#### Study plan

# Name of study plan: navaz. mag. PRE program SC 23/24 (pro studenty studující všechny p edm ty 1. a 2.sem. na VUT)

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Smart Cities Type of study: Follow-up master full-time Required credits: 60 Elective courses credits: 0 Sum of credits in the plan: 60 Note on the plan:

Name of the block: Semestrální projekt Minimal number of credits of the block: 8 The role of the block: ZP

Code of the group: XN SC 1-2 21/22 Name of the group: Projekty nav.prez.1.-2.sem (od) 21/22 na FD programu SC Requirement credits in the group: In this group you have to gain 8 credits Requirement courses in the group: In this group you have to complete 2 courses Credits in the group: 8 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
12XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
14XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
15XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
16XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
17XN1C-E	<b>Thesis 1</b> Tomáš Horák, Miroslav Svítek	Z	4	0P+4C	Z	ZP
18XN1C-E	Thesis 1 Afdhal Afdhal	Z	4	0P+4C	Z	ZP
20XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
21XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
22XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
23XN1C-E	Thesis 1	Z	4	0P+4C	Z	ZP
11XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
12XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
14XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
15XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
16XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
17XN2C-E	Thesis 2 Tornáš Horák, Miroslav Svítek	Z	4	0P+4C	L	ZP
18XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
20XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
21XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
22XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP
23XN2C-E	Thesis 2	Z	4	0P+4C	L	ZP

Characteristics of the courses of this group of Study Plan: Code=XN SC 1-2 21/22 Name=Projekty nav.prez.1.-2.sem (od) 21/22 na FD programu SC

		_	
11XN1C-E	Thesis 1	Z	4
12XN1C-E	Thesis 1	Z	4
14XN1C-E	Thesis 1	Z	4
15XN1C-E	Thesis 1	Z	4
16XN1C-E	Thesis 1	Z	4
17XN1C-E	Thesis 1	Z	4
18XN1C-E	Thesis 1	Z	4
20XN1C-E	Thesis 1	Z	4
21XN1C-E	Thesis 1	Z	4
22XN1C-E	Thesis 1	Z	4
23XN1C-E	Thesis 1	Z	4
11XN2C-E	Thesis 2	Z	4
12XN2C-E	Thesis 2	Z	4
14XN2C-E	Thesis 2	Z	4
15XN2C-E	Thesis 2	Z	4
16XN2C-E	Thesis 2	Z	4
17XN2C-E	Thesis 2	Z	4
18XN2C-E	Thesis 2	Z	4
20XN2C-E	Thesis 2	Z	4
21XN2C-E	Thesis 2	Z	4
22XN2C-E	Thesis 2	Z	4
23XN2C-E	Thesis 2	Z	4

Name of the block: Compulsory courses in the program Minimal number of credits of the block: 50 The role of the block: P

Code of the group: 1.S.NPSC 21/22

Name of the group: 1.s.nav.prez (od) 21/22 - program SC (studium všech p edm t na VUT) Requirement credits in the group: In this group you have to gain 24 credits Requirement courses in the group: In this group you have to complete 4 courses Credits in the group: 24 Note on the group:

Note on the gre	μαρ.					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
17SCF-E	Smart Cities Fundamentals Tomáš Horák, Miroslav Svítek	Z,ZK	6	3P+2C	Z	Ρ
17TSC-E	Technologies for Smart Cities Tomáš Horák, Miroslav Svítek	Z,ZK	6	3P+2C	Z	Ρ
20AIMI-E	Application of ITS in Urban Engineering Josef Filip, Ji í R ži ka, Tomáš Tichý	Z,ZK	6	3P+3C	Z	Ρ
20GINS-E	Geographical, information, localization and navigation systems Petr Bureš, František Kekula, Pavel Hrubeš, Zuzana Purkrábková	Z,ZK	6	3P+3C	Z	Ρ

## Characteristics of the courses of this group of Study Plan: Code=1.S.NPSC 21/22 Name=1.s.nav.prez (od) 21/22 - program SC (studium všech p edm t na VUT)

17SCF-E Smart Cities Fundamentals	Z,ZK	6	
The main smart city components will be described (intelligent transport systems, smart grids, smart buildings, smart lighting, e-governa	nce, etc.) together with their in	tegration methods	
by using existing international standards to achieve the synergies among different sectors. The quality of life for different city residents	is understood as the main crit	erial function.	
17TSC-E Technologies for Smart Cities	Z,ZK	6	
Each presented technology will be described through performance parameters like safety, reliability, integrity, continuity, etc. New busin	ness models of technologies' i	nplementation	
and operation will be introduced to provide advanced deployment decision-making. Legal aspects of technologies' assessment (e.g. GDPR) will be presented for selected application			
areas.			
20AIMI-E Application of ITS in Urban Engineering	Z,ZK	6	
The course focuses mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the	e area, organization of the pub	lic space, concept	
of public space solutions, design of systems for traffic and transport telematics management, coordination of transport modes - autom	obil, pedestrian, MHD, cyclo, r	nodes etc. New	
approaches to the development of Smart and green approaches Promoting into Public.			
20GINS-E Geographical, information, localization and navigation systems	Z,ZK	6	
The subject is specialized in problems of work with applications of geographic information systems with special attention to the specializati	on in the field of transport and to	elecommunication.	
It introduces students to geographic data management practices and tools, real world modeling, geographic data storage models, data	a entry and digitization method	ls, and a number	
of other GIS related technologies such as problem mapping, webmap, etc.			

#### Code of the group: 2.S.NPSC 21/22

Name of the group: 2.s.nav.prez (od) 21/22 - program SC (studium všech p edm t na VUT) Requirement credits in the group: In this group you have to gain 23 credits Requirement courses in the group: In this group you have to complete 6 courses Credits in the group: 23

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11SMCD-E	Smart Cities Design Ond ej P ibyl, Roman Dostál, Jakub Veselka, Michal Matowicki, Jana Kuklová Jana Kuklová Ond ej P ibyl (Gar.)	Z,ZK	6	3P+2C	L	Р
14CISC-E	Cyber Infrastructure for Smart Cities Tomáš Zelinka, Martin Šrotý, Zden k Lokaj Tomáš Zelinka Tomáš Zelinka (Gar.)	Z,ZK	3	2P+1C	L	Ρ
17SCAR-E	Sustainable Cities and Regions Tomáš Horák, Karel Maier Tomáš Horák (Gar.)	Z,ZK	3	2P+1C	L	Р
17SU-E	Smart Urbanism Jakub Vorel Jakub Vorel (Gar.)	Z,ZK	6	2P+3C	L	Ρ
14FCL-E	Future Cities Laboratory Miroslav Svítek Miroslav Svítek (Gar.)	KZ	3	0P+3C	L	Ρ
17PJMG-E	Project Management Alena Rybi ková, Lucie Vicherková, Eliška Glaserová Alena Rybi ková (Gar.)	KZ	2	2P+0C	L	Р

## Characteristics of the courses of this group of Study Plan: Code=2.S.NPSC 21/22 Name=2.s.nav.prez (od) 21/22 - program SC (studium všech p edm t na VUT)

11SMCD-E	Smart Cities Design	Z,ZK	6
Introduction to smart cit	ies, systém analysis and design fundamentals, usage of UML for system design, principles of complex systems, modeling us	ing multiagent sy	stems in the SW
environment AnyLogic, a	application on a small scale real world problem.		
14CISC-E	Cyber Infrastructure for Smart Cities	Z,ZK	3
Status quo and trends in	telecommunications systems applied in cyber infrastructure, technical, economical and legal aspects of telecommunication	s networks desigr	and services
provisioning, identification	on and quantification of hiererchical telecommunications networks and services performance, telecommunication services dedi	cated for transpor	t and specifically
Smart Cities solutions.			
17SCAR-E	Sustainable Cities and Regions	Z,ZK	3
Cities in antiquity and in the middle ages, renaissance ideal of a perfect city, 19. and 20. century cities, modern city planning, sustainability as a concept, historical development of			
transportation in cities, r	modern transportation systems, logistics as a concept, supply chain, logistics center, city logistics.		
17SU-E	Smart Urbanism	Z,ZK	6
Urban metabolism and	ecology, urban morphology and land use, urban society: demography, mobility, social transtition, urban space and places, urb	ban flows, urban n	nodeling, impact
of technology innovatior	ns on urban transition.		
14FCL-E	Future Cities Laboratory	KZ	3
Future cities system arc	hitecture (with focus on C-ITS) and reference projects, functional and technology solutions description and principles, wirele	ss telco solutions	dedicated for
C-ITS systems (ITS-G5,	LTE-V, etc.), security architecture, data security and personal data protection, testing of the systems and functional parameters	s assessment, tecl	hnical properties
evaluaiton, methods of o	data collection and processing.		
17PJMG-E	Project Management	KZ	2
Basic terms of the proje	ct management, project management standards, organizational structures and processess in the project management, life-c	ycle of the project	t, risk analysis,
projects in transport and	transport infrastructure and their specifics, feasibility study and CBA, project evaluation, PPP projects.		

#### Code of the group: 2.S.NPSC VYB 21/22

Name of the group: 2.s.nav.prez (od) 21/22 výb r p edm tu - program SC (studium všech p edm t na VUT)

Requirement credits in the group: In this group you have to gain 3 credits Requirement courses in the group: In this group you have to complete 1 course Credits in the group: 3 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
16SHMI-E	Simulation and HMI Stanislav Novotný, Petr Bouchner, Tereza Kunclová, Michal Cenkner Stanislav Novotný (Gar.)	Z,ZK	3	2P+1C	L	Ρ
17AMOL-E	Application of Operations Research Methods in Logistics Alena Rybi ková, Šárka Vorá ová Alena Rybi ková (Gar.)	Z,ZK	3	2P+1C	L	Р

Characteristics of the courses of this group of Study Plan: Code=2.S.NPSC VYB 21/22 Name=2.s.nav.prez (od) 21/22 výb r p edm tu - program SC (studium všech p edm t na VUT)

16SHMI-E	Simulation and HMI	Z,ZK	3
Simulation for the system	ns in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer grapi	nics for ITS. Simul	ation theory with
application of computing	g equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of veh	icle dynamics, on	-land carriage in
particular. Virtual reality	systems.		
17AMOL-E	Application of Operations Research Methods in Logistics	Z,ZK	3
Exact, heuristic, metahe	uristic methods. Static and dynamic shortest path problem. Location analysis, P&R/K&R facilities location. Travelling s	alesman problem	with constraints.
Assignment problem an	d matching algorithms. Decision making in urban transport. Design of urban transport lines. Scheduling in public transport.		

Name of the block: Compulsory elective courses Minimal number of credits of the block: 2 The role of the block: PV

Code of the group: 1.S.NPSC FA 20/21 Name of the group: 1.s.nav.prez (od) 20/21 - program SC - p edm ty z FA Requirement credits in the group: In this group you have to gain at least 2 credits (at most 7) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) Credits in the group: 2

#### Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
500EKL3	Ecology III - Social Ecology Petr Klápšt Petr Klápšt (Gar.)	КZ	2	2P+0C	Z	PV
500U3	Urbanism III - Theory	ZK	2	1P+1C	Z	PV
555UP1	Planning 1 - Urban Planning Karel Maier, Jakub Vorel, Petr Klápšt Jakub Vorel Jakub Vorel (Gar.)	ZK	3	2P+1C	Z	PV

#### Characteristics of the courses of this group of Study Plan: Code=1.S.NPSC FA 20/21 Name=1.s.nav.prez (od) 20/21 - program SC p edm ty z FA

500EKL3	Ecology III - Social Ecology	KZ	2
Social Ecology: The sub	ject deals with the relationship of man and the environment in landscape and settlements. It acquaints students with selected	d methods of soc	io-ecological
research and participati	on of citizens in the formation of the rural environment, the city and its socio-spatial structure. The theoretical part of the subj	ect is based on c	oncrete practical
examples, which are pro	pressed by the students and present them during the semester.		
500U3	Urbanism III - Theory	ZK	2
The course introduces t	he student to the most important urban theories and ways of thinking about the city from the 19th century to the present. In la	ectures and semi	nars, the student
is led to think critically in	n order to be able to analyze, evaluate, compare and recognize the practical effects of these theories on the development of l	European cities.	
555UP1	Planning 1 - Urban Planning	ZK	3
In the course of Urban I	Planning I, we teach students on how the cities were planned from ancient times to the present and how discipline itself have	evolved in the co	ourse of time. By
using the real examples	, we describe urban planning as a complex process with numerous feedbacks that evolves in time and involves various actors	with different value	ues and interests
and resources. The cou	rse presents general principles and concepts of European spatial planning and planning system in the Czech Republic provid	ding students with	n practical insight
into relevant planning do	ocuments, legislation and institutions. Special lectures focus on actual topics: planning of urban ecosystems and participatory pl	anning. At the end	d of the semester
students will be evaluate	ed based on the presentation and discussion of their seminar work via TEAMS or in classroom. In their seminar works students	will analyse and	critically evaluate
selected case of planning	ng process in one of the following domains: Urban mobility, Housing, Public services, Ecosystems, Economic activities, Cultu	ral heritage.	

#### List of courses of this pass:

Code	Name of the course	Completion	Credits
11SMCD-E	Smart Cities Design	Z,ZK	6
Introduction to sma	rt cities, systém analysis and design fundamentals, usage of UML for system design, principles of complex systems, modeling using	multiagent system	s in the SW
	environment AnyLogic, application on a small scale real world problem.		
11XN1C-E	Thesis 1	Z	4
11XN2C-E	Thesis 2	Z	4
12XN1C-E	Thesis 1	Z	4
12XN2C-E	Thesis 2	Z	4
14CISC-E	Cyber Infrastructure for Smart Cities	Z,ZK	3
Status quo and tre	ends in telecommunications systems applied in cyber infrastructure, technical, economical and legal aspects of telecommunications i	networks design ar	nd services
provisioning, identif	ication and quantification of hiererchical telecommunications networks and services performance, telecommunication services dedicat	ed for transport and	specifically
	Smart Cities solutions.		

14FCL-E	Future Cities Laboratory	KZ	3
Future cities syste	em architecture (with focus on C-ITS) and reference projects, functional and technology solutions description and principles, wireless	telco solutions de	dicated for
C-ITS systems (ITS	S-G5, LTE-V, etc.), security architecture, data security and personal data protection, testing of the systems and functional parameters as	sessment, technica	al properties
	evaluaiton, methods of data collection and processing.		
14XN1C-E	Thesis 1	Z	4
14XN2C-E	Thesis 2	Z	4
15XN1C-E	Thesis 1	Z	4
15XN2C-E	Thesis 2	Z	4
16SHMI-E	Simulation and HMI	Z,ZK	3
	systems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics		-
	puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle		
	particular. Virtual reality systems.		
16XN1C-E	Thesis 1	Z	4
16XN2C-E	Thesis 2	Z	4
17AMOL-E	Application of Operations Research Methods in Logistics	Z,ZK	3
	taheuristic methods. Static and dynamic shortest path problem. Location analysis, P&R/K&R facilities location. Travelling sales		-
	ssignment problem and matching algorithms. Decision making in urban transport. Design of urban transport lines. Scheduling in pub		
17PJMG-E	Project Management	KZ	2
	project management, project management standards, organizational structures and processess in the project management, life-cycl	e of the project, ris	
	projects in transport and transport infrastructure and their specifics, feasibility study and CBA, project evaluation, PPP project	rts.	
17SCAR-E	Sustainable Cities and Regions	Z,ZK	3
Cities in antiquity	and in the middle ages, renaissance ideal of a perfect city, 19. and 20. century cities, modern city planning, sustainability as a conce	pt, historical devel	opment of
	transportation in cities, modern transportation systems, logistics as a concept, supply chain, logistics center, city logistics.		
17SCF-E	Smart Cities Fundamentals	Z,ZK	6
	y components will be described (intelligent transport systems, smart grids, smart buildings, smart lighting, e-governance, etc.) together	•	
	international standards to achieve the synergies among different sectors. The quality of life for different city residents is understood a	s the main criteria	I function.
17SU-E	Smart Urbanism	Z,ZK	6
Urban metabolism	and ecology, urban morphology and land use, urban society: demography, mobility, social transtition, urban space and places, urban	flows, urban mode	eling, impact
	of technology innovations on urban transition.		
17TSC-E	Technologies for Smart Cities	Z,ZK	6
	echnology will be described through performance parameters like safety, reliability, integrity, continuity, etc. New business models of t		
and operation will t	be introduced to provide advanced deployment decision-making. Legal aspects of technologies' assessment (e.g. GDPR) will be pres	ented for selected	application
	areas.		
		7	1
17XN1C-E	Thesis 1	Z	4
17XN2C-E	Thesis 2	Z	4
17XN2C-E 18XN1C-E	Thesis 2 Thesis 1	Z Z	4
17XN2C-E 18XN1C-E 18XN2C-E	Thesis 2 Thesis 1 Thesis 2	Z Z Z	4 4 4
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E	Thesis 2 Thesis 1 Thesis 2 Application of ITS in Urban Engineering	Z Z Z,ZK	4 4 4 6
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization	Z Z Z,ZK on of the public spa	4 4 4 6 ace, concept
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   olutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian,	Z Z Z,ZK on of the public spa	4 4 4 6 ace, concept
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   Jutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.	Z Z Z,ZK on of the public spa MHD, cyclo, mode	4 4 6 ace, concept as etc. New
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so 20GINS-E	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   plutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.   Geographical, information, localization and navigation systems	Z Z Z,ZK on of the public spa MHD, cyclo, mode Z,ZK	4 4 6 ace, concept se etc. New 6
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so 20GINS-E The subject is speci	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   olutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.   Geographical, information, localization and navigation systems   ialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of tra	Z Z Z,ZK on of the public spa MHD, cyclo, mode Z,ZK nsport and telecom	4 4 6 ace, concept is etc. New 6 munication.
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so 20GINS-E The subject is speci	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   olutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.   Geographical, information, localization and navigation systems   ialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of traints to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitized in the special storage models.	Z Z Z,ZK on of the public spa MHD, cyclo, mode Z,ZK nsport and telecom	4 4 6 ace, concept is etc. New 6 munication.
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so 20GINS-E The subject is speci It introduces stude	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   Jour Descent Colspan="2">Source Colspan="2">Source Colspan="2">Thesis 2   Application of ITS in Urban Engineering   Source Colspan="2">Source Colspan="2"	Z Z Z,ZK on of the public spa MHD, cyclo, mode Z,ZK nsport and telecom ation methods, an	4 4 6 ace, concept s etc. New 6 munication. d a number
17XN2C-E 18XN1C-E 18XN2C-E 20AIMI-E The course focuses of public space so 20GINS-E The subject is speci It introduces stude 20XN1C-E	Thesis 2   Thesis 1   Thesis 2   Application of ITS in Urban Engineering   s mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization   plucian of engineering networks in the area, coordination of engineering activities in the area, organization   plucian of traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.   Geographical, information, localization and navigation systems   ialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of trains to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitiz of other GIS related technologies such as problem mapping, webmap, etc.   Thesis 1	Z Z Z,ZK on of the public spa MHD, cyclo, mode Z,ZK nsport and telecom ation methods, an	4 4 6 ace, concept as etc. New 6 nmunication. d a number 4
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