SITEC

HEPENIX

HRC-CODE: THE SUCCESS STORY OF A GERMAN-HUNGARIAN EUREKA COLLABORATION

R. Schulze, J. Toth

7th December, 2021

EUREKA
innovation across borders

AGENDA

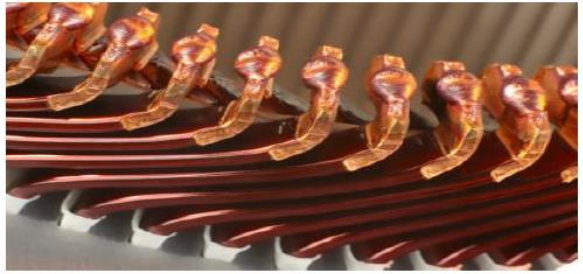
1	SITEC Industrietechnologie GmbH	Mr. Schulze (SITEC)
2	HRC-Code in a short overview	Mr. Schulze (SITEC)
3	Work and results SITEC	Mr. Schulze (SITEC)
4	HEPENIX Kft.	Mr. Toth (Hepenix)
5	Work and results HEPENIX	Mr. Toth (Hepenix)

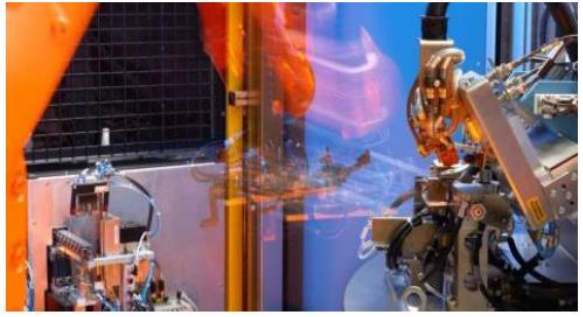
1 – SITEC GMBH

- AUTOMOTIVE
- E-MOBILITY
- HYDROGEN
- RENEWABLE ENERGIES
- MEDICAL TECHNOLOGY
- ELECTRONICS & SEMICONDUCTORS
- AEROSPACE
- CONSUMER GOODS

3.000
delivered production systems

300.000.000
delivered components and assemblies





We develop technologies.

Machinery

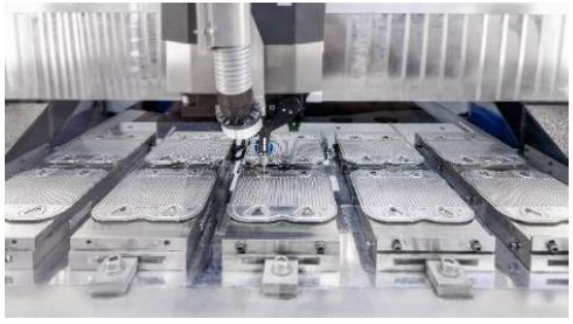
Automation

Assembly

Laser

ECM

Series production



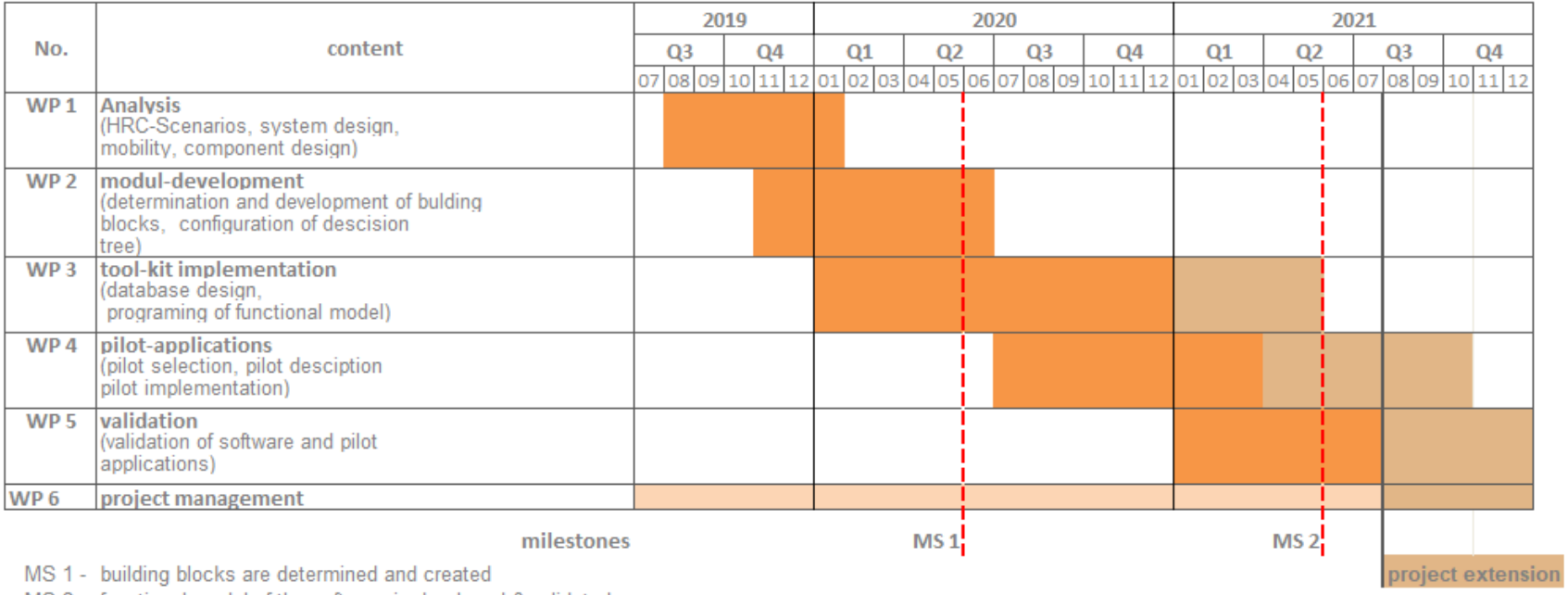
GERMANY (Chemnitz & Regenstauf)

- SITEC Industrietechnologie GmbH
- Institut Chemnitzer Maschinen und Anlagenbau e.V. (ICM)
- Innok Robotics GmbH

HUNGARY (Budapest)

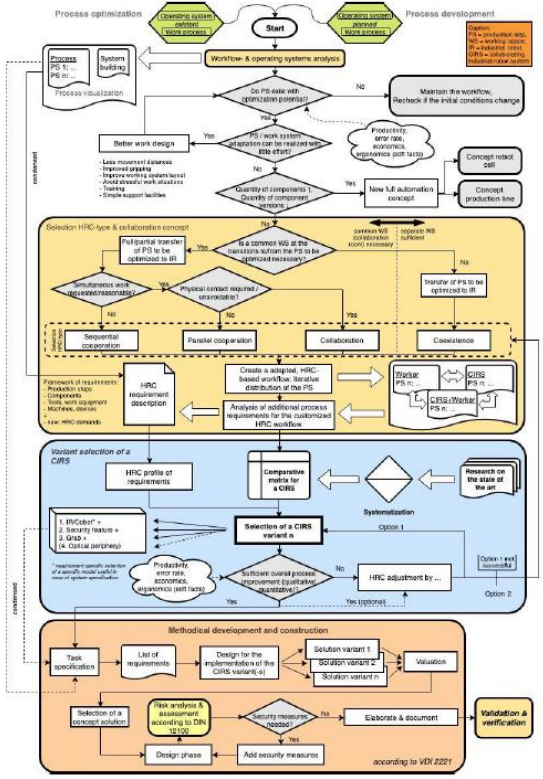
- HEPENIX Kft.
- SZTAKI - Institute for Computer Science and Control (subcontract)

➢ DEVELOPMENT OF A CONFIGURATOR FOR IMPLEMENTING HUMAN ROBOT COLLABORATION (HRC)



MS 1 - building blocks are determined and created
MS 2 - functional model of the software is developed & validated

Work package 1



- Workflow analysis
- Is production system suiteable for HRC?

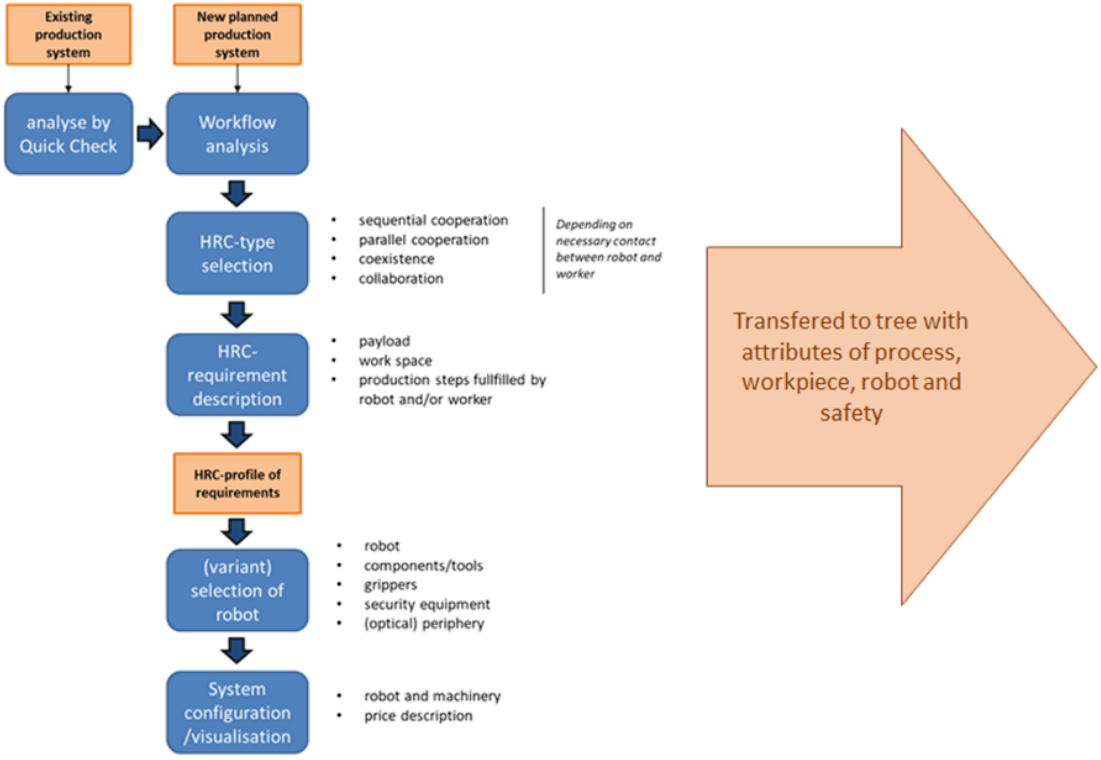
  → **Quick-Check** developed by partner ICM e.V.

- HRC requirement description
- HRC-type selection (coexistence, collaboration…)

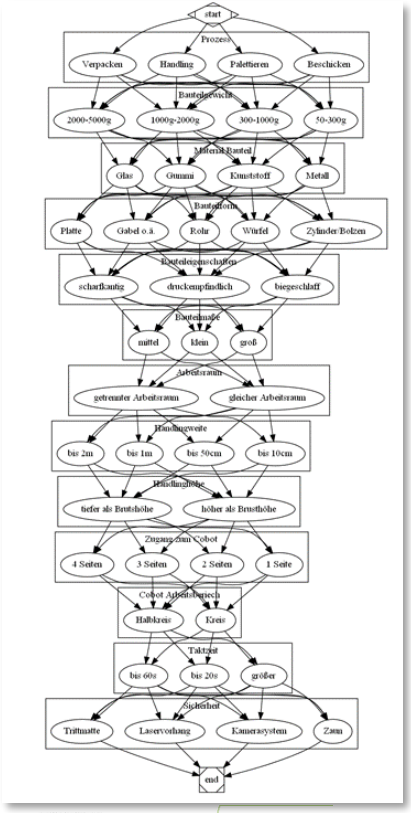
- Selection of robot (variant)
- Selection of components (grippers, security…)

- System configuration and visualisation

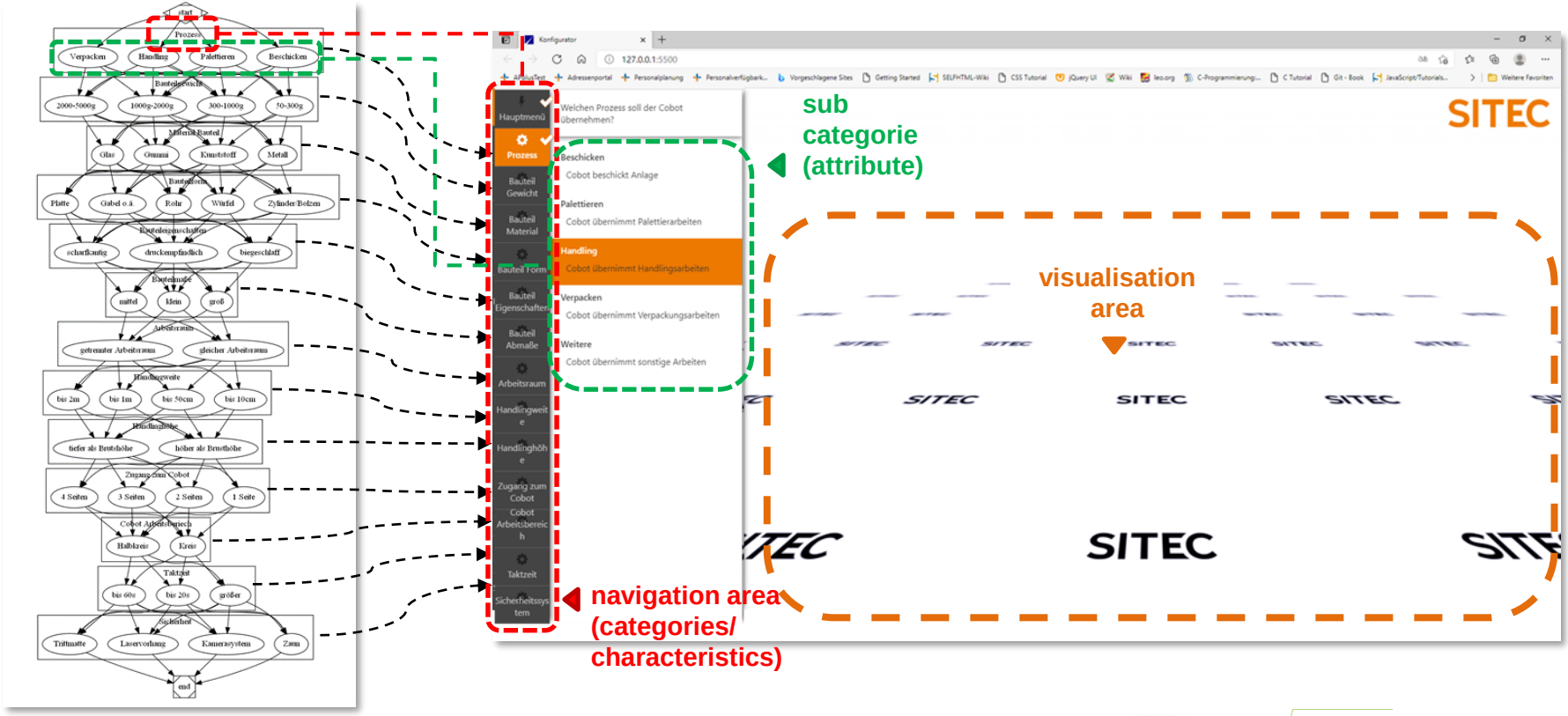
Work package 2



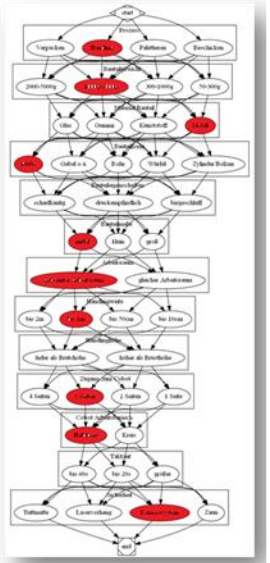
Transfered to tree with attributes of process, workpiece, robot and safety

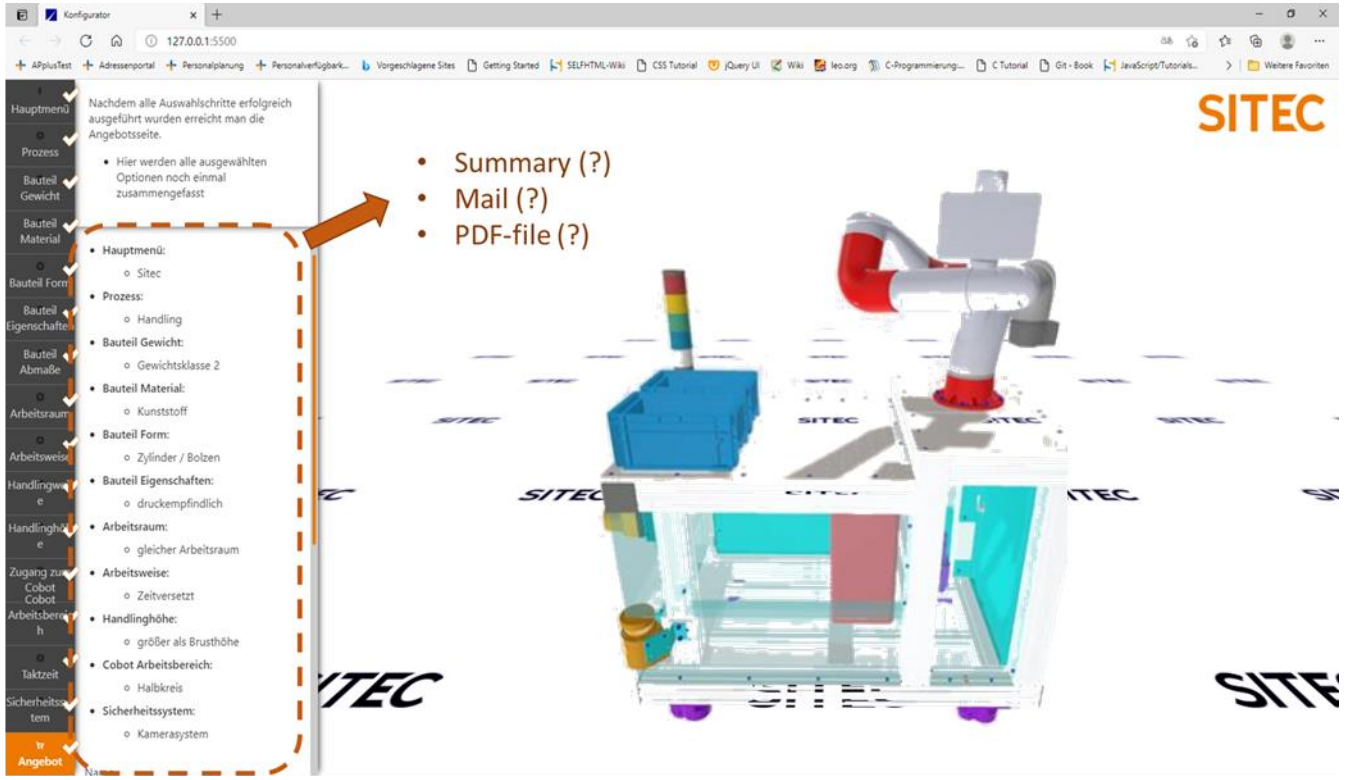


Work package 3

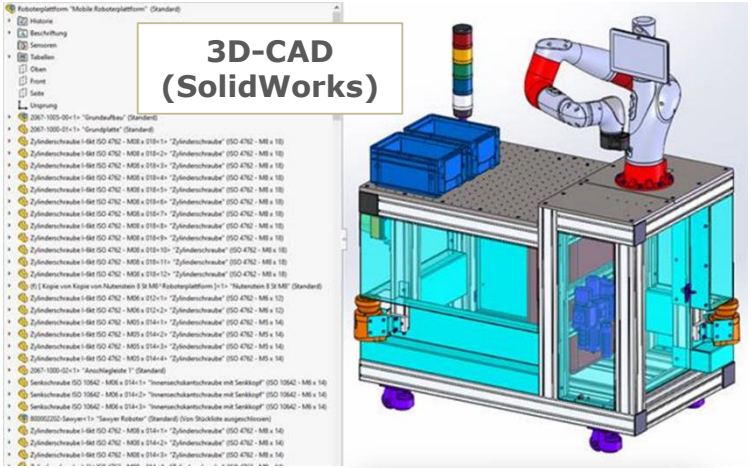


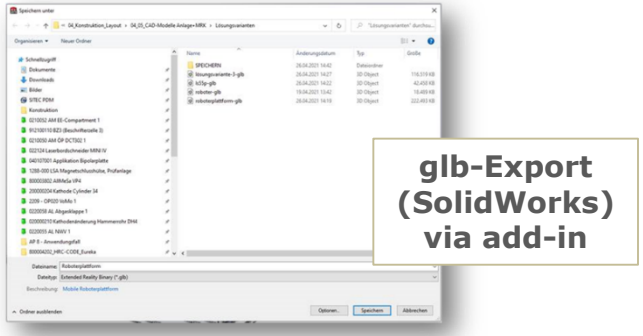
Work package 4 & 5

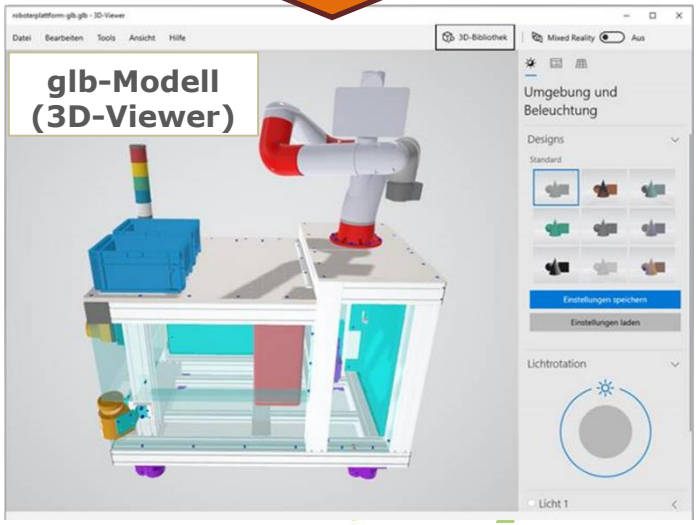




Work package 4 & 5







Thank you!

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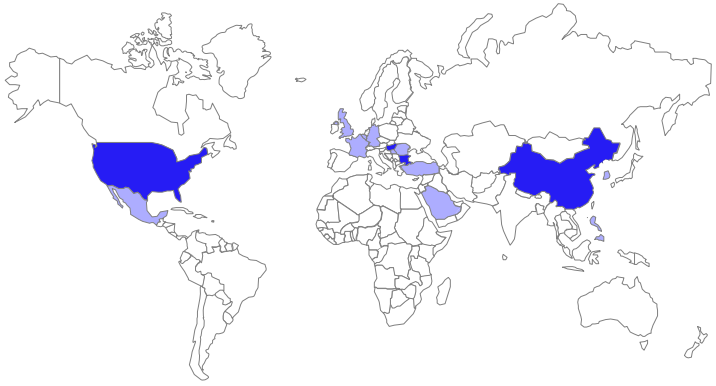
HEPENIX

Turnkey solutions for the challenges of the industry since 1991



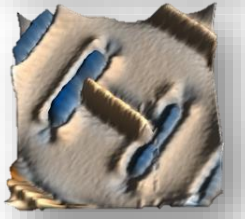
1000 projects, team: 72+ employees
€6M turnover

Automotive

- Assembly lines, stations and components
- Custom machinery

Nuclear

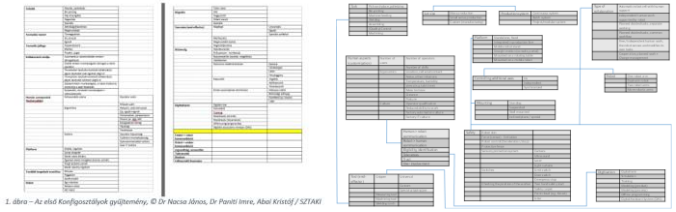
- Equipment and technology development
- Decontamination robots



R&D

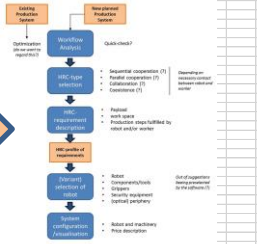
- Regional and international cooperation
- Industry 4.0

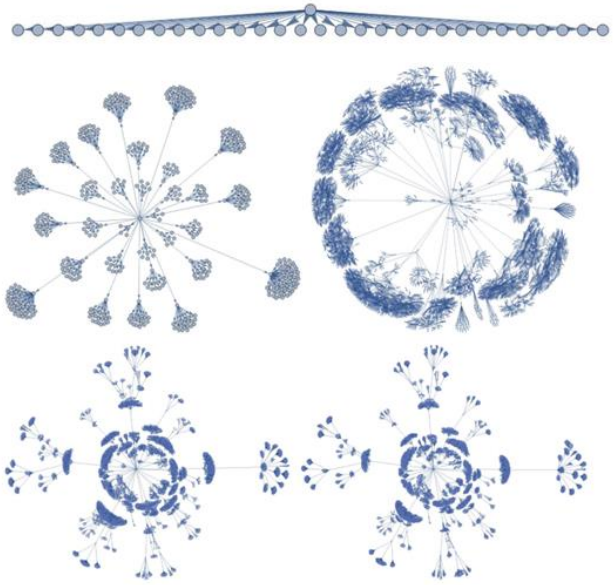
Work package 1



Config classes, multiple approaches, © Dr Nacsa János, Dr Paniti Imre, Abai Kristóf, Tipary Bence / SZTAKI

Group #	Group name	Level	Kérdések	Questions	Choice mode	Possible choices (preliminary list)			
1	Industry	1.1	Iparág	Industry	Drop-down selection	Automotive	Electronics	Nuclear	Food
		1.2	Különleges környezeti igény	Special environment request	Drop-down selection	Simple	ESD	Clean room	ATEX
2	Product	2.1	Termék típus szétválasztás	Variety of the products (1-6)	Value entry				
		2.2	Termék megnevezés	Name of the product	Text entry				
		2.3	Méretű (Szélesség, hosszúság, magasság)	Size (width, lenght, height)	Value entry				
		2.4	Tömeg	Weight	Value entry				
		2.5	Teljes alkatrész szám? Darabjegyzék	Number of subassemblies (1-20)	Value entry				
		2.6	Darabszám? Kihozatal? Db/h	Capacity (Yield) [pcs/h]	Value entry				
		2.7	Termék ellenőrzés / Termék nyomkövetés	Quality check/ for product data management	Optional box + Value entry				
3	Function	3.1	Mi a robot funkciója?	Functionality of the robot	Drop-down selection	Manipulate	Technologies		
		3.2	Ha kiszolgáló akkor, milyen end effector kell?	If end-effectors, what kind of end-effector is used?	Drop-down selection	>End-effectors			
		3.3	Ha technológia, mit kell csinálni a termékkel?	If technologies, what kind of thechnology is used?	Drop-down selection	>Technologies			
4	Layout	4.1	Meglévő elrendezés vagy nem	Existing application?	Drop-down selection	Yes	No		
		4.2	Munkatér pontok (x, y, z) - Max 5	Workplace coordinates (x, y, z) - max: 5 pcs	Value entry				
		4.3	Pontosság? Abszolút? Ismétlési pontosság	Accuracy, Repeatability requirements	Value entry				
		4.4	Milyen rendszer? Központ a vevő	The level of automation	Drop-down selection	HRC	Fully automated		
		4.5	Ha HRC, akkor milyen	If HRC, the level of it	Drop-down selection	Sequential cooperation	Parallel cooperation		
		4.6	Adott biztonsági elemek? Kell-e további	Any additional safety device	Drop-down selection	Safety laser scanner	Light curtain	Mat	
		4.7	Rendelkezésre álló terület	Available layout size	Value entry				
		4.8	Robot elhelyezkedés	Orientation of the robot	Drop-down selection	Hanging	Wall-mount	Upper rail system	Standing
5	Energy supply	5.1	Áramerősség	Amperage	Value entry				
		5.2	Feszültség, fázis	Voltage, # of Phases	Value entry				
		5.3	Vákuum?	Available vacuum value	Value entry				
		5.4	Pneumatika?	Available pneumatics pressure value	Value entry				
6	Control	6.1	Kezelő egységek?	HMI	Drop-down selection	Monitor	Teach pendant	Mouse, keyboard	Other
		6.2	Vezérlő egységek?	Control units	Drop-down selection	PLC	PC	Robot controller	Other
		6.3	Adatgyűjtés (PDM)?	Product data management	Drop-down selection	SCADA	PC	MES	Other
7	Business Development	7.1	Vannak-e mérnökei?	Process engineers (#)	Value entry				
		7.2	Van karbantartó részleged?	Maintenance team (#)	Value entry				
		7.3	Milyen szintű az operátori készültsége?	Operator qualification level	Description (String)				
		7.4	Van-e robot/CNC már a cégnél?	# of CNC machines/Robots at the factory	Value entry				
		7.5	Van-e robot/CNC kezelői tapasztalat már a cégnél?	CNC machine/Robot user experience at the factory	Value entry				
		7.6	Mekkora a költség keret rá?	Budget information	Value entry				





Levels:Nodes (with Services) - 0:30, 1:487, 2:5950, 3:7355, 4:7471

- Quick-Check: Is the production system suitable for HRC?

Work package 2

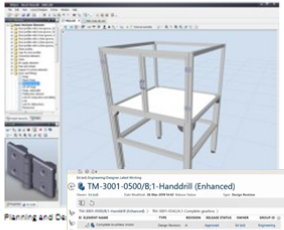
Extract from the compilation of Results at TechTogether for HRC-CODE

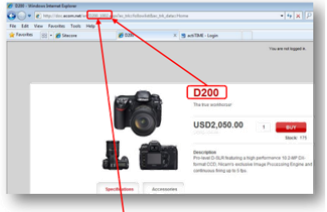
SITEC HEPENIX HR CODE

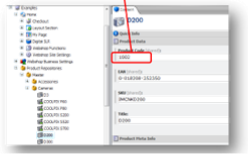
Work package 3

- Simple and straightforward to use (self-explanatory)
- Users: internal and external users
- Easy to maintain / keep up to date
- Proper balance in generalisation / specifics
- Runs on all hardware solutions
- The solution can be refined
- Retains the final solution
- Graphics for aesthetics
- Multiple languages

KEEP IT SIMPLE







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MTpro

rexroth A Bosch Company

- Forms
- Excel ()
- Chatbots
- Webshops
- CTQ, Configure-to-Quote systems
- 3D modeling systems with metainfo
- PDM/PLM solutions a.ka. mega-modelling

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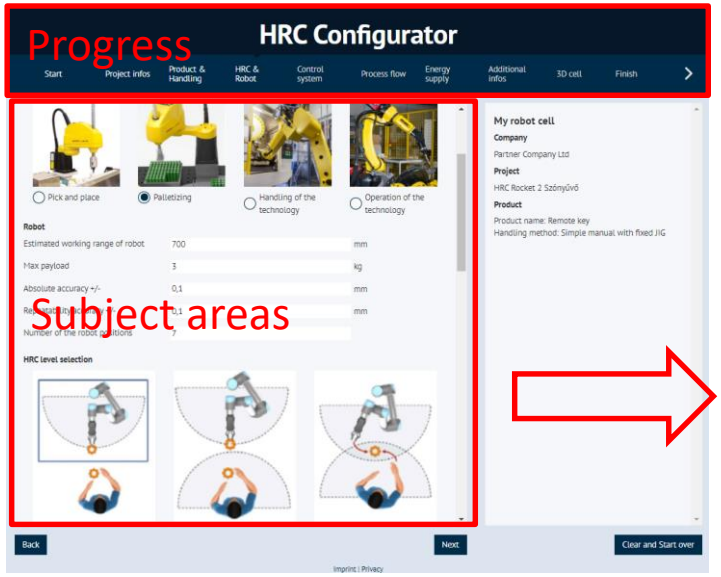
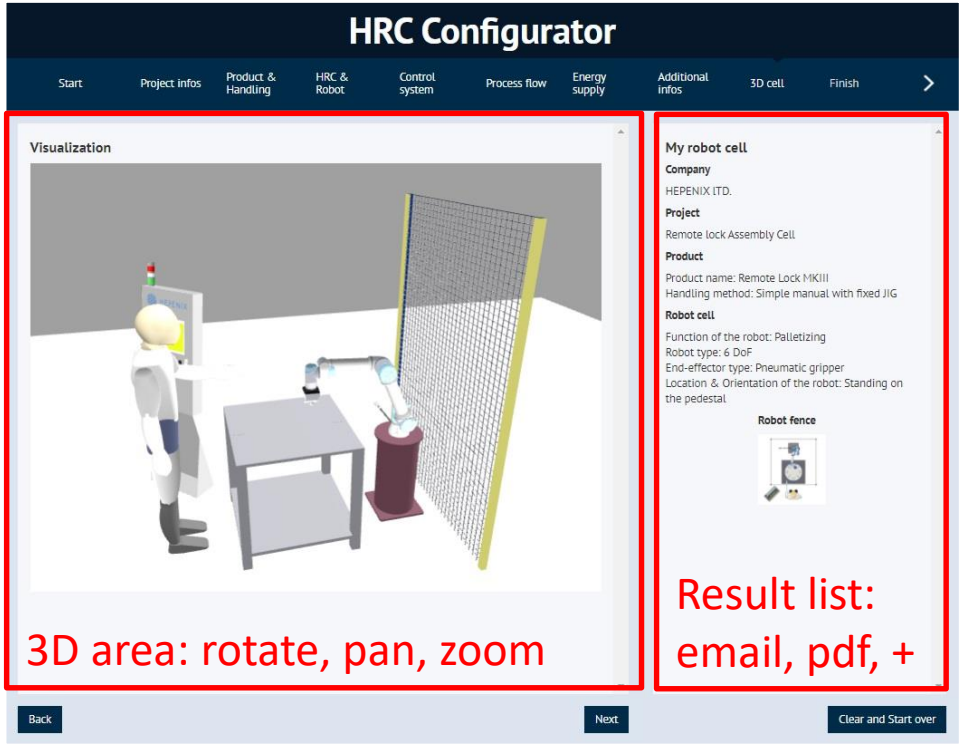
Work package 4 & 5





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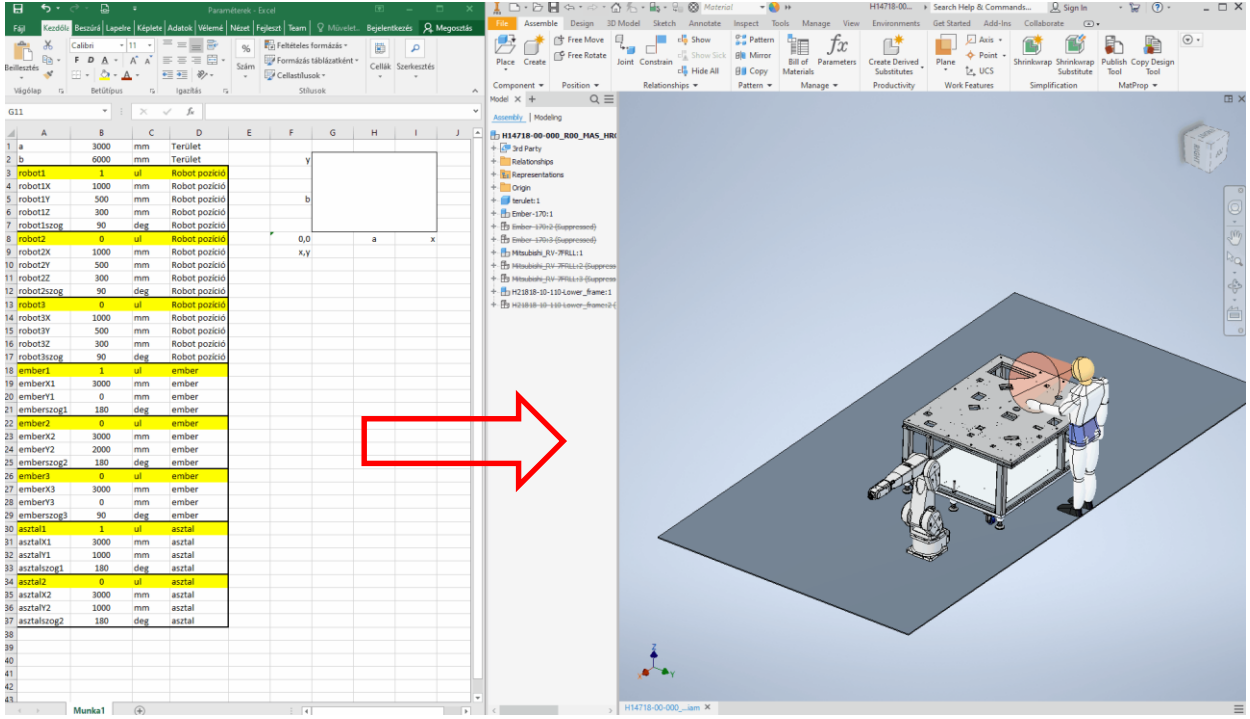
Portions: Innok Robotics (3D), SITEC GmbH
Additional credits. ICM, SZTAKI, HEPENIX

Work package 4 & 5



Mega-model:

- Glb Exports for web

Results on web:

- Summary, list
- 3D visualization
- Hidden export

Further detailing through an import of Configurator results into native 3D CAD system (Autodesk Inventor) via MS EXCEL: table-driven feature.

FINALIZATION

Validation of the configurator:

1 physical and 2 virtual/mixed prototypes with SZTAKI

EXPLOITATION

- Partner network
- Media, articles
- Use of knowledge in product offerings
- Safety-by-Design


HR CODE
ENGINEERING
SOLUTIONS
AT THE
HIGHEST LEV
SPONSORED BY THE
Federal Ministry
of Education
and Research
EUREKA
innovation across borders
NATIONAL RESEARCH, DEVELOPMENT
AND INNOVATION OFFICE
HUNGARY
PROGRAM FINANCED
FROM THE NRDI FUND

Thank you!

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