart specialization’ and ‘open innovation’ [production vs. extraction of value], different systems of financing innovation and sustainable development)

Module III: “Macro-level: Industry 4.0 on the level of governance, policy, regulation and sustainability:

III. 1. Comparative readiness for Industry 4.0: assessment and measurement methodologies:

- Focus areas: how countries across the EU and internationally respond to the management and policy challenges of Industry 4.0 and their strategies to leverage production as a national capability (e.g., WEF Readiness Diagnostic Model Framework)

III. 2. The future of work: Industry 4.0 skillsets:

- Focus areas: skillset requirements of Industry 4.0, comparative vulnerability of skills and occupational profiles to obsolescence due to Industry 4.0 and automation, design of work processes and workplaces, skills and training needs at firm level, human resources management

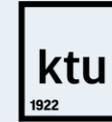
III. 3. Industry 4.0 and social sustainability:

- Focus areas: increasing levels of inequality within firms and society and its management challenges for Industry 4.0. initiatives, social exclusion and segregation

III. 4. Governance: regulation, innovation and sustainability:

- Focus areas: standardization, skills development, competition and anti-trust regulation, challenges of monopoly and monopsony, labor and consumer protection, global governance of big data, social accountability and legal compliance, inter-state tensions regarding the collection and uses of data

Part II: National/EU/international operational and engagement plan



Universities/research: Interdisciplinary

- Mapping the 'terrain' within Lithuania
- ECIU
- A: U of Vienna
- B: KU Leuven
- CDN: Toronto, York, UBC
- CZ: Charles
- DE: Fraunhofer, Max Planck
- DK: CBS
- EE: Tartu
- FI: Aalto, Tampere
- FR: INSEAD, HEC
- GR: AUEB, NTUA
- HU: Corvinus
- IT: Milano, Florence
- NL: Erasmus, VU Amsterdam Amsterdam
- NO: SINTEFF, Research Council of Norway
- PL: Warsaw, Jagiellonian
- ES: IESE, IPTS
- SE: Stockholm, Jönköping, Upsala
- CH: ETHZ, St. Gallen
- UK: Sussex, Oxford, Cambridge, LSE, UCL, LBS, Southampton
- US: NBER, MIT, Michigan, Columbia, Northwestern, Berkeley, Davis, USC

Business community/civil society

- Mapping the 'terrain' within Lithuania
- EU Industry 4.0 initiatives and strategies across the EU and internationally, e.g., Industrie 4.0 platform, Industrial Internet, China 2025 etc.
- BusinessEurope
- National/regional/EU/ industrial unions/associations
- ETUC
- National, regional and cross-border clusters
- European Cluster Observatory
- Smart Specialization authorities and key actors: Lithuania and across the EU
- World Economic Forum

Policy, regulatory organs: Nat'l, EU...

- Mapping the 'terrain' within Lithuania
- A comparative international perspective
- European Commission
- European Parliament
- European Committee of the Regions
- National state agencies attached to Industry 4.0 initiatives
- Centre for European Policy Studies (CEPS)
- Center for Economic Policy Research (CEPR)
- Bruegel
- ETSI
- OECD
- World Bank
- CEDEFOP

Conference strategy	Publications strategy	Industry 4.0 Observatory
<ul style="list-style-type: none">□ IEEE□ CeBIT□ ...	<ul style="list-style-type: none">□ Leading Economics and Management Journals (e.g., <i>European Management Journal</i>)□ Leading policy and regulation journals (e.g., <i>Journal of Public Policy</i>).□ Development of policy-oriented position papers	<ul style="list-style-type: none">□ Live ‘observatory’ on leading trends in Industry 4.0 across the world□ The main objective of the ‘observatory’ is to organize the observatory or ‘radar’ as a cutting-edge data collection mechanism but the same time to help IN4ACT maximize its publicity footprint and impact.□ Institutionalization of internal quarterly ‘review/screening’ of current research to determine publication of ‘working’ and ‘position’ papers under ‘current research’ section of the IN4ACT website.□ Publication and promotion of papers and presentations delivered at reputable conferences and seminars by RG members to the IN4ACT website.

EU

-  Industrie 4.0 Österreich
-  Factory of the Future 4.0
-  Průmysl 4.0
-  MADE
-  e-estonia
-  FIMECC PPP Programs
-  L'Industrie du Futur
-  Industrie 4.0
-  IPAR 4.0
-  Industria 4.0
-  Industry 4.0
-  Smart Industry
-  INNOMOTO / INNOLOT
-  Industria 4.0 / Produtech
-  Industria Conectada 4.0
-  Smart Industry / Production 2030
-  Industry 4.0 / IR4
-  Industry 4.0 Coordination Plans

US

-  Industrial Internet Consortium
Smart Manufacturing
-  Smart Planet
-  Internet of Everything

Asia

-  Made in China 2025
-  Robot Revolution Initiative
Society 5.0
-  Smart Nation



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ERA Chair team members job descriptions and advertisements

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IN4ACT ERA Chair Team: 'Competence clusters'

- ❑ Five research positions to be filled in for the achievement of the IN4ACT project objectives.
- ❑ Competencies organized into 'clusters' composed of diverse scientific and research expertise
- ❑ Interdisciplinary approach and composition:
- ❑ Multi-level approach:
 - ❑ Micro (the level of the firm, or more precise the functions and operations of the production process)
 - ❑ Meso (the level of regional economies and innovation ecosystems)
 - ❑ Macro (the level of policy, regulation, and sustainability)
- ❑ Given their interdisciplinarity, the ERA team positions do not correspond to the mainstream definitions of a 'job' that is related to any specific individual researcher. Instead, they refer to Full Time Equivalent (FTEs) that involve 'interdisciplinary research expertise clusters' that might involve several individual researchers to be engaged concurrently or sequentially for the achievement of specific project goals.

CLUSTER 1: TECHNOLOGY MANAGEMENT

Required competencies and areas of expertise:

- ❑ Data science, big data, algorithmic modelling
- ❑ Artificial Intelligence and learning machines
- ❑ Decision-making support systems
- ❑ Investment trends in technology development / acquisition

CLUSTER 2: BUSINESS MODEL ECONOMICS

Required competencies and areas of expertise:

- ❑ Business process modelling (BPM)
- ❑ Robotic process automatization business models (RPA)
- ❑ Network and ecosystem economics
- ❑ Cutting-edge design of business models
- ❑ Predictive analytics / maintenance
- ❑ Human resources and skills development

CLUSTER 3: ECONOMIC GEOGRAPHY AND REGIONAL ECONOMICS

Required competencies and areas of expertise:

- Smart cities, regional economic and innovation ecosystems
- Smart specialization
- Open innovation
- Comparative regional advantages and strategic promotion of regions in GVCs

CLUSTER 4: POLICY, REGULATION AND SUSTAINABILITY

Required competencies and areas of expertise:

- Design and implementation of policy and regulatory frameworks (ideally from a political economy angle)
- Standardization
- Legal specialization, specifically IPRs, patents, privacy (e.g., GDPR), compliance
- Social sustainability and inclusive development
- Circular economy
- Environmental sustainability and environmental engineering (KPI's, UN)

CLUSTER 5: METHODOLOGIES OF ASSESSMENT OF COMPARATIVE INDUSTRY 4.0 PERFORMANCE

Required competencies and areas of expertise:

- Methodologies of assessment of Industry 4.0 performance (micro-, meso-, macro-levels), e.g., WEF
- Design of methods and programs of Industry 4.0 skills development (academia/research, business, government)
- Labor economics
- Education program and skillset development design specialists (macro)
- Industry 4.0 KPI's and metrics



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Lithuania Industry 4.0 Achieving together

Prof. dr. Takis Damaskopoulos
Industry 4.0 impact on management
practices and economics (IN4ACT)
ERA Chair Holder
School of Economics and Management
Kaunas University of Technology

Gedimino g. 50-316
LT-44239 Kaunas
Mob. Phone +370 603 98047
Mob. Phone: +48 503 720 308
takis.damaskopoulos@ktu.lt
in4act.ktu.edu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 810318. The opinions expressed in the document are of the authors only and no way reflect the European Commission's opinions. The European Union is not liable for any use that may be made of the information.