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Tuğrul U. Daim
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Industry 4.0 Value Roadmap

Integrating Technology and Market Dynamics for Strategy, Innovation and Operations



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ISSN 2195-5816 ISSN 2195-5824 (electronic)
SpringerBriefs in Entrepreneurship and Innovation
ISBN 978-3-030-30065-4 ISBN 978-3-030-30066-1 (eBook)
<https://doi.org/10.1007/978-3-030-30066-1>

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Abstract

Industry 4.0 has been one of the latest concepts which has altered as well as disrupted the business model of organizations around the world. The adoption, however, has been slow in various industries as a clear roadmap for the integration of the same lacks in project planning. Hence, the main purpose of this thesis is to develop a value roadmap for three different industries: Automotive, Healthcare, and Telecommunication so to satisfy the market demand. The value roadmap for these three sectors is developed by taking into consideration five various factors which are market drivers, product features, technology features, enablers, and resources. Finally, these five factors are combined to form the final value roadmap. The roadmap is also segregated into two timelines which are short term and long term. For the evaluation of the value roadmap, views of experts from different organizations have been put into use.

Keywords IoT, Value roadmap, Quality function deployment

Acknowledgments

This work is partially funded by the Basic Research Program of the National Research University Higher School of Economics (HSE) and by the Russian Academic Excellence Project “5-100.”

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Nomenclature

AAR	Audio augmented reality
ABS	Anti-lock braking system
AFSA	Artificial fish swarm algorithm
AH	Authentication header protocol
AM	Additive manufacturing
ATV	All-terrain vehicle
BCM	Body control module
BP	Blood pressure
C-ART	Connected autonomous road transport
CDPD	Cellular digital packet data
COPD	Chronic obstructive pulmonary disease
CRRM	Cognitive radio resource management
CT	Computed tomography
DARPA	Defense advanced research projects agency
DCF	Discounted cash flow
EAP	Extensible authentication protocol
ECG	Electrocardiogram
EDA	Electrodermal activity
EGR	Exhaust gas recirculation
EMG	Electromyogram
ENEC	Emerson network energy center
EPS	Evolved Packet System
ESC	Electronic stability control
ESP	Encapsulated security payload
EWOD	Electrowetting on dielectric
FCD	Floating car data
FHRP	First hop redundancy protocol
FRN	Fixed relay node
GDP	Gross domestic product
GMR	Giant magnetoresistance

HCP	Health care professional
HetNet	Heterogeneous network
HMD	Head mounted display
HR	Heart rate
IC	Integrated circuits
IC engine	Internal combustion
ICT	Information and communications technologies
IEA	International Energy Agency
IoT	Internet of Things
IPComp	IP payload compression protocol
ITS	Intelligent Transport Systems
LED	Light-emitting diode
Li-Fi	Light fidelity
LiPF ₆	Lithium hexafluorophosphate
LOS	Line of sight
LTE	Long-term evaluation
MCM	Mass customization manufacturing
MIMO	Multiple-in, Multiple-out
MODV	Modular vehicle
MRI	Magnetic resonance imaging
MRN	Moving relay node
NAC	Network access control
NLPRS	Network layer packet redundancy scheme
NPV	Net present value
NTP	Non-thermal plasma
OECD	Organization for Economic Co-operation and Development
OEM	Original equipment manufacturer
PAN	Polyacrylonitrile
PHEV	Plug-in hybrid electric vehicle
PM	Predictive maintenance
PMR	Professional mobile radio
PRP	Parallel redundancy protocol
PSS	Public safety and security
QFD	Quality function deployment
QoE	Quality of Experiences
R&D	Research and Development
RAN	Radio access network
RC	Redundancy controller
RHMAS	Remote health monitoring and alert system
RMBI	Remote machine–brain interface
RRM	Radio resource management
RTC	Road traffic crashes
S&T	Science and Technology
SCR	Selected catalytic reduction
SPA	Scalable product architecture

TRM	Technology roadmapping
VAD	Virtual auditory display
VANET	Vehicular ad hoc network
VBTO	Virtual-build-to-order
VoIP	Voice over Internet Protocol
VRM	Value roadmapping
WAP	Wireless access points
WAVE	Wireless access in vehicular environment
WBAN	Wireless body area network
WBSN	Wireless body sensor network
WDM	Wavelength division multiplexing
WEP	Wireless equivalent privacy
WSN	Wireless sensor network