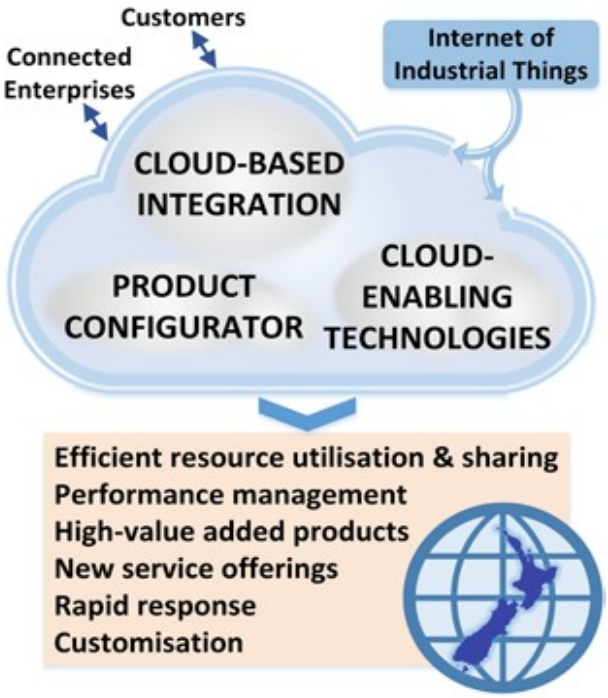
Industry 4.0 and Cloud Manufacturing

Industry 4.0

Industry 4.0 is based on the technological concepts of cyber-physical systems, the Internet of Things and the Internet of Services. It facilitates and contributes to the vision of Smart Factories. Within the modular structured smart factories of Industry 4.0, cyber-physical systems are in fact cyber-physical production systems that monitor physical processes, create a virtual copy of the physical world and make decisions autonomously. Over the Internet of Things, cyber-physical production systems communicate and cooperate with each other and humans in real time. Via the Internet of Services, both internal and cross-organizational services are offered and utilized by participants of the value chain.



Cloud Manufacturing

Cloud technology is changing the way industries and enterprises do their businesses in that dynamically scalable and virtualized resources are provided as a service over the Internet. Cloud computing is emerging as one of the major enablers for the manufacturing industry; it can transform the traditional manufacturing business model, help it align product innovation with business strategy, and create intelligent factory networks that encourage effective collaboration. In Cloud Manufacturing, distributed resources are encapsulated into cloud services and managed in a centralised way. These resources provide on-demand services for highly customised manufacturing needs at changing production scale. Industry 4.0 is widely considered as a key enabling technology for cloud manufacturing. Service Science, Management and Engineering (SSME) provides important scientific basis for cloud-based manufacturing.

The research work at the Intelligent and Interoperable Manufacturing Systems (IIMS) group helps New Zealand adopt this new business model for high-value manufacturing and services. It enables New Zealand businesses to use cloud manufacturing for increased market share and export earnings through streamlined resource management, fast response to market change, and quick introduction to new service offerings. Therefore, cloud manufacturing is "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable manufacturing resources". It enables enterprises to be intra- and inter-connected through the "Internet of Industrial Things", to offer a multitude of business and commercial benefits.

Research Opportunities

- Cyber-physical production systems
- Control System as a Service (CSaaS)
- Additive Manufacturing as a Service
- Open manufacturing cloud platform for future manufacturing business
- Cloud-based decision making in complex engineering environments
- Cloud-based product configurator for manufacturing businesses
- Cloud-based process planning
- Cloud-based product planning
- Cloud-based resource allocation, production planning and Scheduling

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