

# Exploitable Results by Third Parties

17028 MOSIM

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## Project details

<b>Project leader:</b>	Dr. Thomas Bär
<b>Email:</b>	Thomas.baer@daimler.com
<b>Website:</b>	<a href="http://www.mosim.eu/">http://www.mosim.eu/</a>

Name: MOSIM Framework		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>MMU</li> <li>3D Scene incl. avatar</li> </ul>	<ul style="list-style-type: none"> <li>Combination of heterogeneous motion synthesis approaches by utilizing motion model units</li> </ul>	<ul style="list-style-type: none"> <li>Human simulation in chosen target engine</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>The framework allows combining heterogeneous motion synthesis approaches by utilizing modular units referred as Motion Model Units (MMUs). These units can be realized in different programming languages and engines. The core framework utilizes Apache Thrift for communication and to automatically generate source code files for many programming languages.</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>See: <a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>Application developers or research engineers that have interest to generate human simulations based on existing motion model unit.</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>Daimler – Open Source Code</li> <li><a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Dr. Thomas Bär – <a href="mailto:Thomas.baer@daimler.com">Thomas.baer@daimler.com</a></li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>MIT Licence</li> </ul>	
<i>Latest update: June 2021</i>		



**Involved Partner(s):** Daimler Buses, DFKI  
**MOSIM-Framework for the utilization of heterogeneous digital human simulations**

**Type of Exploitable Result:**

- Tool (available as open source software)

**Description:**

- Framework to embed heterogeneous digital human simulations based on Motion Model Units (MMUs)

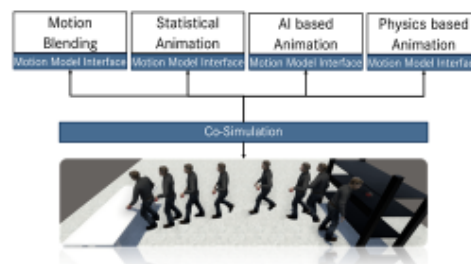
**Target Industry:**

- Main industries: Automotive
- Applicable across different manufacturing industries

**Current Maturity (status of May 2021):**


- Prototype

**Contact:** Thomas Bär, Klaus Fischer, Janis Sprenger



Name: MOSIM Services		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>Avatar Description</li> <li>Service related Properties</li> <li>MOSIM Framework</li> </ul>	<ul style="list-style-type: none"> <li>Shared functionality for various functionality</li> <li>Extendible with generic services possible</li> </ul>	<ul style="list-style-type: none"> <li>Service depending results</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Service based infrastructure for shared functionality within the MOSIM framework</li> <li>Specific service interfaces defined and implemented: Inverse Kinematics (IK), Path Planning, Scene Access, Skeleton Access, Posture Blending Service, Walk Point Selection Service, Coordinate System Mapper, Collision Detection Service</li> <li>Implementation can be exchanged</li> <li>Arbitrary services can be implemented with the generic service interface</li> <li>Services can run independently or integrated in target engine</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>MOSIM Framework</li> <li><a href="https://github.com/Daimler/MOSIM_Services">https://github.com/Daimler/MOSIM_Services</a></li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>MMU developers</li> <li>Behavior model</li> <li>Target engine</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>Daimler – Open Source Code</li> <li><a href="https://github.com/Daimler/MOSIM_Services">https://github.com/Daimler/MOSIM_Services</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Janis Sprenger</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>MIT License</li> </ul>	

Latest update: June 2021



**Involved Partner(s):** DFKI, Daimler Buses, University of Skövde, TWT

**MOSIM Services**

**Type of Exploitable Result:**

- Service (available as Open Source)

**Description:**

- A **path planning service** which allows the planning of collision-free paths between a specified start and end point.
- RULA and direct measurements **ergonomics evaluations service**
- A Blender-based **inverse kinematics service**
- A **retargeting service** to transfer motion from one hierarchy representation to another

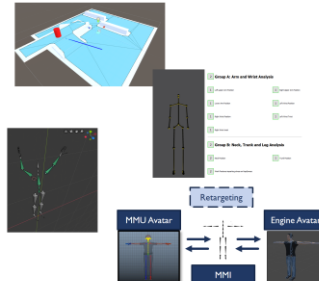
**Target Industry:**

- Research and Development
- Gaming

**Current Maturity (June 2021):**

- Prototype

**Contact:** Janis Sprenger

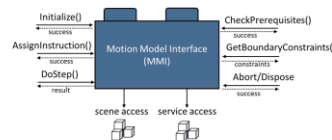


Name: MMI-Interface		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>MOSIM Framework</li> <li>Scene constraints</li> </ul>	<ul style="list-style-type: none"> <li>Standard driven by Standardization Organization</li> <li>Focus on industrial use and defined interface description</li> <li>Use of MOSIM services</li> </ul>	<ul style="list-style-type: none"> <li>Standardized Interface Description</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Standardized MMI Interface for the use if MMU's</li> <li>Use of heterogeneous motion synthesis</li> <li>Use of different programming languages</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>MOSIM Framework</li> <li><a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>MMU developers</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>Daimler – Open Source Code</li> <li><a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>André Rückert</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>MIT License</li> <li>Standardization Org License (under discussion)</li> </ul>	
<i>Latest update: June 2021</i>		



Involved Partner(s): ESI et al.  
Motion Model Interface (MMI)

- Type of Exploitable Result:**
- Standard
- Description:**
- MMI-Standard inspired by the FMI approach to enable heterogeneous digital human simulations based on Motion Model Units (MMUs)
- Target Industry:**
- Universal standard
  - Applicable across different industries
- Current Maturity (status of June 2021):**
- Prototype
- Contact:** André Rückert, Thomas Bär



Name: Intermediate Skeleton		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>Anthropometric scaling</li> </ul>	<ul style="list-style-type: none"> <li>Skeletal definition to exchange motion information between multiple simulation modules</li> </ul>	<ul style="list-style-type: none"> <li>Access to skeletal information</li> <li>Exchange format for motion transfer</li> </ul>
<b>Unique Selling Proposition(s):</b>	<ul style="list-style-type: none"> <li>Well defined skeletal definition of a humanoid actor</li> <li>All participants of the framework must agree on the specific definition</li> <li>Shared definition can be extended in the future (e.g. for more accurate human representation, for non-humanoid characters, etc.)</li> <li>Can be used in combination with the retargeting service and the retargeting configurator to allow fast, reliable, and adjustable retargeting from and to the intermediate skeleton</li> </ul>	
<b>Integration constraint(s):</b>	<ul style="list-style-type: none"> <li>Skeleton Definition (Skeleton Configurator: <a href="https://github.com/Daimler/MOSIM_Tools">https://github.com/Daimler/MOSIM_Tools</a>)</li> <li>Retargeting Service: <a href="https://github.com/Daimler/MOSIM_Services">https://github.com/Daimler/MOSIM_Services</a></li> <li>MOSIM Framework</li> <li>Documentation (<a href="https://github.com/Daimler/MOSIM_Core/wiki">https://github.com/Daimler/MOSIM_Core/wiki</a>)</li> </ul>	
<b>Intended user(s):</b>	<ul style="list-style-type: none"> <li>MMU Developers</li> <li>Service Developers</li> <li>Target Engine Developers</li> </ul>	
<b>Provider:</b>	<ul style="list-style-type: none"> <li>Daimler – Open Source Code</li> <li><a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
<b>Contact point:</b>	<ul style="list-style-type: none"> <li>Janis Sprenger</li> </ul>	
<b>Condition(s) for reuse:</b>	<ul style="list-style-type: none"> <li>MIT License</li> </ul>	

Latest update: June 2021



Involved Partner(s): DFKI, Human Solutions, SignTime, FCC Chalmers  
**Intermediate Skeleton**

**Type of Exploitable Result:**

- (internal) Standard

**Description:**

- A representation of a human body of a joint hierarchy and bone rotations enabling the transfer of motion from different partners
- A default posture to provide meaning to the representation

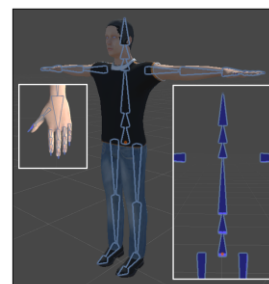
**Target Industry:**

- Research and Development
- Gaming

**Current Maturity (June 2021):**

- Proof of concept

Contact: Janis Sprenger



Name: Basic Motion Model Units (MMUs)		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Scene constraints</li> <li>▪ MOSIM services (IK, path planning)</li> <li>▪ MOSIM intermediate skeleton</li> </ul>	<ul style="list-style-type: none"> <li>▪ Utilization of various motion simulation techniques in different programming languages</li> <li>▪ Communication through motion model interface (MMI)</li> <li>▪ Simulation of specific human motions according to scene constraints</li> <li>▪ Use of MOSIM services &amp; skeleton</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulated human motion in intermediate skeleton format</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ Implementation does not require specific programming language and motion simulation technique.</li> <li>▪ Output is modular and can be combined to complex motions within MOSIM framework.</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ See: <a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ Application developers or research engineers who have interest to generate individual human simulations for their use cases.</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ Daimler – Open Source Code</li> <li>▪ <a href="https://github.com/Daimler/MOSIM_Core">https://github.com/Daimler/MOSIM_Core</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ Dr. Hans-Joachim Wirsching – <a href="mailto:hjwirsching@human-solutions.com">hjwirsching@human-solutions.com</a></li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ MIT License</li> </ul>	
<i>Latest update: May 2021</i>		



Involved Partner(s): Daimler, DFKI, HS, LUT, Mimic, Sign Time, Uni Siegen  
Basic MMUs

**Type of Exploitable Result:**

- Open Source

**Description:**

- Basic MMUs for composition of abstract tasks in manufacturing use case stories
- Generic MMI interface for usage in modular MOSIM Framework
- Utilization of MOSIM intermediate skeleton

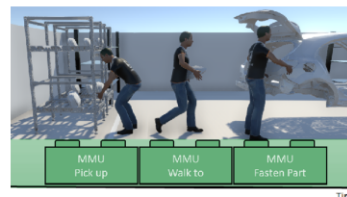
**Target Industry:**

- Manufacture industry: Production design

**Current Maturity (Status of May 2021):**

- Prototype

**Contact:** Hans-Joachim Wirsching, Human Solutions GmbH



Name: MMU library		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>MMU description</li> <li>MMU requirements and motion types</li> </ul>	<ul style="list-style-type: none"> <li>Search for specific motion</li> <li>Preview the motion (image, video)</li> <li>Buy and download the MMU</li> </ul>	<ul style="list-style-type: none"> <li>MMU package (zip Archive)</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>The gallery offers a wide range of MMUs to fit different use cases.</li> <li>MMU providers can upload and sell their MMUs on the library</li> <li>MMU users can download and combine them to create various simulations.</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>Local version available on the user's computer</li> <li>Online version available on the MOSIM website and 3<sup>rd</sup>-party web shops</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>MMU providers who want to sell their own MMUs</li> <li>Everyone who wants to download and use MMUs within the MOSIM framework</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>MP Mimic Production GmbH (Library concept)</li> <li>MOSIM partners (Library development and MMU creation)</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Alexandre Donciu-Julin - <a href="mailto:a.djulin@mimicproductions.com">a.djulin@mimicproductions.com</a></li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>Available online (MOSIM website, third-party webshops)</li> <li>See <a href="https://www.mosim.eu/download.php">https://www.mosim.eu/download.php</a></li> </ul>	
<i>Latest update: June.2021</i>		



**Involved Partner(s): Mimic Productions, HS, LUT**  
**Implementation of a centralized MMU library**

**Type of Exploitable Result:**

- Service

**Description:**

- The gallery offers a wide range of MMUs to fit different use cases.
- MMU providers can upload and sell their MMUs on the library
- MMU users can download and combine them to create various simulations.

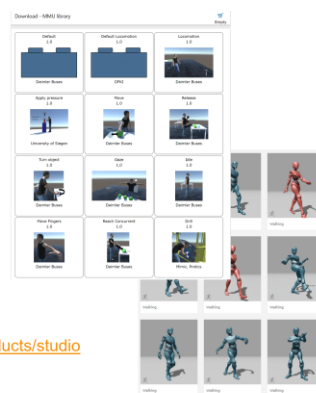
**Target Industry:**

- Industrial Simulations, Artificial Intelligence, Chat-bots, Entertainment, etc.

**Current Maturity (status of June 2021):**

- Prototype available on MOSIM website: <https://www.mosim.eu/download.php>
- Contact with online platforms like Rokoko: <https://www.rokoko.com/en/products/studio>

**Contact:** Alexandre D-Julin, Mimic Productions



Name: Task Editor		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>Task list (high level description of worker tasks)</li> <li>Simulation scene</li> <li>User list</li> <li>Project list</li> <li>Tool list</li> </ul>	<ul style="list-style-type: none"> <li>Simple task editing for human workers</li> <li>Organization of simulation projects</li> <li>User management and access rights for shared project data</li> <li>Multiuser collaboration of simulation project</li> <li>Web interface</li> </ul>	<ul style="list-style-type: none"> <li>Direct integration to AJAN reasoning service</li> <li>XML and JSON standardized format output of tasks</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Based on industrial manufacturing workflow requirements</li> <li>Extendable for other use cases</li> <li>Support for multi-avatar environments and avatar interactions</li> <li>Automatic synchronization of scene elements with target engine</li> <li>Generating human simulation without need for programming</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>Web server with database backend and PHP support</li> <li>Internet domain (if deployed on Internet) and HTTPS certificate for secure connection (if accessible outside local network)</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>MOSIM framework end users</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>Lappeenranta University of Technology</li> <li><a href="https://github.com/Lappeenranta-University-of-Technology/mosim-task-editor-server">https://github.com/Lappeenranta-University-of-Technology/mosim-task-editor-server</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Adam Klodowski</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>Apache2 license</li> </ul>	

Latest update: June 2021



Involved Partner(s): LUT, Daimler Buses  
MOSIM Task Editor

**Type of Exploitable Result:**

- Tool (available as open source software)

**Description:**

- Web-Tool for the formalized description of manufacturing tasks
- Predefined tasks with relation to behavior breakdown and MMUs

**Target Industry:**

- Main industries: Automotive
- Applicable across different manufacturing industries

**Current Maturity (status of Juni 2021):**

- Prototype

**Contact:** Adam Klodowski, Thomas Bär





Name: Reasoning Engine (AJAN)		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Behavior Models (SPARQL-BTs)</li> <li>▪ High-Level Tasks</li> <li>▪ MOSIM Framework endpoints, like Scene-Access</li> </ul>	<ul style="list-style-type: none"> <li>▪ Execution of MMU instructions               <ul style="list-style-type: none"> <li>○ based on High-Level Tasks</li> <li>○ based on internal behavior models</li> </ul> </li> <li>▪ Domain-free, can be used separately from MOSIM</li> </ul>	<ul style="list-style-type: none"> <li>▪ MMU Instructions</li> <li>▪ MOSIM Service calls to get dynamic paths, to get avatar transformation a.o.</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ Domain-free multi-agent system web service for behavior modeling and execution of agents, based on SPARQL-BTs</li> <li>▪ AJAN is fully integrated into the MOSIM infrastructure and is used for dynamic execution of available MMUs based on predefined tasks of the High-Level Task Editor</li> <li>▪ Has a web editor for intuitive modeling of so-called MOSIM-breakdowns</li> <li>▪ It can be easily extended (with the AJAN-Plug-In System) with additional AI methods like, Reinforcement Learning, Action Planning a.o.</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ MOSIM context: MOSIM Framework, MMUs, High-Level Task Editor</li> <li>▪ General: HTTP + RDF</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ MOSIM users in general who want to run avatar tasks or model avatar behavior in detail or test MMU behavior</li> <li>▪ Expert users who are skilled in modeling agents and thus in implementing autonomous system behavior</li> <li>▪ Novices who have no prior knowledge of RDF and SPARQL but still want to model avatar behavior based on expert template</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ DFKI – Open Source Code</li> <li>▪ AJAN-service: <a href="https://github.com/aantakli/AJAN-service">https://github.com/aantakli/AJAN-service</a></li> <li>▪ AJAN-editor: <a href="https://github.com/aantakli/AJAN-editor">https://github.com/aantakli/AJAN-editor</a></li> <li>▪ AJAN-MOSIM-Unity: <a href="https://github.com/aantakli/AJAN-MOSIM-unity">https://github.com/aantakli/AJAN-MOSIM-unity</a></li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ André Antakli</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ AJAN-service: LGPL-2.1 License</li> <li>▪ AJAN-editor: MIT License</li> <li>▪ AJAN-MOSIM-Unity: MIT License</li> </ul>	

*Latest update: <18.06.2021>*



## Involved Partner(s): DFKI Reasoning Engine (AJAN) for Breakdownexecution

### Type of Exploitable Result:

- Service (available as Open Source)

### Description:

- Multi Agent System for the graphical modeling and execution of system behavior.
- AJAN is a Web service that follows the Linked Data paradigm.
- The behavior model used for the BDI Agent Plan is based on RDF/SPARQL Behavior Trees. AJAN provides an interface to use other AI methods for behavioral modeling.

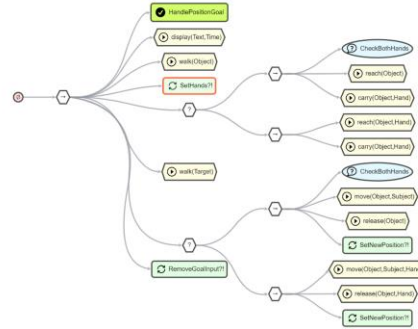
### Target Industry:

- Can be used for orchestration and control of linked data domains
- Can be used for the modeling and execution of behaviors of autonomous entities such as simulated pedestrians, workers and robots

### Current Maturity (status of June 2021):

- Prototype

**Contact:** Andre Antakli, DFKI



Name: Module add-on for human centric process validations (IC.IDO)		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Geometrical scene + constrains</li> <li>▪ Process data</li> <li>▪ MOSIM services</li> <li>▪ MOSIM intermediate skeleton</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulation of specific human motions according to scene constraints</li> <li>▪ Use of MOSIM services &amp; skeleton</li> <li>▪ Easy adaption of scenario parameters and start of a new simulation / virtual tryout environment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Validated and optimized worker process sequences</li> <li>▪ Ergonomics estimation</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ Integration in production planning process</li> <li>▪ Data usage of production planning system</li> <li>▪ Realistic motion simulation</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ MOSIM outcome stability/robustness (MMU availability, behavior modelling)</li> <li>▪ 3D production input availability</li> <li>▪ Availability of a human body model (RAMSIS support)</li> <li>▪ Transfer of meta data out of source systems as simulation parameters</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ Production Planning Engineers</li> <li>▪ Final assembly line workers (blue color people)</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ ESI Software Germany GmbH</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ André Rückert – andre.rueckert@esi-group.com</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ IC.IDO proprietary license</li> </ul>	

Latest update: June 2021



**Involved Partner(s):** ESI Software Germany GmbH  
**Module add-on for human centric process validations (IC.IDO)**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Extension of IC.IDO assembly process validation module
- Validation of assembly sequence plan's out of workers perspective (People, tools, resources)
- Integration of MOSIM platform into IC.IDO "target engine" to simulate human centric assembly processes
- Use of RAMSIS kernel to make use of MMUs in IC.IDO ergonomic analysis (RULA)

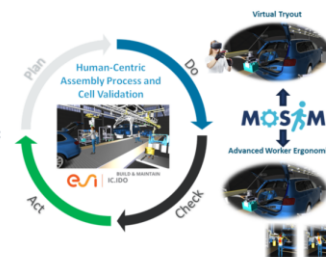
**Target Industry:**

- Automotive, Aero, Transportation: Final Assembly / Assembly Cell & Line Validation

**Current Maturity (Status of May 2021):**

- Proof of concept

**Contact:** André Rückert (ESI Software Germany GmbH)



Name: Module for Production Planning Software		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Geometrical scene + constraints</li> <li>▪ Process data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulation of human body based on the scenario</li> <li>▪ Easy adaption of scenario parameters and start of a new simulation</li> <li>▪ Fast simulation answer</li> <li>▪ 1:1 visualization of simulation results in e.g. VR possible</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulated human body motion based on the scenario: location of parts, tools and carriers</li> <li>▪ Ergonomics estimation</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ Integration in production planning process</li> <li>▪ Data usage of production planning system</li> <li>▪ Realistic motion simulation</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ 3D production planning SW tool decision</li> <li>▪ Availability of a human body model</li> <li>▪ Transfer of meta data out of source systems as simulation parameters</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ Production Planning Engineers</li> <li>▪ Ergonomics Specialist (Technician or Engineer)</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ Daimler Protics GmbH</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ Immo Gürntke, Daimler Protics GmbH, immo.guerntke@daimler.com</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ Daimler or rather Daimler Protics GmbH proprietary license license</li> </ul>	

*Latest update: June 2021*



**Involved Partner(s): Daimler Protics**  
**Module for Production Planning Software**

- Type of Exploitable Result:**
- Add-on (or as Services)
- Description:**
- Possibility to simulate Human Models in 3D production scenarios within a given production planning visualization
  - Based on existing assembly sequence plans
  - Including equipment, tools, etc.
- Target Industry:**
- Automotive
    - Production Planning
    - Service
- Maturity:**
- Proof of concept
- Contact:** [Immo Gürntke](#) (Daimler Protics GmbH)



Name: RAMSIS Interface to MMU library		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Geometrical scene constraints</li> <li>▪ RAMSIS avatar</li> <li>▪ Motion task</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulation of human motion based on motion capture data</li> <li>▪ Consideration of scene constraints and avatar dimensions</li> <li>▪ Extendable by additional motion data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulated human motion in RAMSIS avatar format</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ Seamless integration in RAMSIS simulation framework</li> <li>▪ Customization by additional specific motion data</li> <li>▪ Realistic motion simulation</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ Available in ergonomic tool RAMSIS</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ Ergonomic package engineers who intend to evaluate dynamic ergonomic aspects.</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ Human Solutions GmbH</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ Dr. Hans-Joachim Wirsching – <a href="mailto:hjwirsching@human-solutions.com">hjwirsching@human-solutions.com</a></li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ Human Solutions proprietary license</li> </ul>	
<i>Latest update: June 2021</i>		



**Involved Partner(s): HS**  
**RAMSIS interface to MMU library**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Extension of RAMSIS motion simulation capabilities by MMU, transition and constraint techniques
- Extension of RAMSIS motion simulation kernel by MMI interface concepts
- Implementation of interface between RAMSIS human model and MOSIM intermediate skeleton

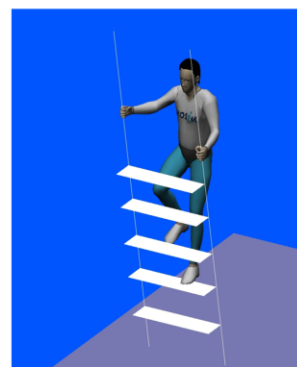
**Target Industry:**

- Automotive industry: Product design

**Current Maturity (Status of May 2021):**

- Prototype

**Contact:** Hans-Joachim Wirsching, Human Solutions GmbH



Name: MOSIM Plugin for Unreal		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>Unreal Scene</li> </ul>	<ul style="list-style-type: none"> <li>Conversion of the Unreal simulation into the format applied by MOSIM</li> <li>Coupling of the MMU's, services and the MOSIM register</li> </ul>	<ul style="list-style-type: none"> <li>MOSIM generated motions fulfilled by the Unreal character in the Unreal scene</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Integration of MOSIM into Unreal</li> <li>Additional Game Engine extends the amount of possible users of MOSIM considerably</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>Conversion of the Unreal simulation into the format applied by MOSIM</li> <li>Coupling of the MMU's, services and the MOSIM register</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>Everyone who wants to use MOSIM with the Unreal Engine</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>TWT GmbH</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Caroline Handel</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>MIT Licence</li> </ul>	
<i>Latest update: June 2021</i>		



**Involved Partner(s):** TWT GmbH  
**MOSIM Plugin for Tronis®**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Connection between Tronis® pedestrian simulation and MMU library with the MOSIM intermediate skeleton
- Possibility to realize more complex behaviors with the MMI toolkit (task list, behavior modeling)
- Compatibility to standardized task descriptions with the MOSIM task editor

**Target Industry:**

- Main Industries: Automotive

**Current Maturity (status of April 2020):**

- Concept

**Contact:** Caroline Handel, TWT GmbH



Name: Mevea integration to MOSIM framework		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>▪ Task list for human avatars</li> <li>▪ MMUs</li> <li>▪ Services</li> <li>▪ Human avatars</li> </ul>	<ul style="list-style-type: none"> <li>▪ Simulation of the human interacting with machines</li> <li>▪ Testing sensors' digital twins with human models</li> <li>▪ Evaluation of hazardous scenarios</li> </ul>	<ul style="list-style-type: none"> <li>▪ Human simulation in environment with machines that are digital twin of real machines</li> <li>▪ Human – machine interaction</li> <li>▪ Digital twins of sensors can interact with human avatars in the scene</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>▪ State of the art real-time simulation of machines</li> <li>▪ Digital twins of sensors modules</li> <li>▪ Support for motion platforms and real controls</li> <li>▪ Hardware in the loop integration</li> <li>▪ Operator training (including scenarios with observers)</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>▪ Mevea software package</li> <li>▪ Mosim framework</li> <li>▪ Unity</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>▪ MOSIM framework end users who need also dynamics real-time multibody simulator</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>▪ Mevea Oy</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>▪ Asko Rouvinen</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>▪ Commercial license</li> </ul>	

*Latest update: June 2021*



**Involved Partner(s):** LUT, Mevea  
**Mevea integration to MOSIM framework**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Use of MMUs through MOSIM framework together with Mevea real-time simulation of machines in one target engine (Unity)
- Interaction between human avatars and machines simulated in Mevea

**Target Industry:**

- Main industries: Cranes, Excavators, Work machinery, Wood processing
- Applicable across different manufacturing industries


**Current Maturity (status of June 2021):**

- Prototype

**Contact:** Adam Klodowski, Asko Rouvinen



Name: IPS platform as a MMU target engine		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>MMU</li> <li>3D geometry</li> </ul>	<ul style="list-style-type: none"> <li>Use features from MMUs</li> <li>Possibility to blend MMUs with the algorithm heavy IMMA motions</li> </ul>	<ul style="list-style-type: none"> <li>Animation of MMU</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Make use of MMU library inside IPS IMMA</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>License of IPS IMMA</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>Simulation engineers in production</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>IPS AB</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Tobias Forsberg</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>Perpetual or leasing license of IPS IMMA</li> </ul>	
<i>Latest update: June 2021</i>		



**Involved Partners: FCC, IPS AB**  
**IPS platform as a MMU target engine**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Connection between IPS IMMA and MOSIM MMU using the MOSIM MMI interface
- IPS IMMA imports and utilizes certain MMUs
- Can be used in workplace optimization module of IPS software


**Target Industry:**


- Main industries: Automotive

**Current Maturity (status of May 2021):**

- Prototype

**Contact: Niclas Delfs, FCC**






End-to-end Digital Integration based on Modular Simulation of Natural Human Motions

6/5/2021 Slide 1



Name: Ergonomic Balancing		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>Production assembly structure in AVIX</li> <li>Ergonomic simulation from IPS</li> </ul>	<ul style="list-style-type: none"> <li>Line balancing with time and ergonomic aspects</li> <li>Visualization of ergonomic load per manually activity in assembly</li> </ul>	<ul style="list-style-type: none"> <li>Line optimization with increased capacity</li> <li>Improved ergonomic situation for operators</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Combines optimization of production capacity and ergonomic load for operators.</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>Ergonomic simulation in IPS to calculate ergonomic load automatically.</li> <li>Or manually performed ergonomic assessment</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>Production engineers, Process planners</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>Solme AB</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Oskar Ljung</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>AVIX license</li> </ul>	
<i>Latest update: June 2021</i>		



**Involved Partner(s): Solme AB, IPS AB**  
**Name of Exploitable Result**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Connection between IPS and AVIX
- Visualization of ergonomic assessment in Yamazumi chart

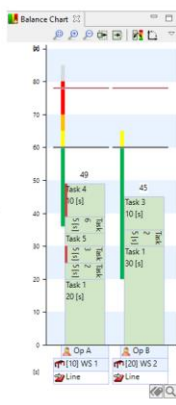
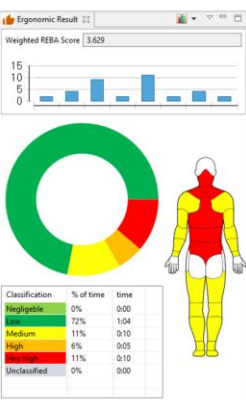
**Target Industry:**


- Automotive
- Production with manual operations with high repetivity

**Current Maturity (status of June 2021):**

- Start of Industrialization

**Contact:** Oskar Ljung, Solme AB



End-to-end Digital Integration based on Modular Simulation of Natural Human Motions

6/23/2021 Side 1

Name: IPS workplace optimization		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> <li>3D Geometry 3D geometry</li> <li>JSON file from Avix with instructions on the setup of bite-sized simulations</li> </ul>	<ul style="list-style-type: none"> <li>Wizard to set up and adapt simulations wrt ergonomics</li> <li>Simulations possible to view and adapt</li> <li>Rebalancing in Avix based on times</li> </ul>	<ul style="list-style-type: none"> <li>Videos of simulations</li> <li>Optimized simulations wrt ergonomics</li> </ul>
Unique Selling Proposition(s):	<ul style="list-style-type: none"> <li>Setting up advanced ergonomically sound simulations, guided from start to finish</li> <li>Use EPP for finalized step of optimizing positions of surrounding geometries</li> </ul>	
Integration constraint(s):	<ul style="list-style-type: none"> <li>Avix software</li> <li>IPS IMMA software</li> </ul>	
Intended user(s):	<ul style="list-style-type: none"> <li>Simulation engineers within production</li> <li>Ergonomists</li> </ul>	
Provider:	<ul style="list-style-type: none"> <li>IPS AB</li> </ul>	
Contact point:	<ul style="list-style-type: none"> <li>Tobias Forsberg (tobias.forsberg@industrialpathsolutions.com)</li> </ul>	
Condition(s) for reuse:	<ul style="list-style-type: none"> <li>Perpetual license or leasing</li> </ul>	

Latest update: June 2021



**Involved Partners: IPS AB, FCC, SOLME AB, Skövde**  
**IPS workplace optimization add-on**

**Type of Exploitable Result:**

- Add-on

**Description:**

- Multiway software: connection between AVIX, IPS and EPP
- Multiple manikin optimization with regards to assembly time and ergonomics
- Connects workplace optimization with the MMUs through IPS MMU add-on

**Target Industry:**

- Main industries: Automotive

**Current Maturity (status of May 2021):**

- Prototype

**Contact:** Tobias Forsberg, IPS

