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REFLEX
RELIABLE & FLEXIBLE GLOBAL BUSINESS PROCESSES

TECHNOLOGIES FOR RELIABLE AND
FLEXIBLE GLOBAL BUSINESS PROCESSES AND WORKFLOWS

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TECHNOLOGIES FOR RELIABLE AND FLEXIBLE GLOBAL BUSINESS PROCESSES AND WORKFLOWS

Workflows and business processes, in particular in the financial and public sectors, are increasingly being supported by so-called process-aware information systems in order to provide transparent, reliable and cost efficient services.

However the current standards for process-aware information systems such as Business Process Model and Notation (BPMN) and Web Services Description Language (WSDL) face two fundamental barriers: Firstly, flow diagrams as described in BPMN tend to capture a process that rarely fits the reality and is difficult to adapt, after the system is put into use. Secondly, while standards such as WSDL for service composition have matured, standards for modular and reliable process composition are lacking. Consequently it is impossible to construct and maintain reliable process-aware information systems across organizational and national borders that require flexibility in response to changing demands, laws and regulations.

The Process and System Models Group at IT University of Copenhagen develops technologies that can remove these barriers: Through series of projects in collaboration with industry and as chair of a working group for tools and applications within the recently established EU COST Action for Behavioural Types for Reliable Large-Scale Software Systems (BETTY) the research group is developing models and notations for flexible, adaptive and reliable large-scale distributed business processes rooted in both foundational formal process models and industrial practices.

RESEARCH EXAMPLE 1:
DCR GRAPHS - THE KNOWLEDGE WORKFLOW GPS
A new Adaptive Case Management technology, the DCR graph, can make it easier for knowledge workers to make the best possible decisions and modify the work processes if goals or laws changes en route. This could for instance be the case when doctors and nurses work together with patients in order to find the right treatment while taking into account that the course of a disease is not always predictable.

The DCR graph can be described as a Knowledge Workflow GPS; a dynamic navigation tool much like the GPS that automatically creates a new route when the driver decides to stop at a gas tank or when a road is closed due to construction work. The DCR graph is being developed in a research collaboration between the IT University of Copenhagen and the small Danish company Exformatics who has integrated the DCR graph in their case and knowledge management solution ECM 7.0.

RESEARCH EXAMPLE 2:
DESIGN-ORIENTED THEORY OF COMPUTATIONAL ARTIFACTS IN COOPERATIVE WORK PRACTICES

Computational artifacts increasingly penetrate all spheres of life, also in the form of mechanical regulation of human interaction. EGovernment, eHealth, Workflow Management and Self-service systems and many other forms of coordination technologies exemplify this. In spite of the enormous economic and social importance of computational regulation we have no systematic conceptual foundation for understanding their advantages and disadvantages and organizing their use.

Meeting this foundational challenge requires concerted contributions from theoretical computer science, sociology and communication theory. The inter-disciplinary foundational research project *Computational Artifacts – Towards a design-oriented theory of computational artifacts in cooperative work practices* aims to do exactly that and develop a systematic conceptualization of computational regulations of human interaction by means of computational artifacts. The project is funded by the Velux foundation from 2014-2017 and is a collaboration between University of Copenhagen, Copenhagen Business School and IT University of Copenhagen.

RESEARCH EXAMPLE 3:
EU COST ACTION IC1201
- BEHAVIOURAL TYPES FOR RELIABLE LARGE-SCALE SOFTWARE SYSTEMS (BETTY)

Modern society is increasingly dependent on large-scale software systems that are distributed collaborative and communication-centered. Correctness and reliability of such systems depend on compatibility between components and services that are newly developed or may already exist. The consequences of failure are severe and include security breaches and unavailability of essential services. Current software development technology is not well suited to producing these large-scale systems, because of the lack of high-level structuring abstractions for complex communication behavior.

Action IC1201 will use behavioral type theory as the basis for new foundations, programming languages, and software development methods for communication-intensive distributed systems. Behavioral type theory encompasses concepts such as interfaces, communication protocols, contracts, and choreography. As a unifying structural principle it will transform the theory and practice of distributed software development.