Intelligent Cyber Value Chain Network

August 2026

FINANCIAL PARTNERS:

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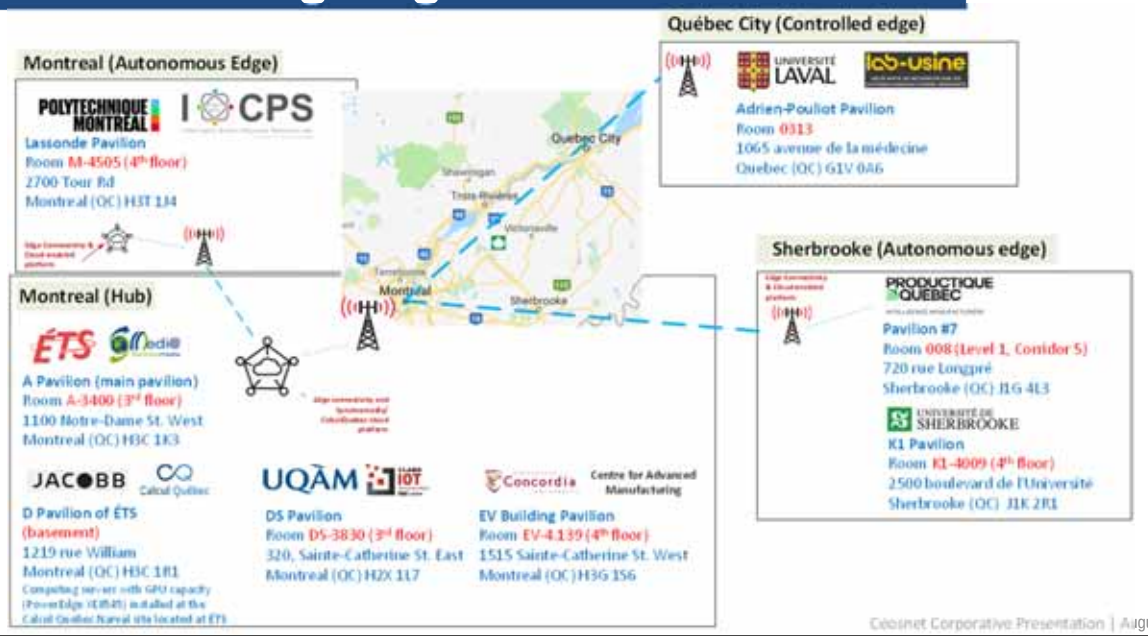
Genesis of the CFI #40115 Grant of Céos$_{net}$ Network

CÉOS (SAY-ohs)
Titan of intellect and constellations (ancient Greek: Κοῖος (Koîos), meaning "query, questioning" or "intelligence")



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Céos$_{net}$: Federated Cloud-based Manufacturing Logistics



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OUTLINE

1. **Céos$_{net}$: Mission, vision, values, objectives, key elements and valorization**
2. **Governance Structure**
3. **Scientific Program**
4. **Specializations in each Node**
5. **Infrastructure in each Node**
6. **Operationalization of Céos$_{net}$**

   HQP Training / Industrial R&D Projects / Outreach Activities

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1. Céos$_{net}$: Mission

Address the urgent need of Canadian industry to develop knowledge and research infrastructure, to implement and test advanced manufacturing and business processes **to support the digital transformation from traditional methods to smart, connected and sustainable manufacturing**.

Provide researchers, particularly in the **area of smart, connected, and secure manufacturing and processing**, with **access to state-of-the-art equipment as well as technical expertise** to contribute to the advancement of knowledge and training of highly qualified personnel.

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1. Céos$_{net}$: Vision

The strategic vision behind the creation of Céos$_{net}$ aims for a constellation of intelligent design-prototyping-manufacturing-warehousing Nodes that enable the offshoring/relocation of activities related to Cloud Manufacturing.

This testbed aims to address major gaps in order to promote a distributed digital manufacturing logistics (based on cutting-edge distributed cloud computing — "Hub/Nodes/Edge") and will thus transfer the developed expertise to industry through a technology showcase approach using a "Living Lab" model.

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1. Céos$_{net}$: Values

The achievement of the Céos$_{net}$ Network's mission and vision relies on the following values:

- **Accessibility :** Network equipment, regardless of location, is accessible under the same terms (excluding rates, which will be set by each Node) to all Network Members, regardless of their home Institution.
- **Excellence** : each Institution uses reasonable means at its disposal to ensure excellence in research and innovation related to the Céos$_{net}$ Network.
- **Cooperation:** the Céos$_{net}$ Network promotes cooperation and collaboration in the best interest of researchers.
- **Sustainability :** Institutions take reasonable measures to ensure the stability of the Cēosnet Network over its expected ten (10)-year lifespan.
- **Agility :** the Céos$_{net}$ Network adapts to evolving technology and researcher needs to continuously improve Network Equipment and services.

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1. Céos$_{net}$: Objectives

- Stimulate **research and development in the Network's Domain (smart, connected, sustainable, and secure manufacturing and processing)** and promote recent and emerging analytical methods to research groups in Quebec and Canada;
- Provide and make accessible **the tools for sustainable offshoring production** necessary for scientific and technological progress in the academic and industrial sectors concerned in Quebec and Canada;
- Ensure the **training of highly qualified personnel** in industrial digital transformation;
- Enable and encourage the **development of new techniques and methods** associated with advanced industrial digital transformation, and to create/animate a community of Users.

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1. Céos$_{net}$: Testbed's Key Elements

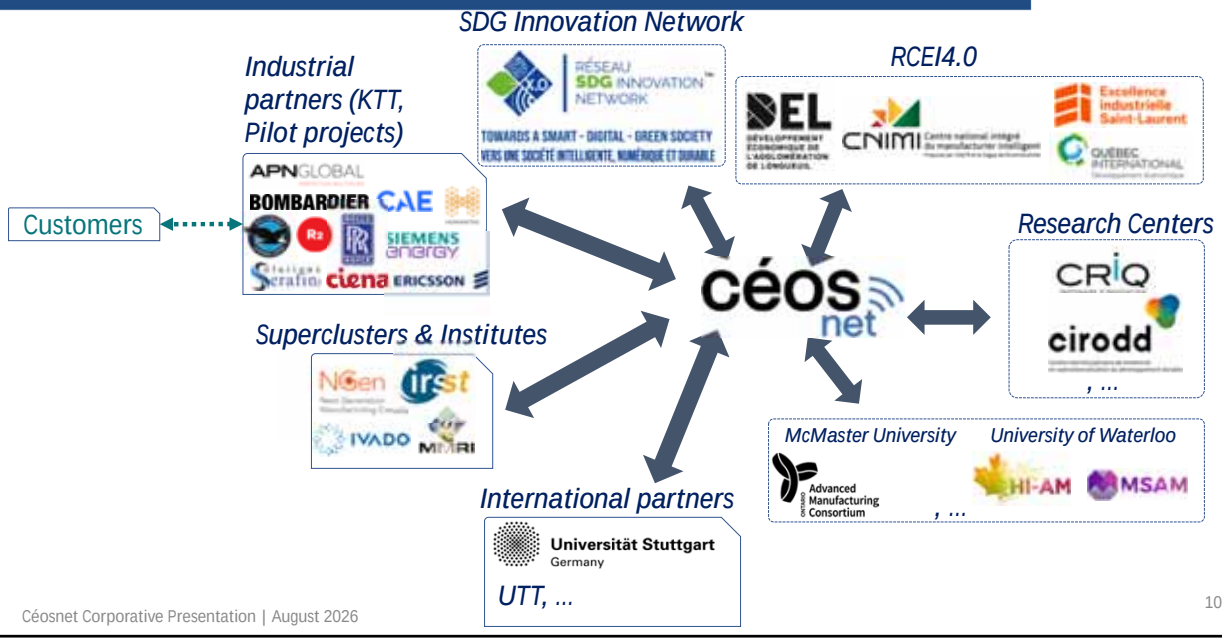
- 5G
- Cloud Computing
- Artificial Intelligence
- Robotics
- Human-robot interfaces
- Recycling
- Reuse manufacturing

REAL-TIME design, assembly, production, control, planning, maintenance, and logistics

MONITORING physical equipment performance via responsive data in the cloud

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1. Céos$_{net}$: Valorization



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2. Governance Structure



Prof. Soumaya Yacout



Prof. Mohamed Cheriet

Administrative Director

Board of Directors

Scientific Director

Scientific Committee

Steering Committee

International Advisory Committee

Network Coordinator (NC)
Dr. Ali Aidibe



Node Representative

Institutions

Student Executive Committee

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2. Governance Structure
Node Representative



Prof. Foutse Khomh



Prof. Lucas Hof



Mr. Ivan Torres

Montreal (Autonomous Edge)

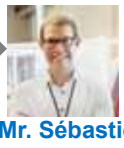
Montreal (Hub)

Québec City (Controlled edge)



Prof. Jonathan Gaudreault

Sherbrooke (Autonomous edge)



Mr. Sébastien Houle



Prof. Elaine Mosconi



Prof. Ygal Bendavid



Prof. Rolf Wuthritch

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2. Governance Structure
Steering Committee

Members :

Administrative Director (**co-chair**)
Scientific Director (**co-chair**)
Network Coordinator

The **role** of the Steering Committee is to provide **advice**, **support and guidance**, and to **monitor progress** towards objectives of Céos$_{net}$.

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2. Governance Structure
Scientific Committee

The **role** of the Scientific Committee is to approve research projects, develop a research strategy, monitor the use of equipment, and prepare annual reports on the network's operations.


Prof. Yacout, Co-chair


Prof. Cheriet, Co-chair


Dr. Aidibe, Coordinator


Prof. Moustapha


Dr. Jocelyn, StC Delegate


Prof. Wuthritch


Prof. Kazemi Zanjani


Prof. Gaudreault


Prof. Bendavid


Prof. Mosconi


Prof. Khomh


Prof. Boukherroub


Prof. Hof


Prof. Jahazi


Prof. Nadeau


Prof. Nguyen


Mr. Beaudoin


Madam Kolmogorova

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3. Scientific Program
Research Program Overview

Theme 1- Intelligent product and manufacturing process design

a) Mass customization manufacturing products
b) Self-learning advanced manufacturing
c) Disassembly & product (material) tracking for circular manufacturing

Theme 2- Intelligent , agile and adaptive value chain operations planning

a) Real-time and dynamic maintenance and operations planning
b) Collaborative human-robot ecosystem configuration
c) Human shared reality and user experience optimization
d) Complex value chain network design an planning



Theme 3- Data exchange and processing platform design

a) Ultra-low latency communications and network slicing for federated production centers
b) Emergent intelligence for federated cloud
c) Computational efficiency for real time massive data processing
d) Security and interoperability of the communication network

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4. Specializations in each Node

Montreal (Autonomous Edge)

POLYTECHNIQUE MONTRÉAL — Intelligent Cyber-Physical Systems (ex. Smart Warehouse)

*Intelligent decision support based on digital twin technology
*Real time data-based maintenance for physical asset health management
*Human-machine interaction
*Intelligent robots
*User experience
*Cybersecurity
*Enabling communication network's technology

Quebec City (Controlled Edge)

UNIVERSITÉ LAVAL

Manufacturing of wooden micro-trailers

A 4.0 factory utilizing cutting-edge digital production technologies and processes.

Montreal (Hub)

ÉTS — Concordia — UQÀM

*Circular and smart manufacturing of custom parts. Advanced, intelligent 3D manufacturing and characterization of custom parts (additive, subtractive)
*Jigless assembly assisted by 3D metrology
*Human-in-the-Loop & occupational health and safety
*Decision theater and digital twin platforms
*Cloud computing and next G systems platform
*Enabling communication network's technology

Sherbrooke (Autonomous Edge)

UNIVERSITÉ DE SHERBROOKE — PRODUCTIQUE QUÉBEC — JACOBB

Transversal contribution through the other experimental sites. Collect, store, organize and share data from Productique Québec mini-factory 4.0.
*Decision theater and digital twin platforms
*Manufacturing AI
*Data valorization through AI

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5. Infrastructure
École de technologie supérieure

- Pultec robotized



- Complete turnkey of laser-ultrasonic detection unit



- Rotating Dynamometer High-Speed Spindle



- Decision Theater



- Holocube



- Autonomous Mobile Robot with arm



- Micro-machining of SiO2-based materials



- Système de simulation thermo-mécanique et physique



- Instruction Projection System



- Laser Tracker



- iGPS



- Biometric capture system



- Biosensors



- Metal Laser Powder Bed Fusion
- (In-Situ Process Monitoring Unit)



- Smart gloves



- Exoskeletons



- Smart glasses



- Intelligent sensor/monitoring system
- Wavelength network (ÉTS <-> Productique Québec)
- 5G solution, 5G emulation and test devices, 5G network test equipment, Relay equipment for each institution, and monitoring equipment for wired and wireless (5G) networks
- Data storage resources
- Secure internal computing resources for the testbed

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5. Infrastructure
Polytechnique Montréal





I CPS

SCP I

- Warehouse server: Industrial controller (PLC), controller software, Edge PC, IE Switch, IWLAN access point,, I/O Link Modules,



- RFID read/write modules



- QR code reader



- In-sight vision camera



- Decision theater



- Diffuse IR Proximity Sensors



- Autonomous Mobile Robot (AMR Transporter)
- AMR Manipulator with 2 arms



- Shelves (receiving, shipping)



- Ergonomic sensors



- Mini CNC Milling Machine



- AR/VR devices

Microsoft



- Powerful servers CPU and GPU



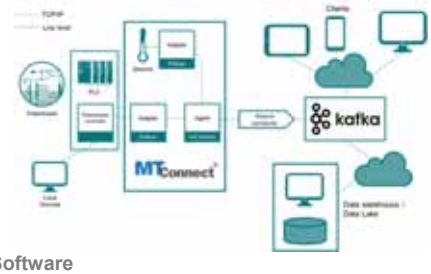
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5. Infrastructure
Concordia University







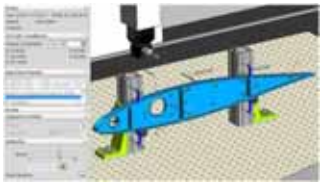


KMR iiwa mobile robot

ProCAST Software



NX CMM Inspection Programming



Laser tracker



AnyLogic/AnyLogistix simulation software



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5. Infrastructure
Université Laval

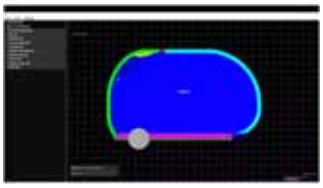
Lab-Usine

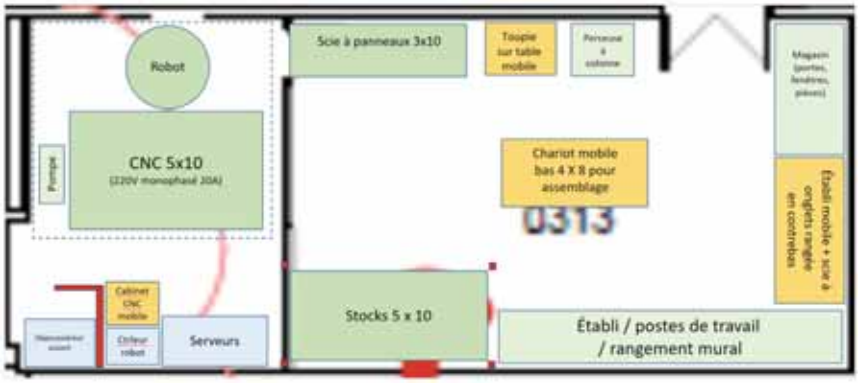












Robot & CNC



Augmented Reality Projector



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5. Infrastructure
Université de Sherbrooke

Decision Theater

- Flexim license
- Furniture
- Interactive whiteboard
- Stand
- Server
- Screens







SMART electric height-adjustable mobile stand





VB-WMK-002

TV Mount for ViewSonic all-in-one conference camera

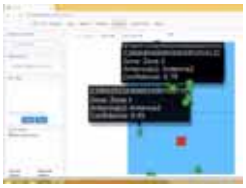
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5. Infrastructure
Université du Québec à Montréal

Basic idea :Real-time visibility

RF Controls – Passive RTLS RFID











Portable Technology Solution – Passive RTLS RFID

Softwares
- TracerPlus
- ClearStream RFID software (BLE + RFID)

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5. Infrastructure
Productique Québec



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5. Infrastructure
JACOBB

Powerful compute server

Calcul Québec Site: Narval - ÉTS

PowerEdge XE8545





Node Customer

SSH Tunel

SLURM Inverter

- CQ Allocation
- Main project "ctb-mcheriet
- Possibility of sponsoring new users (sponsorship request sent from a Calcul Canada account)

- 6 units
- 24 GPU years

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6. Operationalization of Céos$_{net}$
HQP training – Granted Budget (2023-2029, $3.13M)

NSERC-CREATE

Title: Leadership in Manufacturing Systems Science and Engineering 4.0

Target: 23 masters, 13 PhD, 27 undergraduate internships

University-Industry Collaboration

Research and Industry
- Researchers work on digital and intelligent Design, configuration, manufacturing and control of production.
- Student projects develop solutions for industrial problems.

Student Projects
- Master's (2 years) and PhD (3 years).
- Internships at partners' companies.
- Address digital transformation challenges.

Testbeds on Campus
- Universities have operational testbeds.
- Funded by CFI (CĒOS^{Net}).
- Use advanced technologies.

Solution Deployment
- Tested at the universities' testbeds.
- Implemented with partner companies.

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6. Operationalization of Céos$_{net}$
Industrial R&D Projects – OTN (2022-2027, $11.2M*)

PROGRAM: OFFENSIVE DE TRANSFORMATION NUMÉRIQUE (OTN)

FINANCING COLLABORATIVE INDUSTRIAL R&D PROJECTS IN DIGITAL, INTELLIGENT AND SUSTAINABLE TRANSFORMATION

Target: Technological support for 60 SME

Open Call for Projects



*The final amount to be confirmed following the final list of confirmed and involved projects.

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6. Operationalization of Céos$_{net}$
Industrial R&D Projects – Other Granted Applications

Period Budget	Researchers	Partners	Theme Project title
2020-2025 $2M	Julie Dion (Cégep de Sherbrooke)	Productique Québec, Dienamex recherche en extrusion, SC2I inc., OSI Précision inc., Logiflex, R2i et L.P. Royer inc	**Artificial Intelligence** Realization of Manufacturing Artificial Intelligence - An Optimized System Architecture in Living Lab Mode
2023-2026 $528k	S. Yacout (Poly) M. Cheriet (ÉTS)	NSERC, Innovée, Mitacs, Solutions Serafin	**Smart Electrical Transportation** Intelligent Predictive Maintenance 4.0 for Heavy-Duty Electrical Bus
2021-2026 $371k	D. St-Onge (ÉTS), L. Birglen (Poly), G. Beltrame (Poly), D. Brodeur (Productique Québec)	NSERC, Mitacs, Prompt, Kinova	**Collaborative Mobile Robots** Enhanced Awareness for Mobile Cobots in Manufacturing Assembly
2023-2026 $90k	A. Tahan (ÉTS)	NSERC (Discovery grant), 7D-Kinematic	**Jigless Assembly** equipment: iGPS de Nikon & AR
2022-2027 $155k* *to be confirmed	S. Nadeau (ÉTS)	NSERC (Discovery grant)	**Assembly/Disassembly 5.0** Risk Management Decision-Making Models for Human-Centered 4.0/5.0 Assembly/Disassembly Production; equipement: système de projection FARO
2024-2025 $20k	S. Nadeau (ÉTS), A. Tahan (ÉTS), J.P. Kenné (ÉTS), L. Hof (ÉTS)	CIRODD-Synergy, Auto Prévention	**Disassembly 5.0** Disassembly 5.0 - a Case Study from the Automotive Sector
2019-2026 $205k	L. Hof (ÉTS)	NSERC (Discovery grant)	**Advanced glass machining** High-precision machining of glass for remanufacturing
2021-2025 $180k	A. Tahan (ÉTS)	NSERC (Discovery grant)	**Advanced Manufacturing** Jigless Assembly using iGPS
2022-2024 $60k	A. Tahan (ÉTS)	Mitacs	**Advanced Manufacturing** Assemblage aassisté par Réalité augumentée
2023-2027 $90k	M. Jahazi (ÉTS)	Mitacs, Finkl Steel	**Advanced Manufacturing** Infleunce of deformation path on microstructure evolution during hot forming
2024-2029 $200k	K. Nguyen (ÉTS)	NSERC (Discovery grant)	**Telecommunications** Net-A-Eye: Network Intelligence Framework To Improve Accessibility For People With Vision Disability

*The final amount to be confirmed following the final list of confirmed and involved projects.

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6. Operationalization of Céos$_{net}$
Industrial R&D Projects – Other Granted Applications

Period Budget	Researchers	Partners	Theme Project title
2023 $5k	Y. Maïzi, Y. Bendavid (UQAM)	UQAM (Bourse Interne VDR)	**Digital Twins** Typology and Prototyping of a Digital Twin in Health and Social Services
2024 $17.69k	Y. Bendavid, M. Gruson (UQAM)	CINIMI, RF Controls, reelyActive	**RTLS - Real Time Location Systems** Deployment of a real-time production tracking system based on passive RFID RTLS technologies
2024-2026 $216.808k	J. Gaudreault (U-Laval), R. Wuthrich (U-Concordia)	NSERC, Mitacs, MEIE-OTN2, SOKIO	**Smart Factory** Automated Design + Generation of Manufacturing Instructions for Custom Homes
2023-2025 $181k	JF. Lalonde (U-Laval), J. Gaudreault (U-Laval), P. Giguère (U-Laval)	NSERC, Mitacs, MEIE-OTN2, Foncer, SBI, Neurobot IA	**Smart Factory** High-Mix Low-Volume 3D Object Detection and Tracking
2022-2026 $183.125k	J. Gaudreault (U-Laval), M. Ben Ali (Poly)	Mitacs, MEIE-OTN2, Foncer. Mecart	**Planning & Assembling 4.0** Amélioration des processus de planification et d'assemblage de murs manufacturés pour salles
2024-2027 $180k	W. De Paula Ferreira (ÉTS), D. Brodeur (Productique Québec)	NSERC, Mitacs, SimWell	**Industry 4.0; Digital Twin** An integrated digital twin decision support platform for managing complex operations and supply chains
2023-… $350k	W. De Paula Ferreira (ÉTS) Productique Québec is supplier in this project	MEIE, Confidential partner	**Virtual Reality** Utilisation des technologies immersives et du web pour favoriser l'inclusion et la participation sociale des enfants autistes et de leurs familles
2022-2024 $150.625k	L.A. De Santa-Eulalia (UdeS), K. Zhang (ÉTS)	NSERC, Mitacs, MEIE-OTN1, reelyActive, EOSNation, Centre de recherche CREATECH, FuséeLab, Merinov, Cercle.i.	**Traceability 5.0** Traçabilité du homard gaspésien via Blockchain et IoT
2025-2027 $292.387k	S. Nadeau (ÉTS), A. Tahan (ÉTS), J.P. Kenné (ÉTS), L. Hof (ÉTS)	Commission des partenaires du marché du travail, Innoviste, ARPRC, AutoPrévention	**EV Recycling** Industrial Apprentice Training 5.0: The Case of Electric Vehicle Recycling
2025-2030 $43k/year	L. Zhaoheng (ÉTS)	NSERC (Discovery Grant)	**Advanced Manufacturing** Coordinated robotic machining, Digital twins, Condition monitoring

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6. Operationalization of Céos$_{net}$
Outreach activities (2023-2025)

Organization and participation in national and international webinars and conferences	
CIGI-QUALITA-MOSIM (2023)	▪ Special Day, 7 scientific articles Organizer: Sylvie Nadeau
IISE (2024)	▪ Track CĒOSNet / SDG Networks ; 14 scientific articles Organizers: Soumaya Yacout, Jean-Marc Frayret, Ali Aidibe
Webinars (Winter 2025, Fall 2025, Winter 2026)	▪ International Ergonomic Association: Systemic Methods in Complex and Digitalized Manufacturing Webinar Series Moderator: Sylvie Nadeau ▪ *L'Assemblage sans gabarit, assisté par la métrologie 3D* Presenter: Antoine Tahan ▪ *Jumeau numérique pour la gestion adaptative de la maintenance et de la recharge : Approche de synchronisation en temps réel* Présenter: Hedir Oukassi, Animator: Ali Aidibe ▪ Presentation of the Intelligent Cyber-Physical Systems Laboratory of Polytechnique Montreal Présenter: Soumaya Yacout, Animator: Ali Aidibe
CSME (2025)	▪ Smart Production Systems Organizers: Antoine Tahan, Lucas Hof, Masoumeh K. Zanjani

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The topics covered include predictive maintenance, intelligent production management, resilient supply chains, Industry 4.0, cyber-physical systems, collaborative robotics, circular economy, ergonomics, and many others.

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6. Operationalization of Céos$_{net}$
Outreach activities (2023)

CIGI-QUALITA-MOSIM 2023 SPECIAL DAY

June 14, 2023, at the Delta Marriott Hotel in Trois-Rivières



Responsible: Sylvie Nadeau **7 papers ; 6 universities**

Themes / Number of papers	Session Chair
Sharing, integration, analysis and visualization of real-time data in decision-making of complex dynamic systems throughout their life cycle (2)	Tasseda Boukherroub (ÉTS), Jean-Pierre Kenné (ÉTS) et Daniel Chamberland-Tremblay (UdeS)
Use of **collaborative 3D measurement technologies** for inspection and quality control, as well as for workers, autonomous mobile vehicles, positioning and support for design, manufacturing / assembly / disassembly / construction / operation (2)	Sylvie Nadeau (ÉTS)
The **Digital Supply Chain**: development of new approaches to maximize the value of the supply chain using digital technologies (2)	Amin Chaabane (ÉTS), Masoumeh Kazemi Zanjani (Concordia) et Luis Antonio de Santa-Eulalia (UdeS)
Connectivity and intelligent machines	Sousso Kelouwani (UQTR)
Maintenance 4.0; towards an e-service for autonomous and self-repairing systems (1)	Soumaya Yacout (Poly) et Matthieu Gruson (UQAM)

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6. Operationalization of Céos$_{net}$
Outreach activities (2024)





IISE2024 – Track Céos$_{net}$ / SDG Networks

IISE ANNUAL CONFERENCE & EXPO 2024 — May 18–21, 2024 — Montréal Convention Centre, Montreal, Canada

Soumaya Yacout – *Primary Track Chair*
Ali Aidibe – *Secondary Track Chair*
Jean-Marc Frayret – *Program Chair*

6 sessions ; 14 papers ; 17 students & 4 postdocs ; 8 universities

Session ID	*Session Title (Number of presentations: 14 articles + 2 abstracts)*	*Session Chair*
1883	**Internet of Things (IoT) Technology**: Tools, Management & Applications (4)	Jean-Marc Frayret (Poly)
1884	**Smart and Sustainable Maintenance:** Machine Learning, Blockchain and Circular Economy Approaches (3)	Yaoyao Fiona Zhao (McGill)
1885	**Digital Innovation in Supply Chain Management:** Simulation, Decision Support, and Shared Tools (4)	Jean-Francois Audy (UQTR)
1886	**Emerging Technologies and Safety:** From AMR Integration to Urban Air Mobility (3)	Sabrina Jocelyn (IRSST)
1887	**Smart Manufacturing and Design** (4)	Masoumeh Zanjani (Concordia)
2182	**PANEL -** Industry-academy collaborative project in the age of smart digital green transformation: what's in it for me? (4 panelists confirmed)	Ygal Bendavid (UQAM)

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Intelligent Cyber Value Chain Network