### Development Roadmap

<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016–2019</td>
<td>Run quantum circuits on the IBM Quantum Platform</td>
</tr>
<tr>
<td>2020</td>
<td>Release multi-dimensional roadmap publicly with initial aim focused on scaling</td>
</tr>
<tr>
<td>2021</td>
<td>Enhancing quantum execution speed by 5Xs with Qiskit Runtime</td>
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<tr>
<td>2022</td>
<td>Brion dynamic circuits to unlock more computations</td>
</tr>
<tr>
<td>2023</td>
<td>Enhancing quantum execution speed by 5X with quantum serverless and execution modes</td>
</tr>
<tr>
<td>2024</td>
<td>Improving quantum circuit quality and speed to allow 5K gates with parametric circuits</td>
</tr>
<tr>
<td>2025</td>
<td>Enhancing quantum execution speed and parallelization with partitioning and quantum modularity</td>
</tr>
<tr>
<td>2026</td>
<td>Improving quantum circuit quality to allow 7.5K gates</td>
</tr>
<tr>
<td>2027</td>
<td>Improving quantum circuit quality to allow 10K gates</td>
</tr>
<tr>
<td>2028</td>
<td>Improving quantum circuit quality to allow 15K gates</td>
</tr>
<tr>
<td>2029</td>
<td>Improving quantum circuit quality to allow 100M gates</td>
</tr>
<tr>
<td>2033+</td>
<td>Beyond 2033, quantum-centric supercomputers will include 1000’s of logical qubits unlocking the full power of quantum computing</td>
</tr>
</tbody>
</table>

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### Innovation Roadmap

#### Software Innovation

- **IBM Watson Experience**
  - Qiskit: Circuit and operator API with cooperation to multiple targets
  - Application modules: Modules for diverse specific applications and algorithms workflows
  - Qiskit Hummingbird: Performance and abstract through runtime
  - Qiskit Chimera: System partitioning to enable parallel execution
  - AI enhanced quantum modules: Prototypes demonstrations of AI enhanced circuit transcription
  - Serverless partitioning with classical reconstructions at HPC scale
  - Scalable circuit management:
    - Error correction decoder: Demonstrates path to improved quality with logical error correction decoder
  - Error correction decoder:
    - Demonstrates path to improved quality with logical error correction decoder
  - Resource management:
    - Demonstrates path to improved quality with logical error correction decoder
  - Circuit partitioning:
    - Demonstrates path to improved quality with logical error correction decoder
  - Code assistant:
    - Functions:
      - Mapping Collection:
        - Specific Libraries:
          - General purpose QC libraries

#### Hardware Innovation

- **IBM Quantum Experience**
  - Early:
    - Canery 5 qubits
    - Albatross 14 qubits
    - Penguin 20 qubits
    - Protoype 12 qubits
  - Dynamic circuits:
    - Benchmarking 27 qubits
  - Falcon:
    - Benchmarking 27 qubits
  - Hummingbird:
    - Demonstrates scaling with multiplexing
  - Eagle:
    - Demonstrates scaling with multiplexing
  -Egypt:
    - Demonstrates scaling with high-fidelity qubit delivery
  - Condor:
    - Single system scaling and fridge operation
  - Kookaburra:
    - Demonstrates scaling with modular connectors
  - Crossbill:
    - rs - coupler
  - Heron:
    - Architecture with variable centers
  - Flamingo:
    - Demonstrates scaling with tunable coupler
  - Condor:
    - Single system scaling and fridge operation
  - Kookaburra:
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  - Crossbill:
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