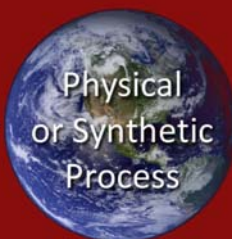


STRATUM 4 LLC

Engineering Intelligent Automation Systems



Intelligent
Automation
System



Physical
or Synthetic
Process

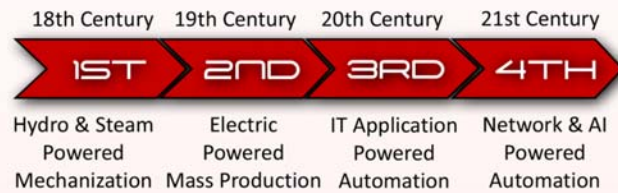
Technology Consulting
Research & Development
Program Management
Training & Support



Providing architecture and engineering services to create intelligent automation solutions for industrial and commercial operations.

Cognitive computing is an engineering discipline within computational science enabling development of intelligent automation devices and service systems. Intelligent systems operate in *cyberspace*, the confluence of geo-, info- and socio-spatial dimensions. Intelligent applications are enhanced by capabilities of new AI technologies and are driven by competitive demands to improve productivity and quality through automation and control of complex, data intensive physical, economic and social processes.

As defined in Germany's Industry 4.0 programs and in the U.S. by NIST and NSF specifications for Internet of Things (IoT), Industrial Internet of Things (IIoT), and Cyber-Physical Systems (CPS) programs, the industrial revolution is entering its fourth generation, where automation is increasingly carried out by intelligent, semi-autonomous, internetworked machines.



Flexible solutions for your technology needs

Stratum 4 is a systems engineering consultancy providing a wealth of industrial experience, related patents, technical publications, and a suite of CTO-class services addressing strategy, design, implementation and support of *intelligent systems and services*.

As a professional advisory practice, Stratum 4 also provides *fractional* CTO-class experience, capabilities and services related to technical due diligence (M&A), staff training, and R&D program and technology alliance management. Capabilities include knowledge of systems science (*cybernetics*), data science (*analytics*), software engineering, distributed systems (*secure, real-time, high performance and high availability computing, storage and communication systems*), and applied mathematics (*dynamic systems modeling, simulation, and visualization*).

IA SYSTEMS TECHNICAL SERVICES

- USE CASES
- REQUIREMENTS SPECIFICATIONS
- DATA ANALYTICS
- DESIGN SPECIFICATIONS
- FUNCTIONAL COMPONENT PROTOTYPES
- COMPONENT VERIFICATION
- PLATFORM ENGINEERING
- SOFTWARE ENGINEERING
- REAL-TIME PERFORMANCE
- SYSTEMS INTEGRATION
- SYSTEMS DOCUMENTATION

DATA ANALYTICS IN IA SYSTEMS



INDUSTRIAL AUTOMATION SYSTEMS

Intelligent Industrial Automation (IA) systems produce and consume exponentially growing data sets requiring application of advanced computational (data) science and systems engineering methods, including artificial intelligence (machine learning), secure time-sensitive networks, cloud storage systems and the continuous analysis of processes involved in data management, situation assessment, decision and adaptive control applications.

The Internet is not solely a packet-switched communications platform. It is a global, distributed “cloud” computer, large, growing and decentralized, attached to an incredible array of software-defined “things” that alone and in concert act as “computational service systems” for the purpose of automating any physical or synthetic process that can be exactly specified.

Advancing production efficiencies, productivity and security in a broad range of industrial settings, IA systems employ enterprise-level architectures and operational strategies for automating the monitoring, analysis, supervision and regulatory control of real or synthetic *value production processes*.



Decentralized Industrial Organizations

Decentralized industrial organizations are federations of sovereign enterprises, each operating as a member of permissioned, peer-to-peer *supply and command chain* production networks, without need of a central authority. As sovereign entities DIO contain intelligent agents that employ AI applications to achieve and maintain degrees of *situational awareness* needed to implement trusted, resilient and agile process management regimes. DIO produce, share, analyze and learn from large operational data sets with support of data warehouses (*data lakes*), distributed ledgers (*blockchains*) and data science algorithms (*machine learning*).

DIO typically operate on the edge of large-scale cloud-hosted service systems. As such, they require higher levels of automation, necessarily sharing common cybersecurity requirements, policies and production mechanisms, internally (within enterprise intranets) and at their extranet interfaces (APIs). At these interfaces they cooperate and share operational imperatives governed by policies (i.e., rules-of-engagement, smart contracts.) DIO form ecosystems, graphs linked horizontally along producer-consumer supply chains and vertically along superior-subordinate asset accountability chains.

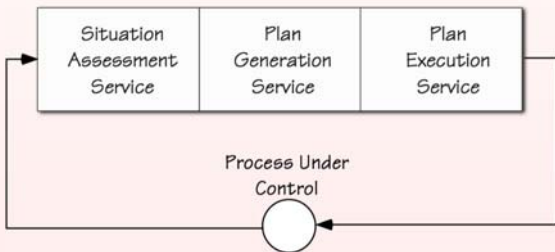
DIO are intelligent (cognitive) to the degree they continuously maintain awareness of, and predictable performance in response to, a range of situations unfolding within their operational ecosystems. Further, DIO may be stationary or mobile (in cyberspace-time), whether their services are embedded as components in other systems or function independently as distributed “end systems” at the edge of large-scale cloud-hosted service systems.



CONSULTING
PROGRAM MANAGEMENT
TECHNOLOGY ALLIANCES
ACADEMIC ENGAGEMENT

For reference, Intelligent Industrial Automation systems serve to establish and enforce a continuous, high-availability monitoring and control regime for governing the unfolding behavior of production processes. As diagrammed below, such regimes involve establishing and maintaining situational awareness, response plan generation for planned and unplanned events, and plan execution.

This cyclic control strategy provides the basis for encapsulating production cell-, line-, and plant- and enterprise level automation systems.



Stratum 4 has significant experience in performing academic and applied research and applying those results in commercial, industrial and military settings.



Technology Strategy, Design and R&D Program Management

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