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Teamwork in the Simultaneous Product Realisation

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The paper presents a transition from sequential to simultaneous product realisation. Such a transition is not possible without prior well-organised teamwork or virtual teamwork. The article demonstrates a two-level team structure for simultaneous product realisation with a core team on the first level and several project teams of simultaneous product realisation loops on the second level and process for forming team or virtual team. Track and loop process and well-organised teamwork or virtual teamwork of the core team and project teams of simultaneous product realisation loops allows the savings in time and costs achieved by a transition from sequential to simultaneous product realisation. The results of organising teamwork and virtual teamwork are shown on a case study of simultaneous realisation of component for automotive industry.

Keywords: product realisation, track and loop process, virtual team, communication tools, communication matrix

0 INTRODUCTION

The essence of modern production is to make a product that a customer needs as quickly and cheaply as possible.

Under these conditions, only a company that can provide customers with the right products in terms of functionality and quality, produced at the right time, at the right location, of the required quality and at an acceptable price, can expect global market success. A product that is not produced in accordance with the wishes and requirements of customers, hits the market too late and/or is too expensive, will not survive competitive pressure [1] to [3]. The customer should therefore participate in the process of simultaneous realisation of a product as early as possible. They can participate by expressing their wishes and requirements regarding project definition. The customer should be a temporary member of project teams in simultaneous product realisation loops.

The main feature of sequential product realisation is the sequential execution of stages in the product realisation process [4] and [5]. The observed stage of the product realisation process can only begin after the preceding stage has been completed. Data on the observed process stage are built gradually and are completed at the end of the stage–the data are then forwarded to the next stage (Fig. 1). In contrast with sequential product realisation, the main feature of simultaneous product realisation is the concurrent execution of stages in the product realisation process [4] and [6]. In this case, the observed stage can begin before the preceding stage has been completed. Data on the observed process stage are collected gradually and are forwarded continuously to the next stage (Fig. 1).

A transition from sequential to simultaneous product realisation considerably reduces the time and costs of product realisation [5] and [6], as shown in Fig. 2.

It can be seen from Fig. 2 that product definition costs rise uniformly in sequential product realisation, because of sequential execution of product definition activities (marketing, product draft, product development, elaboration of design documentation, material management), while production costs rise rapidly, due to long iteration loops for carrying out changes or eliminating errors.

The cost of product definition is much higher in simultaneous product realisation due to the parallel execution of activities (more work is done during this stage), while production costs are much lower than in sequential realisation, due to short iteration loops for carrying out changes and eliminating errors.

In simultaneous product realisation, there are interactions between individual stages of the product realisation process. Track-and-loop technology has been developed for executing these interactions [1]. The type of loop defines the type of co-operation between the overlapping stages of the simultaneous product realisation process. Winner [7] suggests that 3-T loops should be used where interactions exist between three levels of a simultaneous product realisation process.

A transformation of input into output is made in every loop on the basis of requirements and restrictions [4] and [6].

In small companies, a two-level team structure is planned for the execution of 3-T loops of a simultaneous product realisation process [5], [6] and [8], with a variable structure of core and project teams, as shown in Fig. 3. The task of the core team is process support and control, while the task of (virtual)

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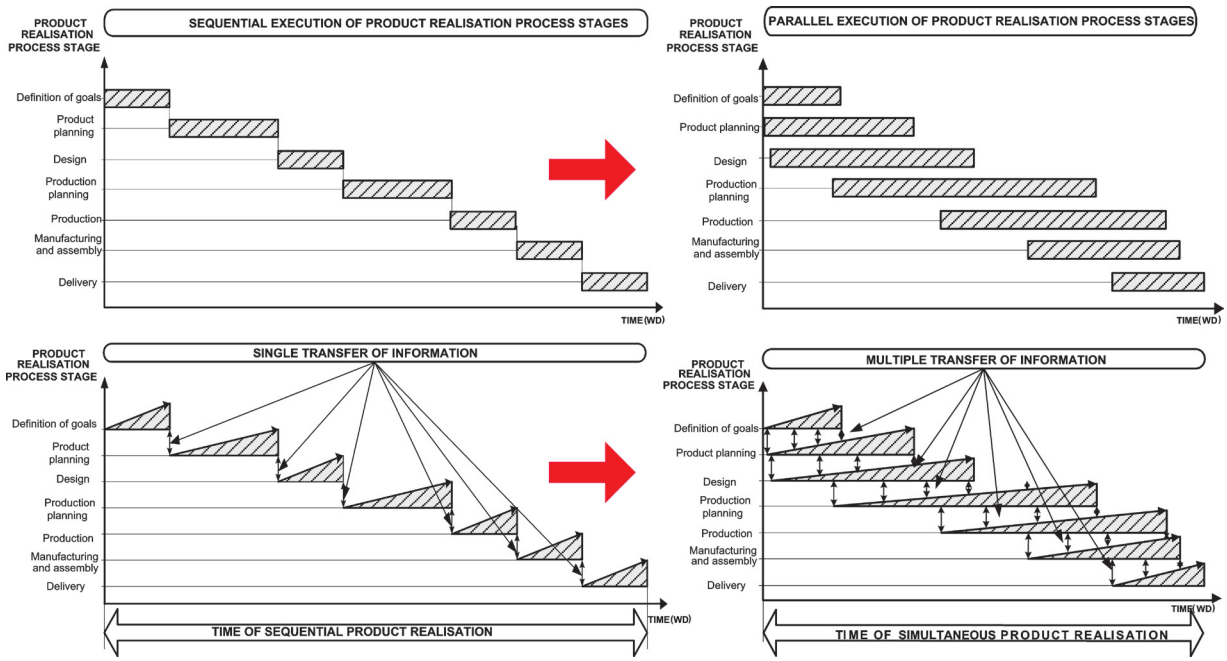

Fig. 1. *Sequential and simultaneous product realisation*

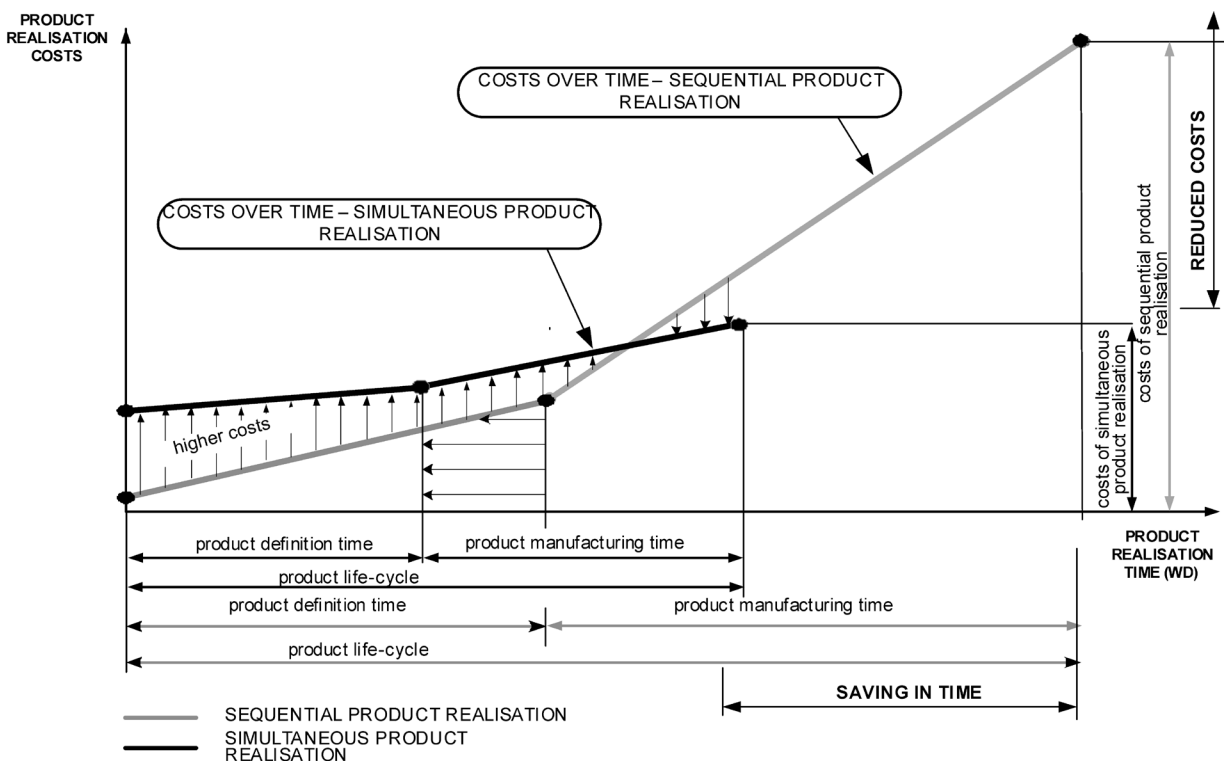

Fig. 2. *Time and costs of sequential and simultaneous product realisation*

project teams is the execution of the tasks defined within the simultaneous product realisation process. It is obvious that simultaneous product realisation is not possible without well-organised teamwork or virtual teamwork, which is the means for organisation integration. It incorporates:

- the formation of a core team, project teams or virtual project teams in product realisation loops,

- the selection of communication tools for the core team, project teams or virtual project teams,
- the definition of a communication matrix.

1 TEAMWORK IN SIMULTANEOUS PRODUCT REALISATION

Teamwork is a precondition for a transition to simultaneous product realisation.

1.1 Forming Teams or Virtual Teams for Product Realisation

Analysis of teams in small companies led the authors to the conclusion that simultaneous product realisation required a shift from the terms "team" and "teamwork" to "virtual team" and "virtual teamwork" [9] and [10] when forming project teams.

A team is defined as a small group of people with complementary abilities that are activated in order to achieve the common goal for which they are all responsible. Team members are at the same location and in the same room. A virtual team is defined as a team consisting of members that are located in various buildings, countries or states and their cooperation is not limited by distance, organisation or national borders. Virtual teams are formed to carry out a specific project. The teams are disbanded when the project is finished. A geographically dispersed virtual team allows a company to select the best team members, regardless of their locations. There are also substantial savings in time and costs of virtual team operation. Moreover, a virtual team may often have short meetings (if needed), which is physically difficult to achieve with a »classical« team.

Experience in solving problems related to forming teams or virtual teams [11] to [13] led the laboratory researchers to the conclusion that a virtual team should be formed in the following steps:

Step 1: Identifying the need for a virtual team.
Step 2: Definition of virtual team tasks.
Step 3: Definition of procedures and processes for achieving the common goal.
Step 4: Selection of virtual team members.
Step 5: Appointment of a virtual team leader.

The success of a virtual team leader depends on their skills, tools, techniques and strategies in a virtual environment. Because of many different forms of expert knowledge and leadership abilities, it is possible to rotate the virtual team leader–various members of a virtual team can undertake the role of team leader at various stages of the product realisation process.

Table 1. *Advantages and drawbacks of tools for (virtual) teamwork*

Communication tool	Features	Advantages	Drawbacks
TEAM MEETING on one location Suitable for: TEAMWORK	Best tool for real-time communication because of personal contact and visual & verbal communication between team members. Meetings can be formal or informal.	Visual and verbal communication. Personal contacts between team members. All team members know each other. Participants can prepare for a meeting.	All team members must have time to attend the meeting. Much time needed for travel. High travel costs.
VIDEO CONFERENCE Suitable for: VIRTUAL TEAM	Good tool for real-time communication because of visual and verbal communication and the possibility of interactions between team members. No direct personal contacts between team members.	Visual and verbal communication. Indirect personal contact. Prompt communication. No expensive travel. Saving in time. Team members can prepare for a meeting if they know its purpose and agenda in advance. The use of audio/video equipment.	All team members must be in the video conference room at the same time. Preparation in advance is required. Time delay of video due to distance. High costs of hiring communication channels.
AUDIO CONFERENCE Suitable for: VIRTUAL TEAM	Good tool for real-time communication. Verbal communication and the possibility of interactions between team members. Functions in the Internet environment.	Reliable and always available communication tool. Participants are on various locations. Participants only need the Internet connection. Low cost of use.	Only verbal communication. Participants must be simultaneously present in the communication network.
VOICE MAIL Suitable for: VIRTUAL TEAM	Tool for impersonal communication. For urgent messages only.	Message is sent to the recipient regardless of his presence. Recipient has time to prepare an answer.	Impersonal communication. Suitable for urgent, short messages.
E-MAIL Suitable for: VIRTUAL TEAM	Impersonal communication without visual and verbal communication. No interactions between team members.	Useful for sending text messages and documents. Return receipt.	Impersonal communication. Limited size- documents to be sent.
GROUPWARE Suitable for: VIRTUAL TEAM	Allows verbal communication between team members. Exchange if information in real-time. Simultaneous communication between several team members. During task execution the system allows simultaneous work of several participants on various locations. Common databases. Communication process must be defined in advance.	Simultaneous cooperation of team participants on various locations. Concurrent exchange of data and information. Access to data on a common server. Video communication is possible with additional video equipment. Information can be sent to team members via voice mail.	High burden for computer communications. High data-transmission costs.
ELECTRONIC WHITE BOARD Suitable for: TEAMWORK and VIRTUAL TEAM	Portable or fixed board that allows electronic data acquisition, exchange and archiving.	Simple use. Intended for taking notes on results. Rapid electronic transfer of the board contents to other team members.	High investment cost. Expensive and complicated maintenance.

1.2 Communication Tools Used in Teams and Virtual Teams for Simultaneous Product Realisation

Members of (virtual) teams must constantly communicate in order successfully to perform their tasks and to achieve the common goal. This is possible by using the available hardware and software [14]. Hardware includes telephones, modems and communication links (Internet connections). These are used for data transfer and for video conferences. Software includes efficient programs, LAN, communication and other tools for holding meetings.

It is possible to achieve efficient communication between members of the core team and virtual project teams by using the Internet. Several communication tools exist for efficient communication among team members [11]:

- team meeting,
- video conference,
- audio conference,
- voice mail,
- e-mail,
- groupware and
- electronic white board.

The research group at the Laboratory for Manufacturing Systems at the Faculty of Mechanical Engineering in Ljubljana, Slovenia, decided to analyse the characteristics, advantages and drawbacks of communication tools required in (virtual) teamwork of simultaneous product realisation. On the basis of collected and verified data from vendors of (virtual) teamwork communication tools, every team member made a list of the features, advantages and drawbacks of these tools. The team leader then organized a

Table 2. *Communication matrix in simultaneous product realisation loops*

ID	Input information–document	Activity	Output information–document	Tools used	Information (document) sent by	Information (document) received by	Communication tool
1	Input information of activity 1	ACTIVITY 1	Output information of activity 1	...	Sender 1	Receiver 1	Tool 1
2	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...
	:	:	:	:	:	:	:
n	Input information of activity *n*	ACTIVITY *n*	Output information of activity *n*		Sender *n*	Receiver *n*	Tool *n*

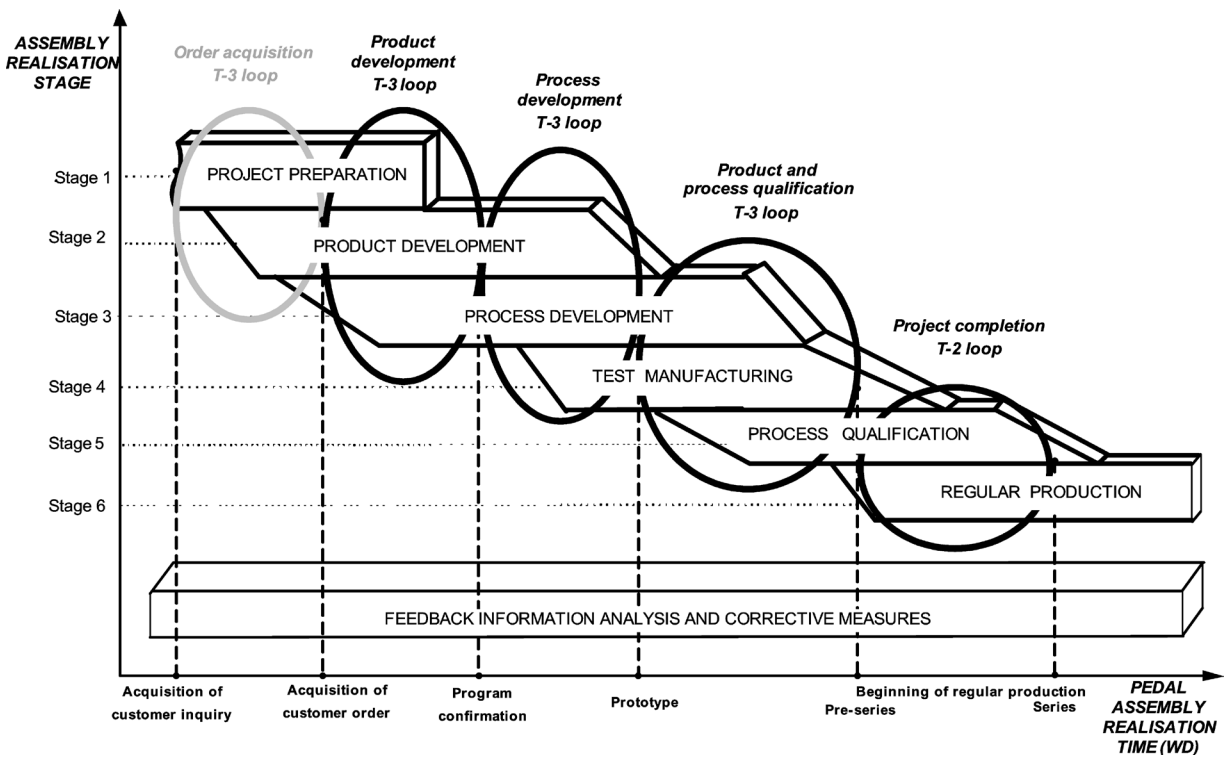

Fig. 3. *Loops of simultaneous realisation of car component*

creativity workshop to obtain a coordinated proposal of the features, advantages and drawbacks of available communication tools. The results of the creativity workshop are shown in Table 1.

It can be seen from Table 1 that only two types of communication tools are suitable for teamwork (team meeting and electronic white board), while other tools are suitable for virtual teamwork.

1.3 Communication Matrix in Product Realisation Loops

The communication matrix defines the method of exchanging information and documents in the execution of simultaneous product realisation activity loops.

A list (Table 2) must be made for every activity:

- input information with required documents for beginning the execution of the activity,
- output information with required documents that arise from execution of the activity,
- tools for creating and storing information,
- sender of the information or document,
- receiver of the information or document,
- communication tool used for information exchange.

2 SIMULTANEOUS REALISATION OF A CAR COMPONENT

2.1 Organisation for Simultaneous Realisation of Car Component

A company decided to make a project plan for simultaneous realisation of a car component (pedal assembly) and to carry out this project. The goal of the project was to make a competitive car component, suitable in terms of quality, reliability, mass, price and realisation time. Simultaneous realisation of the car component was divided into six stages:

Stage 1: Preparation of the car component.
Stage 2: Development of the car component.
Stage 3: Development of the realisation process.
Stage 4: Test production of car component.
Stage 5: Qualification of the realisation process.
Stage 6: Regular production.

The WBS method [10] and [11] was used for a decomposition of the project into activities. There were 280 activities and five loops of simultaneous realisation of the car component within the six stages of pedal assembly realisation:

- order acquisition loop (3-T loop),
- pedal assembly development loop (3-T loop),

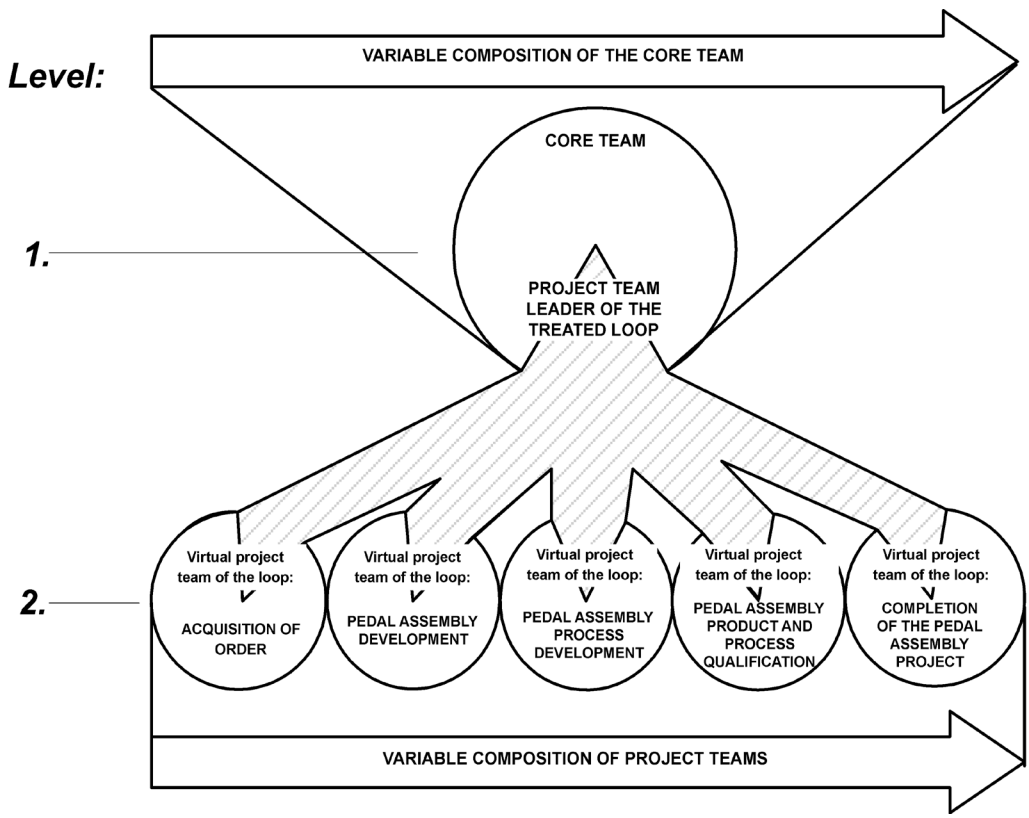

Fig. 4. *Structure of teams for simultaneous realisation of car component*

- pedal assembly process loop (3-T loop),
- pedal assembly qualification loop (3-T loop),
- completion of the project of pedal assembly realisation loop (2-T loop).

Fig. 3 shows how the loops are formed, and the type of cooperation within realisation stages.

When linking activities in a project network diagram, the principle of parallelism was used in such a way as to achieve maximum overlapping of activities [10] and [11] where needed due to continuous information flow between people who execute activities.

After seeing the presentation of two- and three-level structures of (virtual) teams in product realisation loops [5] and [8] the company management selected a two-level team structure, whereby the core team is on the first level and five virtual project teams are on the second level (Fig. 4).

2.2 Forming Teams / Virtual Teams for Simultaneous Realisation of Car Component

The core team for simultaneous realisation of the car component will monitor the whole project, solve organisational issues and coordinate the strategy of performing tasks [15] and [16]. The company management decided that the following people would be members of the core team:

- project manager (PM)–permanent member,
- project team leader of a particular loop (VPL)–non-permanent member,
- head of supply department (external supply and sales of investment funds–PUR+SIF)–permanent member,
- head of sales and sales logistics department (S+LD)–permanent member,
- head of development department (DEV)–permanent member,
- head of industrialisation and development of manufacturing technology department (IND+MTD)–permanent member,
- head of manufacturing planning and supply, maintenance and manufacturing centre (MP+MNT+MC)–permanent member,
- head of quality control department (Q)–permanent member,
- head of suppliers (SUP)–permanent member,
- head of customers (CUS)–permanent member.

Fig. 5 shows the structure of the core team for simultane ous realisation of the car component.

The core team members (with the exception of the project manager) will work on the project for someof their working time, while the rest of the time they will perform tasks in their departments.

The project team manager will be outside their department throughout the project duration and will work full time on the project. When the project is finished, the project team manager will return to their department.

As shown in Fig. 3, there will be five virtual project teams in loops of simultaneous realisation of the car component.

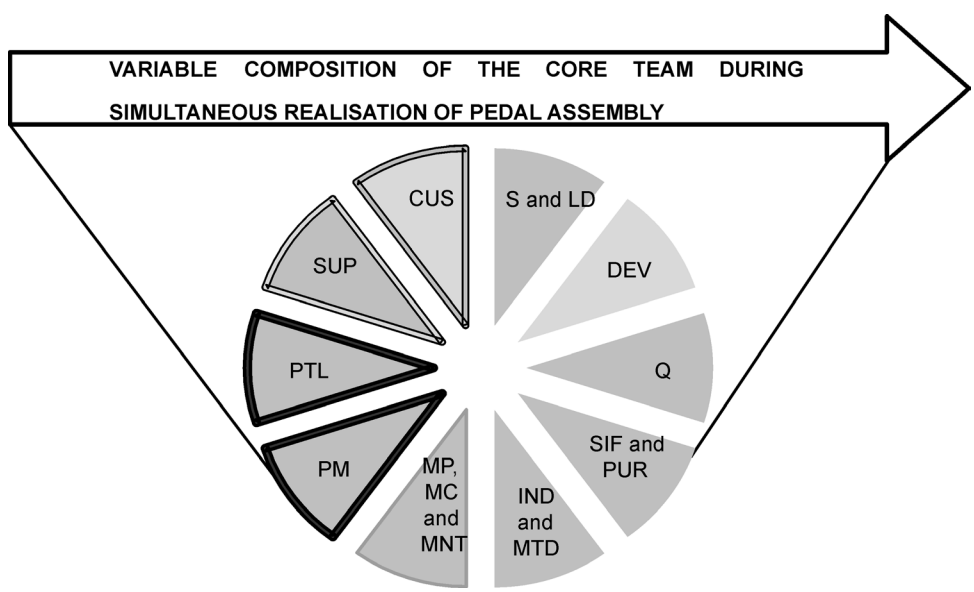

Fig. 5. *Core team structure*

Members of virtual teams will be experts from 14 company departments and two representatives from strategic suppliers and customers, depending on the level of assigned responsibility for execution of activities within a particular loop.

When the company obtains an offer, loop 1 activities (Order acquisition loop) are started; its three stages are: project preparation, the development of the pedal assembly and the development of the pedal assembly process. This loop is executed when the sales department considers that it is sensible to make an offer for the realisation of the pedal assembly.

Loop 1 is followed by loops 2 to 5.

The project manager decided (in agreement with the company management) that the intensity of responsibility of each virtual team member during the execution of activities would be marked by a 1-3-9 method, as shown in Table 3.

A creativity workshop [17] was organised with 14 representatives from company departments, as well as representatives from suppliers and customers.

The goal of the workshop was to score the intensity of the responsibility of virtual team members when executing the activities of the five loops in simultaneous realisation of the car component.

Part of the results of scoring the intensity of responsibility of virtual team members during the execution of the first loop of simultaneous realisation of the car component are presented in Table 3.

The responsibilities of each virtual team member for the execution of activities in the first loop of car component realisation can be seen from Table 3.

The procedure of scoring the intensity of the responsibility of virtual team members was also carried out for the other loops.

From the sum of points assigned to the ith team member during execution of activity in the j^{th} loop, a factor of total intensity of responsibility of the i^{th} member in the jth loop can be calculated as:

$$FTI_{i,j} = \frac{SMP_{i,j}}{SAP_j},$$

where $FTI_{i,j}$ is a factor of total intensity of responsibility of the i^{th} team member in the j^{th} loop, $SMP_{i,j}$ sum of the points assigned to the i^{th} member in the j^{th} loop and SAP_j sum of all points assigned in the j^{th} loop.

A part of the results of the calculation of the total intensity of the virtual project team members' responsibility factor during the execution of activities in all five loops of simultaneous realisation of pedal assembly are shown in Table 4.

After they had made an overview of the total intensity of responsibility factors of virtual team members during the execution of activities in the loops of pedal assembly realisation, the creativity workshop participants reached the following conclusions:

- the i^{th} member of the virtual project team (VPT) of the j^{th} loop of realisation of the pedal assembly, with the maximum factor of total intensity of responsibility, would be appointed as team leader of the j^{th} loop of PTL,
- representatives from departments with a total intensity of responsibility factor above 5% would

Table 3. *Scoring the intensity of responsibility of virtual team members in the "Order acquisition loop"*

Name	MNG	S	PM	DEV	IND	Q	MTD	SIF	PUR	MC	MP	MNT	AD	LD	SUP	CUS
SIMULTANEOUS REALISATION OF PEDAL ASSEMBLY																
Offer preparation project activities																
Preparation of the project																
Inquiry review																
Receipt of inquiries and determination of their status		9														3
Review of requirements for completeness		9		3												
Opening of the project		9	1	1	1	1		1	1					1		
Preparation of inquiry		9	1	1	1	1		1	1					1		
Definition of project team		9	1	1	1	1		1	1					1		
Repartition draft																
Initial meeting 1 (inquiry)		9	3	3	3	3		3	3					3		
etc.,																

Table 4. *Factors of total intensity of responsibility of virtual project team members during the execution of loops of "Order acquisition loop"*

Realisation of pedal assembly loops	Virtual team members	MNG	S	PM	DEV	IND	Q	MTD	SIF	PUR	MC	MP	MNT	AD	LD	SUP	CUS	SUM
Loop 1: Preparation of order	Scoring of individual team members in Loop 1	3	165	19	163	104	61	9	84	87	9	10	0	0	11	10	30	765
	Intensity factor of individual team member	0.39	21.5	2.48	21.3	13.6	7.97	1.19	11.2	11.5	1.19	1.33	0	0	1.46	1.33	3.98	100
	Selected team members in Loop 1		165		163	104	61		84	87							30	694
	Intensity factor of the selected team member	0	23.8		23.4	14.9	8.79		12.1	12.5							4.32	100

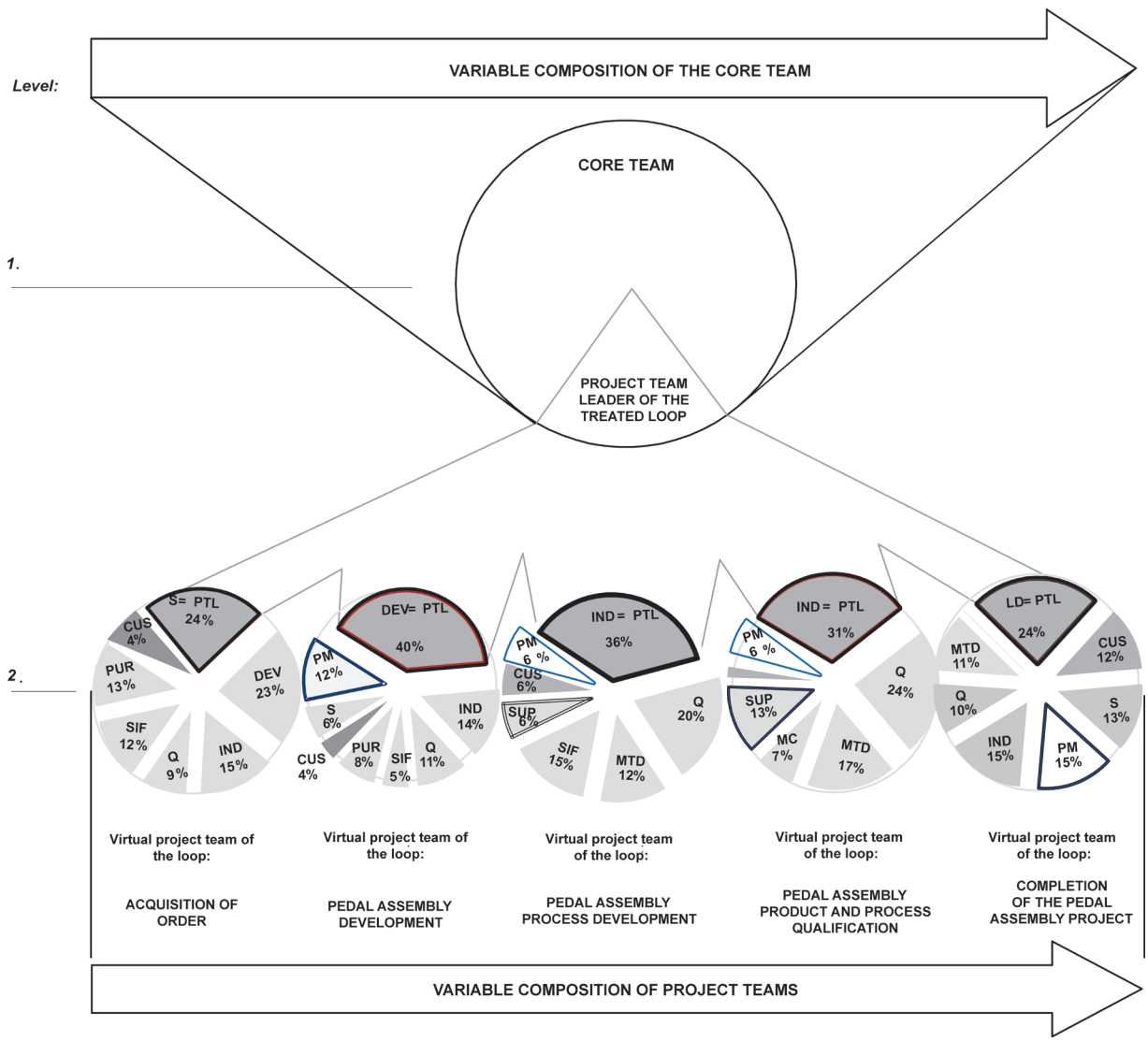

Fig. 6. *Virtual project teams in the loops of simultaneous realisation of the car component*

also be included in the j^{th} loop of pedal assembly realisation,

- representatives of suppliers and customers would also be included in the j-th loop of pedal assembly realisation, regardless of their total intensity of responsibility factor, in order to avoid misunderstanding suppliers' and customers' requirements.

Fig. 6 presents the structure of virtual project teams of five loops in simultaneous realisation of the pedal assembly.

2.3 Forming the Communication Matrix

A creativity workshop was organised with 14 representatives from company departments, as well as representatives from suppliers and customers.

Table 5. *Communication matrix for execution of "Order acquisition loop" activities*

ID	Input information – document	Activity	Output information – document	Tools used during execution of activity	Information (document) sent by	Information (document) received by	Communi-cation tool
0	SIMULTANEOUS REALISATION OF PEDAL ASSEMBLY						
1	Offer preparation project activities						
2	Preparation of the project						
3	Inquiry review						
4	Inquiry	Receipt of inquiries and determination of their status	PP document		Customer	P	e-mail
5	PP document	Review of requirements for completeness	Check of data (first sieve)		S		
6	Check of data (first sieve)	Opening of the project	Design of implementation project	SAP	S	All departments	
7	Design of implementation project	Preparation of inquiry	Message about opening of inquiry	SAP	S	All departments	e-mail; GW
8	PP document	Definition of project team	Decision about temporary project group		S	DEV, IND, PUR, Q, PM	e-mail; GW
:	:	:	:	:	:	:	:
64	3D model, customer requirements; 2D drawings; Minutes of the meeting about product draft; Known required quantities, manufacturing deadlines and price	Technological process design	Technological process design		IND	DEV, Q, IND	SAP;SMT
65	Known required quantities, manufacturing deadlines and price; Message on opening of inquiry; Design of implementation project	Process planning, synoptics, process feasibility	Definition of plan, synoptics and process feasibility				SAP;SMT; e- mail
66	Customer requirements regarding packaging; 3D model, customer requirements; 2D drawings	Design of packaging	Design of packaging		IND	S	SVP; EWB
67	3D model, customer requirements; Minutes of the meeting about product draft, Repartition draft; 2D drawings; Technological process design	QM plan elaboration	QM plan elaboration		IND	DEV,Q, IND, Calculation	SAP;SMT
68	Table of tolerances, Special requirements for a particular technology; 2D drawings; Test validation report	Checking of feasibility, Reminder 01	Reminder 01		IND	DEV,Q, IND	SAP; SMT; meeting
69	Reminder 01	PKU according to reminder01	PKU according to reminder01		IND, Q	DEV, IND	meeting
70	Technological process design; QM plan elaboration	Design of the necessary KMPO	Report on KMPO		IND, Q	DEV, IND	SAP;SMT, EWB

The goal of the workshop was to define the following for every activity in the loops of simultaneous realisation of the car component:

- input information with required documents for beginning execution of an individual activity,
- output information with required documents that arise from execution of an individual activity,
- tools for creation and storage of information,
- senders of information or documents,
- receivers of information or documents, and
- the mode of sending the information or documents.

Table 5 shows some results of the creativity workshop regarding the formation of the communication matrix for execution of activities of the "Order acquisition loop". The communication matrix defines in advance the mode of information exchange and communication tools required.

3 CONCLUSION

The paper emphasises that simultaneous product realisation is not possible without well-organised teamwork or virtual teamwork.

A two-level team structure of a track-and-loop process of simultaneous product realisation, suitable for small companies, is presented. An overview is given of available communication tools for teamwork/virtual teamwork, with the advantages and drawbacks of individual tools.

When making virtual project teams in the loops of simultaneous product realisation, a method of calculating a responsibility intensity factor of team members with respect to loop activities was used. The content of the communication matrix of simultaneous product realisation is formed, defining the exchange of information/documents in the execution of simultaneous product realisation activity loops.

The suggested methodology of forming teams or virtual teams and communication matrix of simultaneous product realisation was tested on a study case of a pedal assembly. Altogether, there were 41 people in the core team and in the teams of the concurrent realisation loops. Because of the use of simultaneous product realisation strategies (parallelism, standardisation and integration) [10], [18] and [19] and the tools for continuous communication between team members, the execution time for realisation of pedal assembly project was reduced by 42%.

Further work on solving simultaneous product realisation problems will be focused on making a catalogue of the entire simultaneous product realisation process using ARIS–a tool for process modelling and re-engineering [20].

4 REFERENCES

[1] Dickman, P. (2009). *Schlanker Materialfluss*. Springer Verlag, Berlin - Heidelberg.

[2] Palčič, I., Buchmeister, B., Polajnar, A. (2010). Analysis of innovation concepts in Slovenian manufacturing companies. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 56, no. 12, p. 803-810.

[3] Anišić, Z., Krsmanović, C. (2008). Assembly initiated production as a prerequisite for mass customization and effective manufacturing. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 54, no. 9, p. 607-618.

[4] Prasad, B. (1996*). Concurrent Engineering Fundamentals, Volume I: Integrated Product and Proces Organization*, Prentice Hall, New Jersey, p. 216-276.

[5] Kušar, J., Duhovnik, J., Grum, J., Starbek, M. (2004). How to reduce new product development time. *Robotics and Computer-Integrated Manufacturing*, vol. 20, no. 1, p. 1-15.

[6] Rihar, L., Kušar, J., Duhovnik, J., Starbek, M. (2010). Teamwork as a precondition for simultaneous product realisation. *Concurrent Engineering: Research and Applications*, vol. 18, no. 4, p. 261-273, DOI:10.1177/1063293X10389789.

[7] Winner, R.I. (1988). *The Role of Concurrent Engineering in Weapons System Acquisition, IDA Report R-338*, Institut for Defence Analysis, Alexandria.

[8] Duhovnik, J., Starbek, M., Dwivedi, S.N., Prasad, B. (2001). Development of New Products in Small Companies. *Concurrent Engineering: Research and Applications*, vol. 9, no. 3, p. 191-210.

[9] Rad, P.F., Levin, G. (2003). *Achieving Project Management Success using Virtual teams*. J. Ross Publishing, Boca Raton.

[10] Duhovnik, J., Žargi, U., Kušar, J., Starbek, M. (2009). Project-driven concurrent product development. *Concurrent Engineering: Research and Applications*, vol. 17, no. 3, p. 225-236, DOI: 10.1177/1063293X09343823.

[11] Kušar, J., Bradeško, L., Duhovnik, J., Starbek, M. (2008). Project management of product development. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 54, no. 9, p. 588-606.

[12] Žargi, U., Kušar, J., Berlec, T., Starbek, M. (2009). A company's readiness for concurrent product and process development. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 55, no. 7/8, p. 427-437

[13] Vujica-Hecog, N., Tuppinger, J., Polajnar, A., Palčič, I. (2007). Modern management concepts in Slovenian and Austrian companies, an empirical research. *Advanced Production Engineering management*, vol. 2, no. 1, p. 28-36.

[14] Duarte, D.L., Snyder, N.T. (2006). *Mastering Virtual Teams*. Jossey-Bass, cop., San Francisco.

[15] Fain, N., Moes, N.., Duhovnik, J. (2010). The role of the user and the society in new product. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 56, no. 7/8, p. 521-530.

[16] Fain, N., Kline, M., Duhovnik, J. (2011). Integrating R&D and marketing in new product development. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 57, no. 7/8, p. 599-609, DOI:10.5545/sv-jme.2011.004.

[17] Scheer, J. (2007). *Kreativitätstechniken*. GABAL Verlag, Offenbach.

[18] Kušar, J., Berlec, T., Žefran, F., Starbek, M. (2010). Reduction of machine setup time. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 56, no. 12, p. 833-845.

[19] Polajnar, A., Leber, M., Vujica-Herzog, N. (2010). Muscular-skeletal diseases require scientifically designed sewing workstations. *Strojniški vestnik - Journal of Mechanical Engineering*, vol. 56, no. 1, p. 31-40.

[20] Scheer, A.W. (1999). *ARIS – Business Process Modeling*. Springer-Verlag, Berlin – Heidelberg.