



# DiFac: Digital Factory for Human-Oriented Production System

## DiFac Consortium

### Presence

Presence is the sensation of “being there” without physically being in a place.

The innovation of the project is the use of a theory called “FLOW”: a subjective state reported when you are completely involved in something to the point of forgetting time, fatigue, and everything else but the activity itself.

In the centre of the schema there's the interconnection between the two main theories: the Presence “classical” measurement by Singer and Witmann and the Flow by Csikszentmihalyi.

Proto, Extended and Core Presence are three different states influenced by the internal state of the subject and by the external conditions and their interaction.

Skills and challenges are the two main components to reach the optimal state. Coping is the system for measuring the equilibrium between skills and challenges and the Effort to positive obtain it. Following the scheme the Relavance theory, as we've already seen, measures the different degrees to arrive to the Flow state. Linked to this theory is the Feedback that is the balance between stimulus and the capacity to process them.



DiFac aims to create a piece of the future digital factory centered on “human being”. All the developments have to be designed around human needs and expectations.

DiFac considers Presence, Collaboration and Ergonomics for the development of its 3 demo cases on Product Design, Factory analysis and Training.

The pillar components are a sort of “library” with the instruments needed during the development of VEs. DiFac is not going to realise the whole set of needed tools for supporting factory task (activities) but the needed ones for creating meaningful examples.



### Collaboration

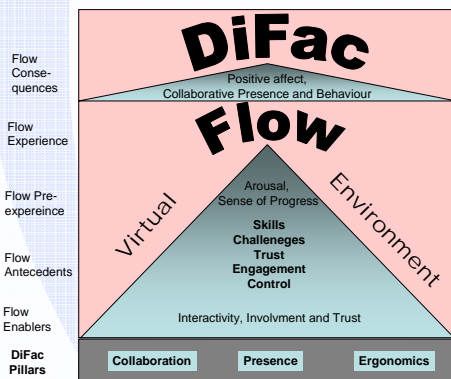
DiFac will focus its efforts on the establishment of an innovative solution for collaborative product development using high-end synchronous collaboration methods and VR techniques aimed at the sensible reduction of a product's time-to-market, as well as production cost. The collaboration framework will provide among others users and role management, data security, user friendly environment, file sharing/browser, file/project versioning, download synchronisation, public/private chat rooms for on-line communication among users and personal inbox/outbox for off-line communication.

The DiFac methodology for collaborative measurement is based on the Flow

enhancing Hoffman and Novak's (1996) model in computer-mediated environments with new constructs, reflecting the collaborative aspects and their impact on experience of flow.

The model consists of the following constructs:

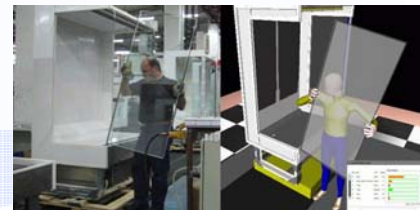
- > core experience of flow,
- > very close correlates of flow, as playfulness,
- > antecedents of flow, as: skill, challenge, engagement, focussed attention, control, enhanced by interactivity, involvement and trust, and extended as arousal, time distortion, collaboration, presence, and sense of progress,
- > consequences of flow, as positive affect and collaborative presence and behaviour.



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### Ergonomics



Ergonomics is concerned with taking proper account of people's needs and capabilities in the design, implementation and operation of systems and technologies.

There are two facets to the contribution of ergonomics to DiFac.

The first is the application of ergonomics methods, in particular user-centred design, to the development of the DiFac technologies so that end-users can achieve their goals effectively and efficiently, while remaining safe and healthy. In other words, to develop DiFac solutions which are comfortable and easy to use.

The second is the development of tools which can actually be used to improve the ergonomics of products, training and factories. This will be achieved by modelling the performance capabilities and behaviour of employees to analyse digital representations of products, workplaces and factory procedures at an early stage in the design process when changes are less costly to implement. This proactive approach prevents rather than responds to complaints of ill-health and injury in the workplace. Additionally, avatars demonstrating realistic behaviours will be used to populate the digital factory to increase the realism of training simulations.

