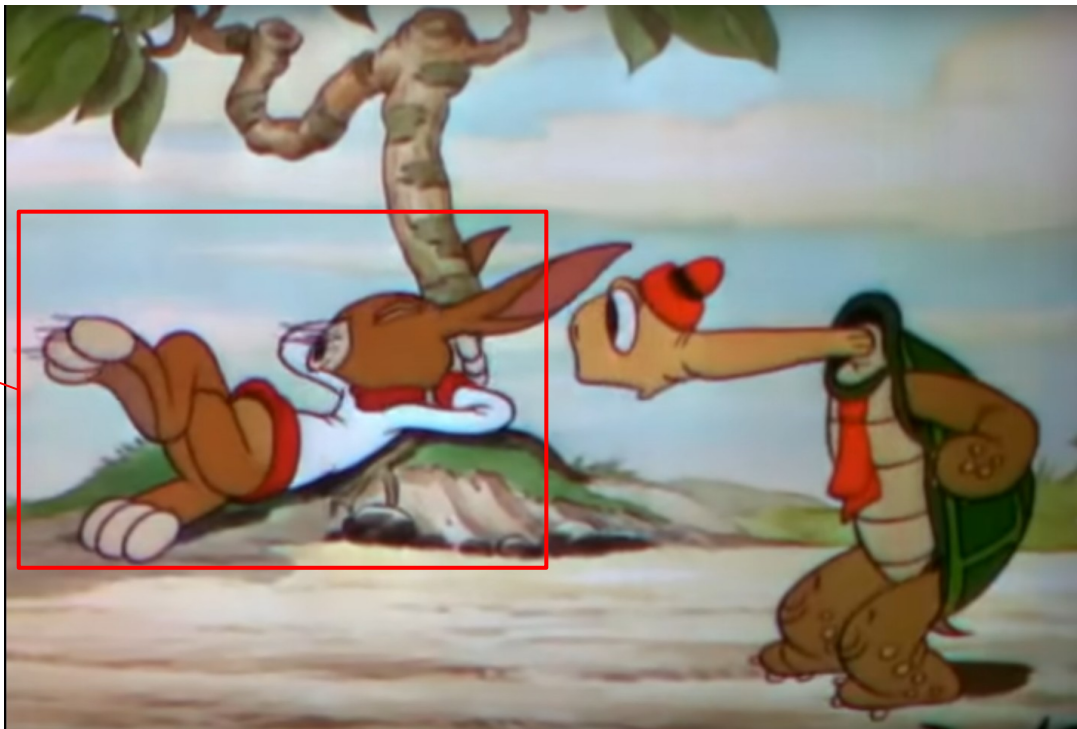# A meta-benchmark for quantum computers
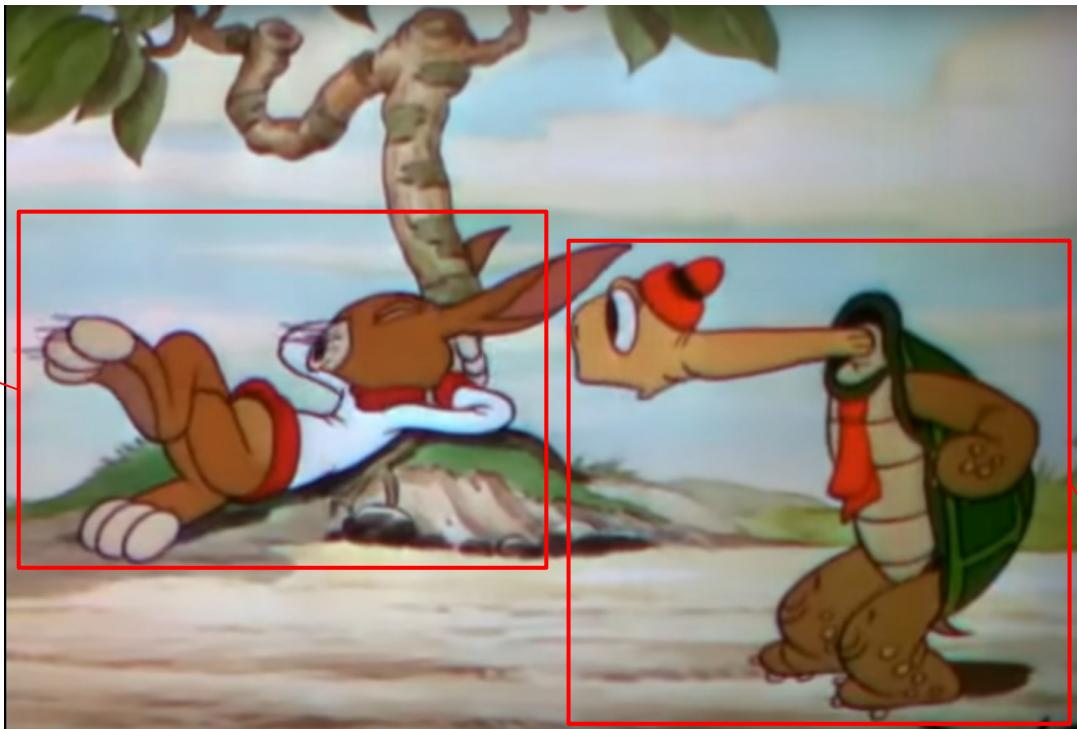
Teratec TQCI Seminar 24-25th June 2025

Valentin Gilbert
valentin.gilbert@quantumbenchmarkzoo.org
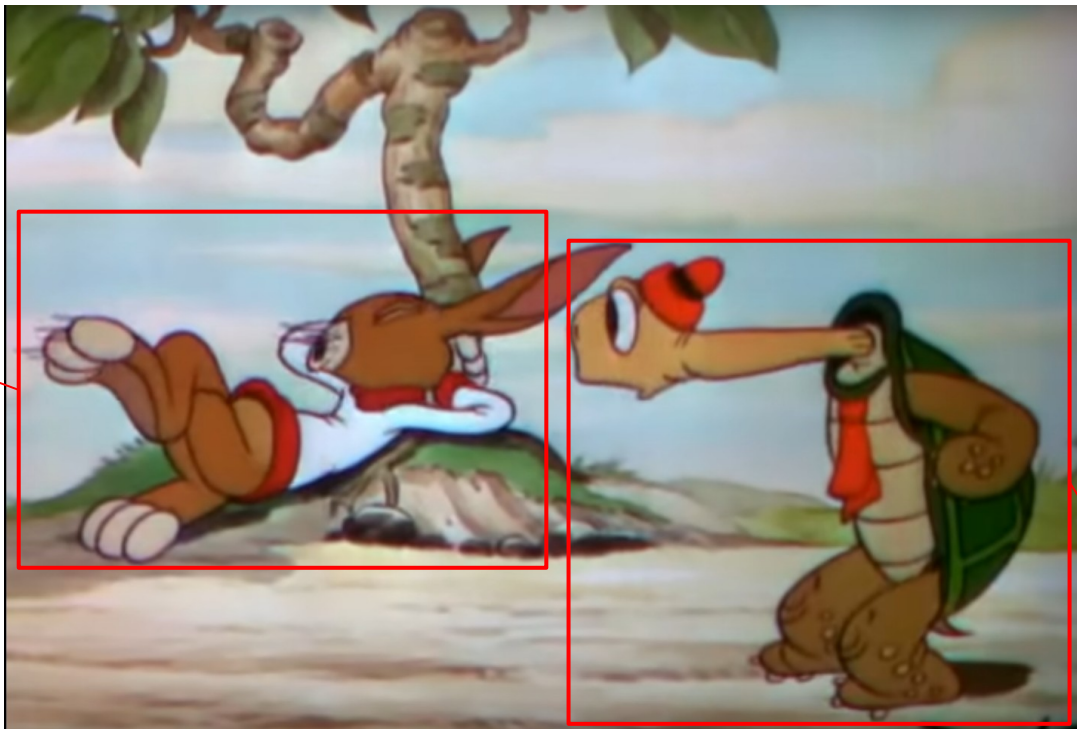25/06/2025

NISQ

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FTQC

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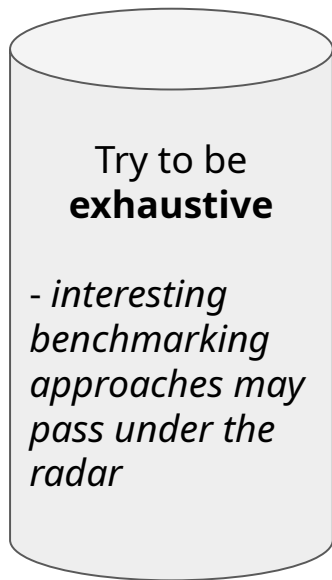 - Each approach does not speak to everyone => Multi-level approach and exhaustivity

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II- Pillars of the QBZ initiative

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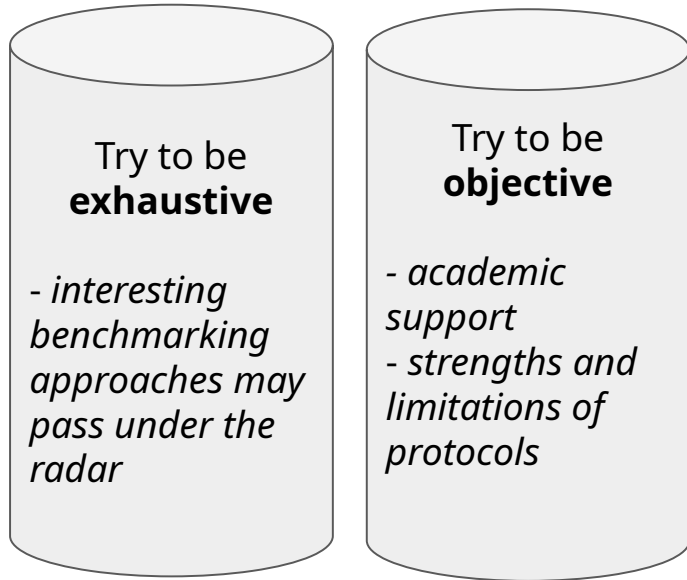
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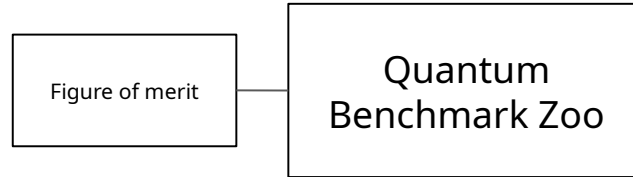
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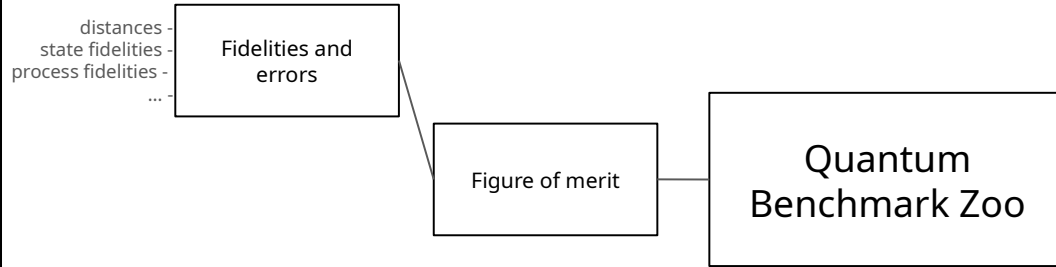 - a real zoo

III- QBZ current content

Quantum Benchmark Zoo
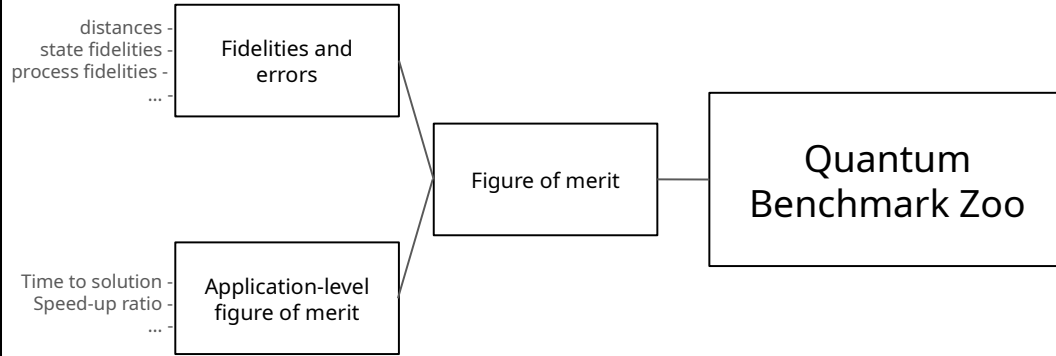
III- QBZ current content

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distances -
state fidelities -
process fidelities -
... -

Fidelities and errors

Figure of merit

Quantum Benchmark Zoo

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Time to solution -
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Application-level figure of merit

Figure of merit
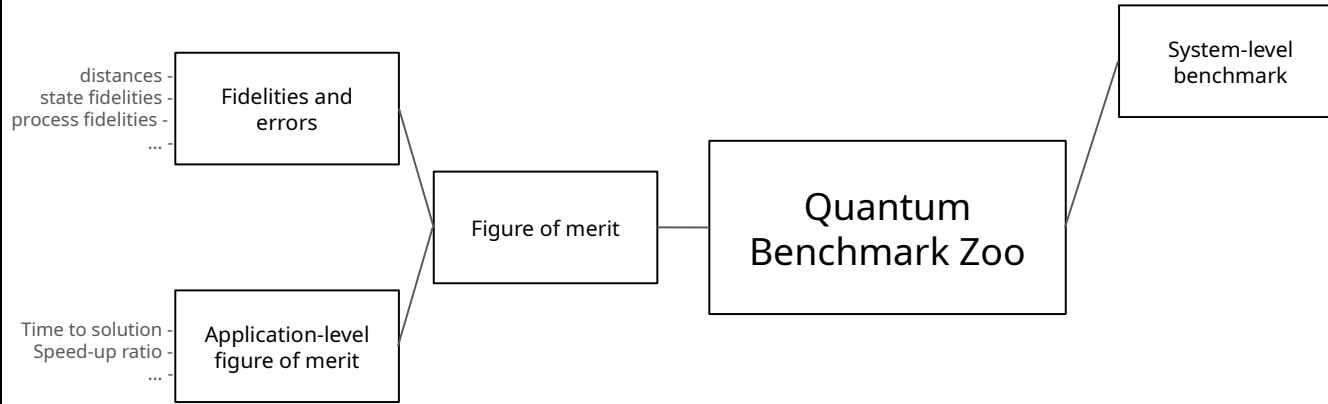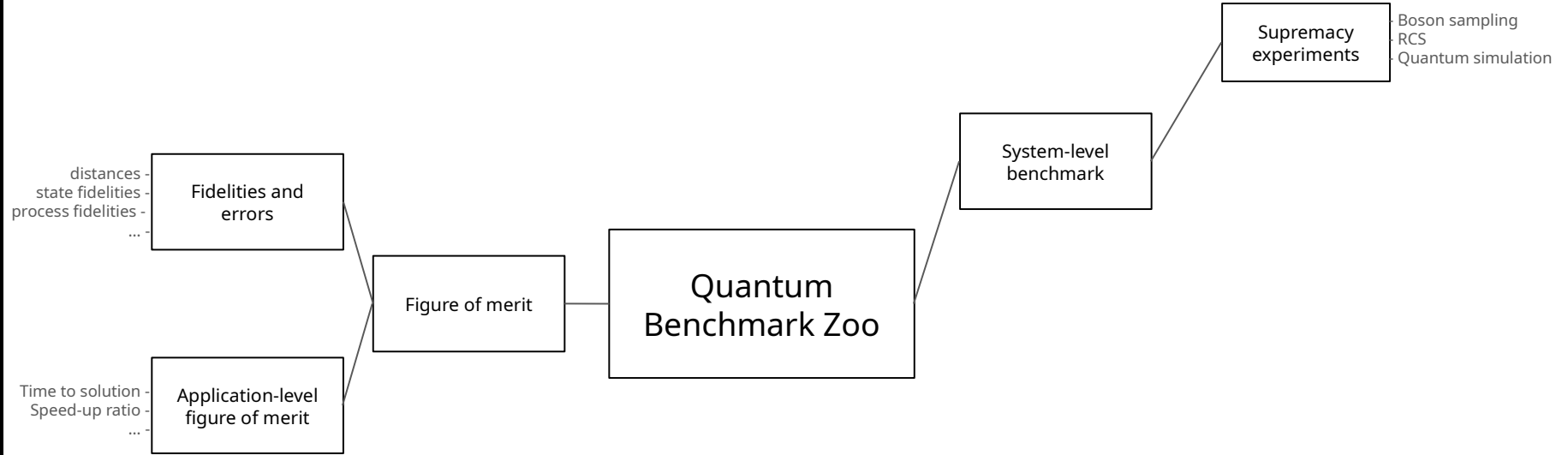
Quantum Benchmark Zoo

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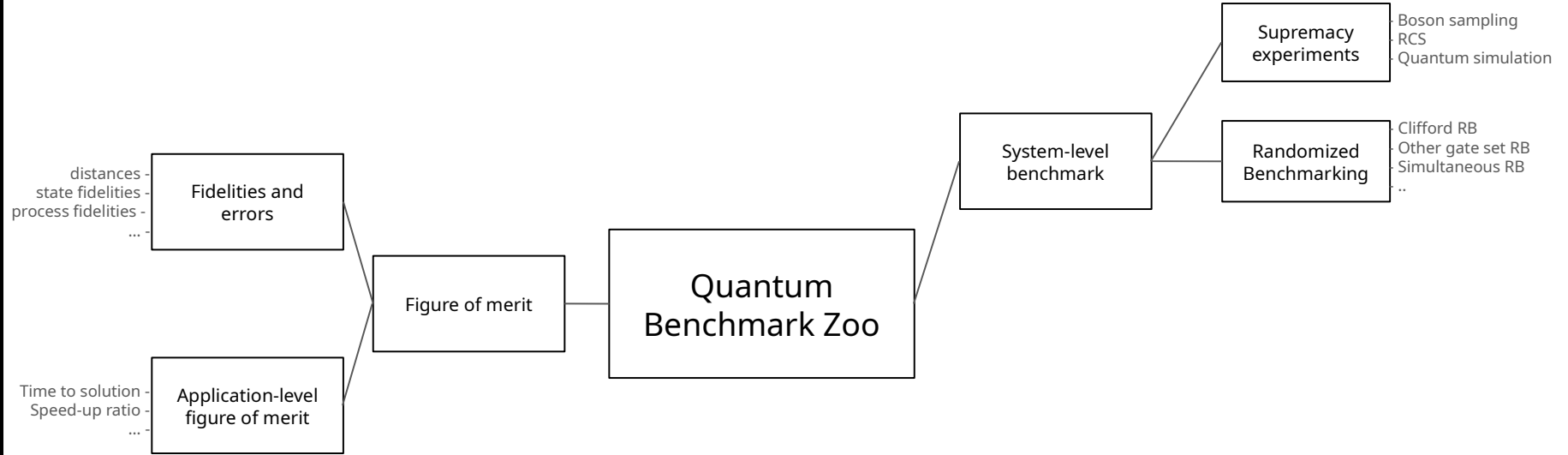
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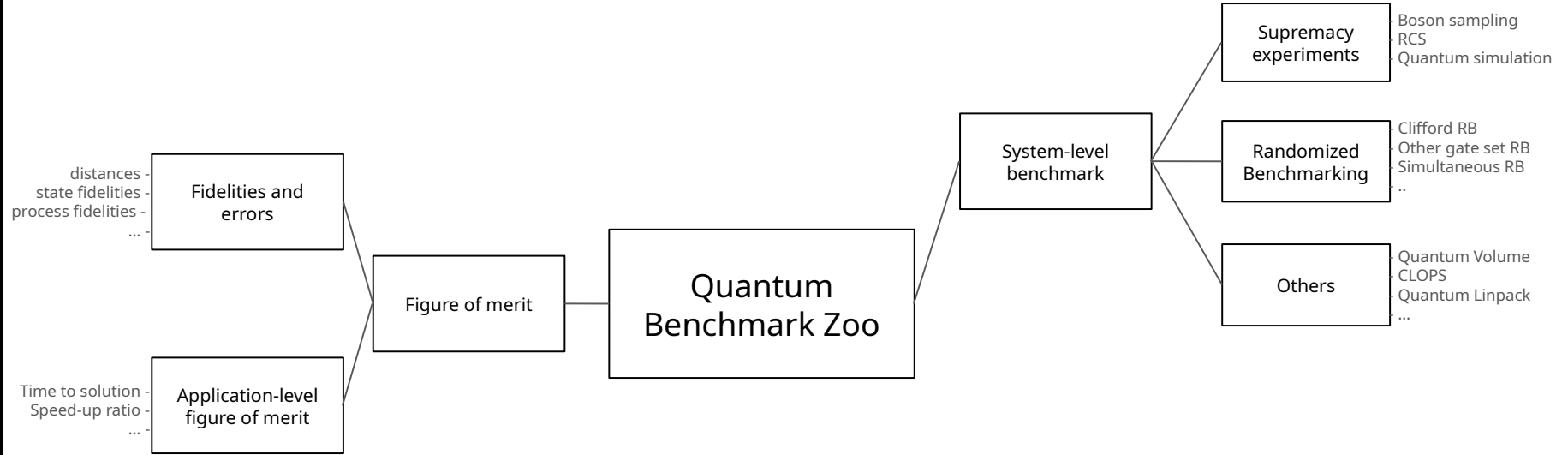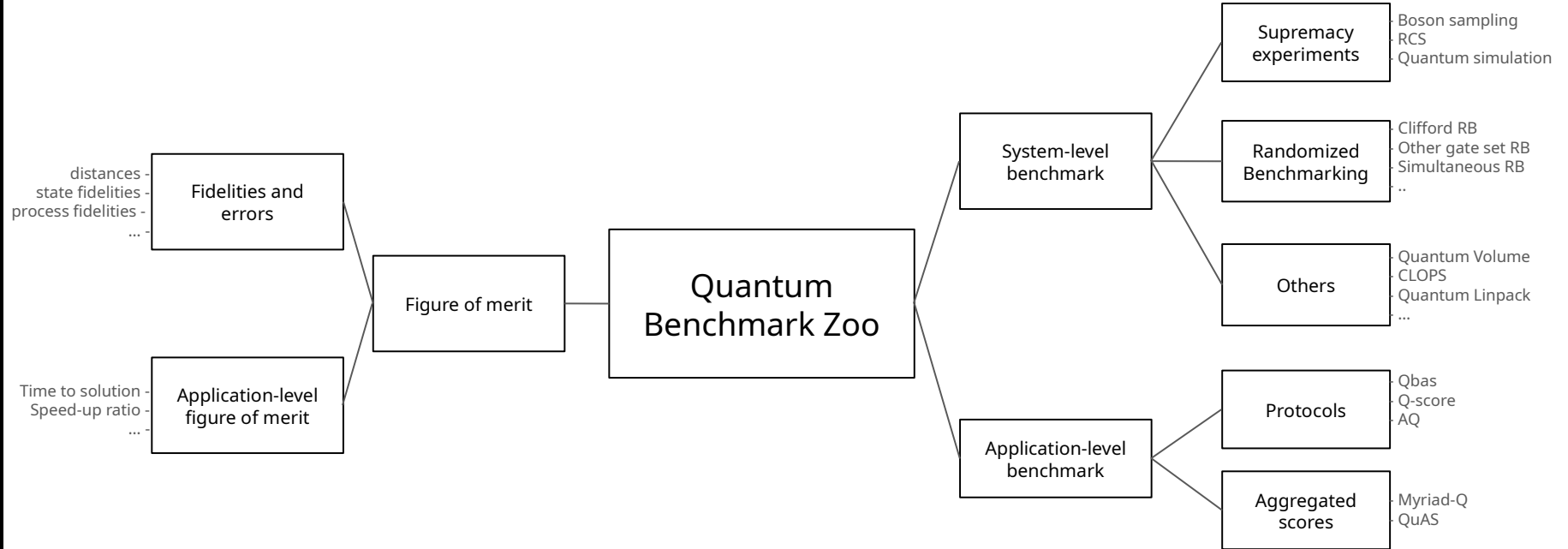
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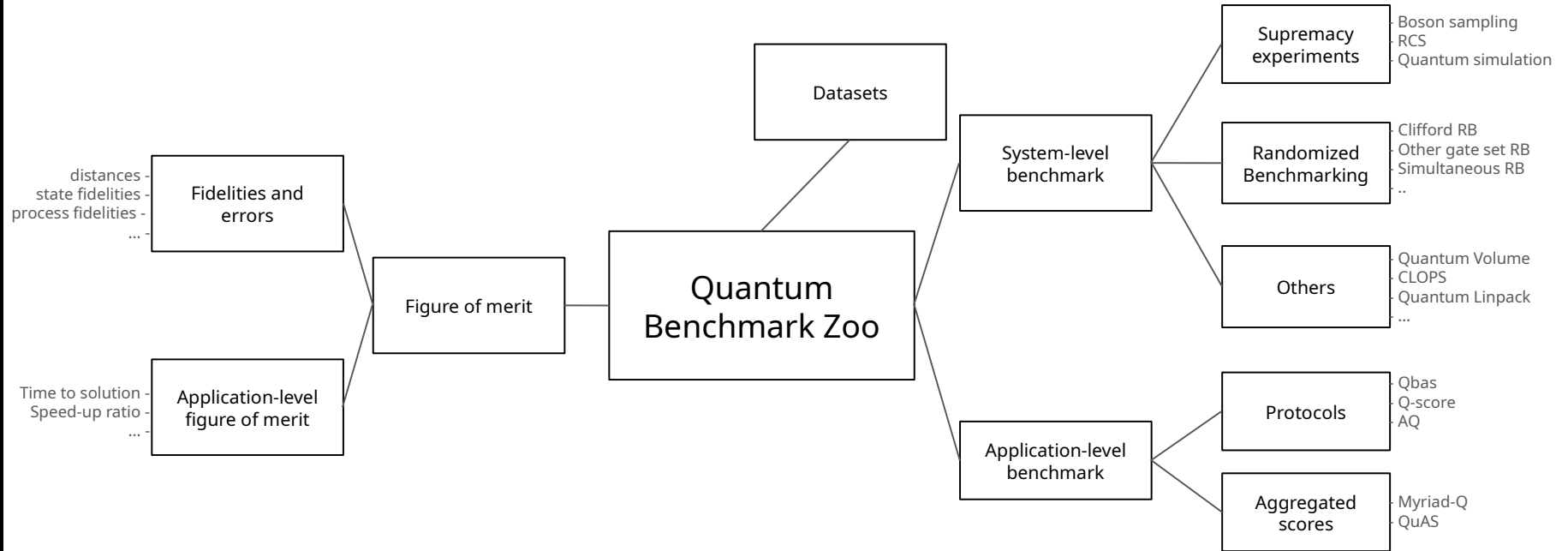
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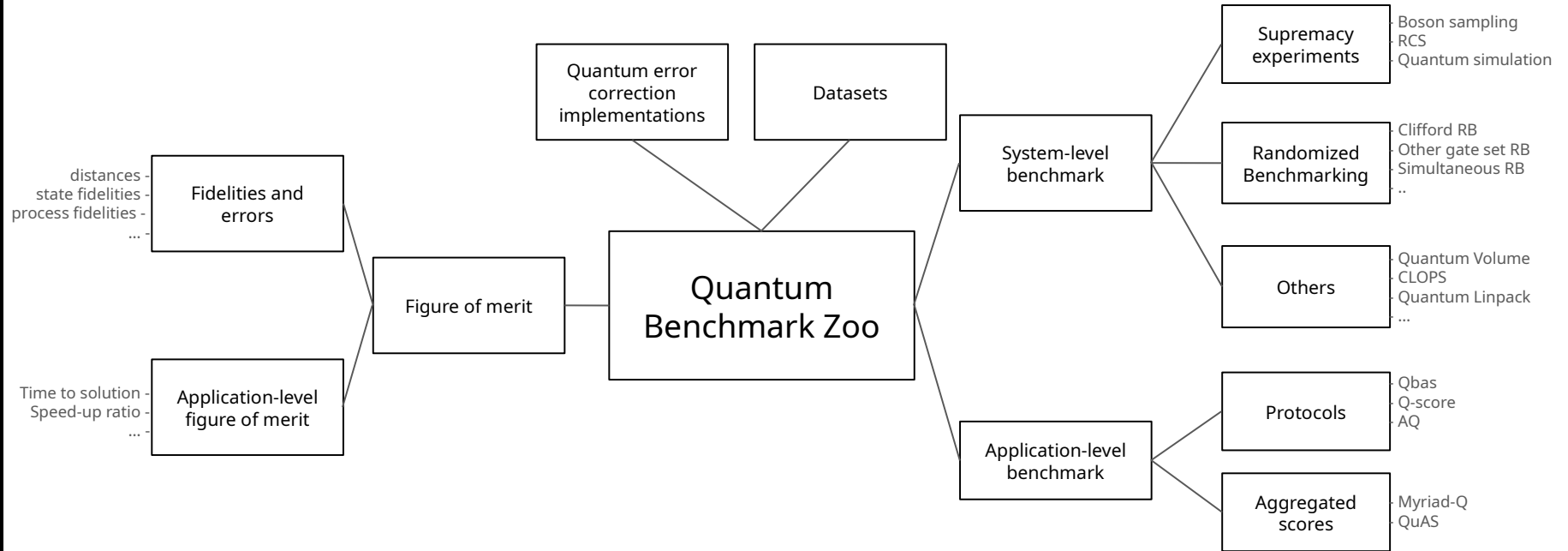
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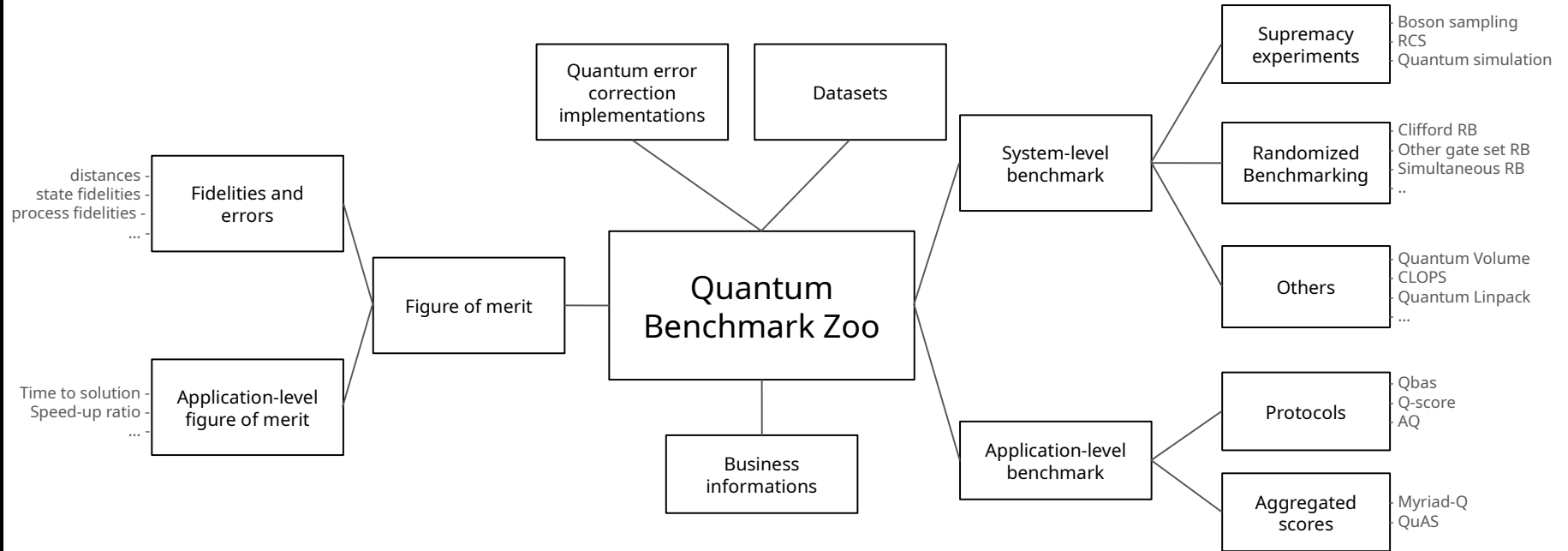
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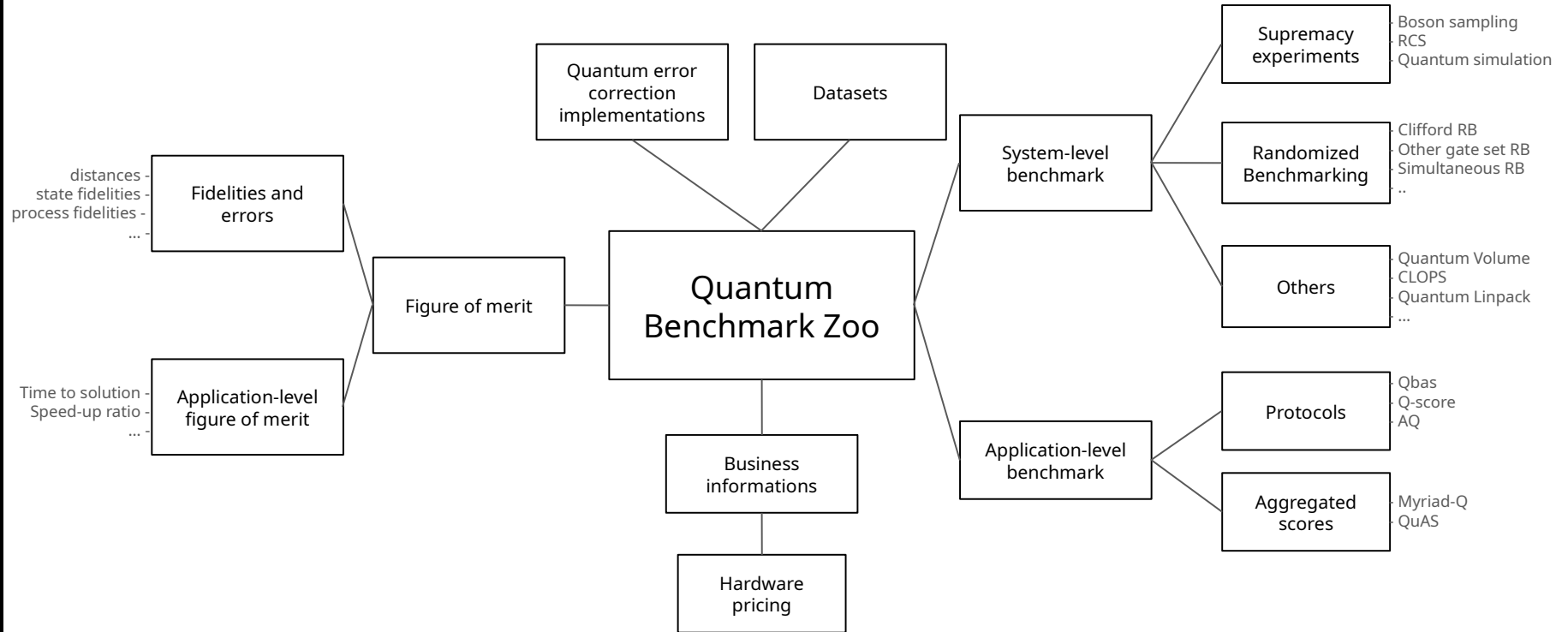
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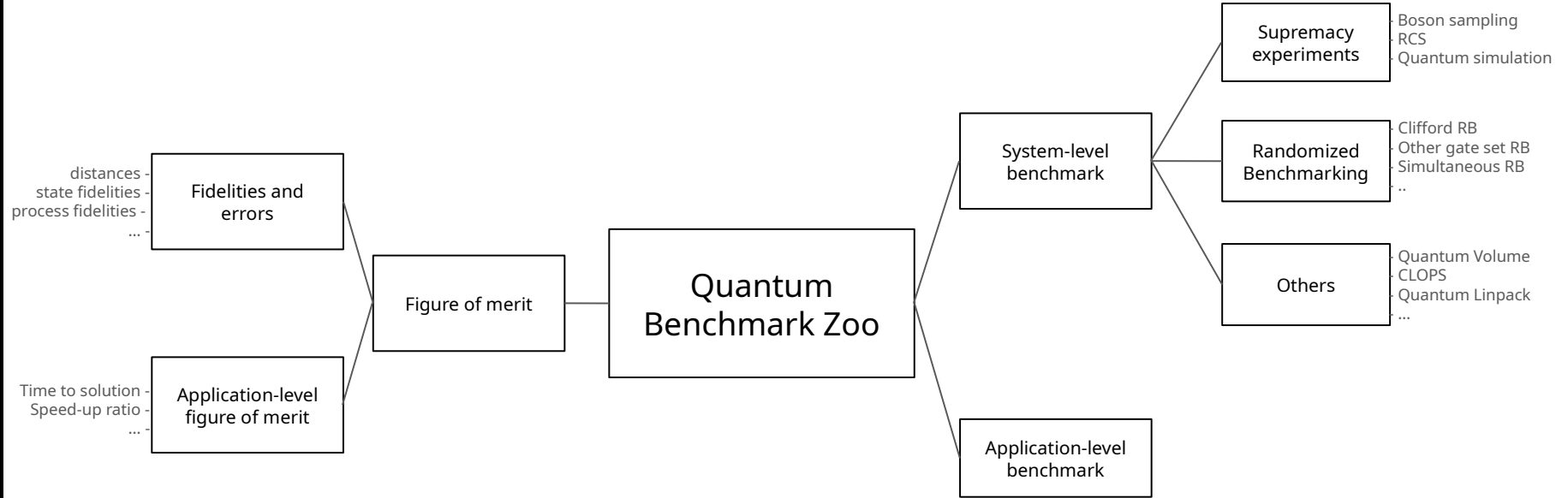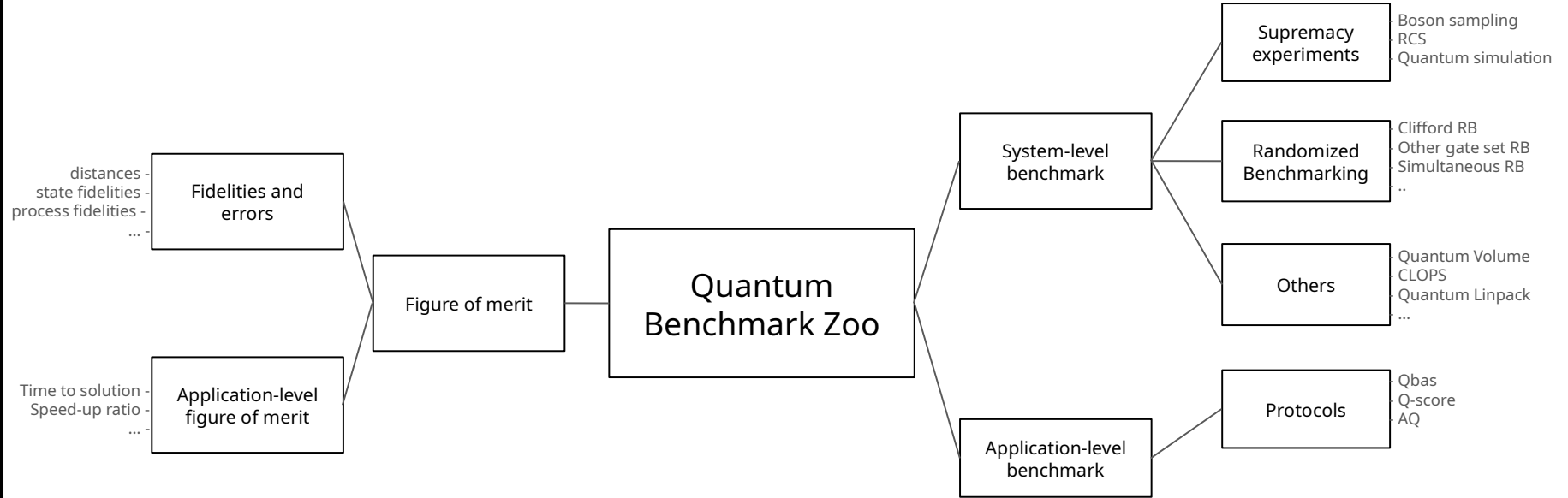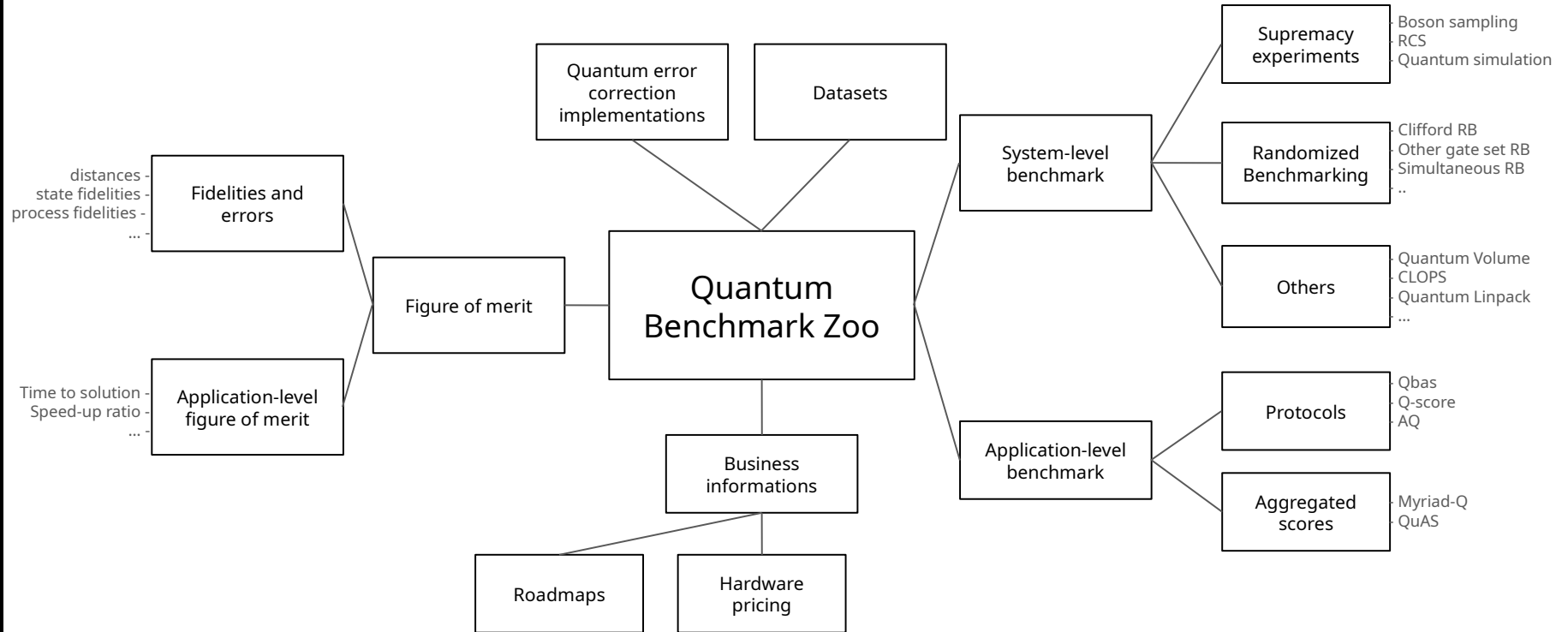# III- QBZ current content

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Date & Ref.	Pb.	n	m	Group - Chip	Type	Challenged Ref.	Weakly Refuted Ref.	Refuted Ref.
2019/10 [2]	RCS	53	20	Google - Sycamore	Superconducting	[3], [4], [5], [6], [7], [8], [9]	[10], [11]	[12]
2020/03 [13]	GBS	50	100	USTC - Jiuzhang	Photonic		[14]	
2021/06 [15]	RCS	56	20	USTC - Zuchongzhi	Superconducting	[11], [16]		
2021/06 [17]	GBS	50	144	USTC - Jiuzhang 2.0	Photonic		[14]	
2021/09 [18]	RCS	60	24	USTC - Zuchongzhi	Superconducting	[16], [9]		
2022/06 [19]	GBS	216	216	Xanadu – Borealis	Photonic		[14]	
2023/04 [16]	RCS	67	32	Google - Sycamore	Superconducting			
2023/04 [16]	RCS	70	24	Google - Sycamore	Superconducting			
2023/04 [20]	GBS	50	144	USTC - Jiuzhang 3.0	Photonic		[14]	
2023/06 [21]	Qsim	127	60	IBM - Kyiv	Superconducting	[22]		[23], [24], [25], [26], [27], [28], [27]
2024/03 [29]	Qsim	567	-	D-Wave - ADV1/2	Superconducting Annealing	[30], [31]		
2024/12 [32]	RCS	83	32	USTC - Zuchongzhi 3.0	Superconducting			

Valentin Gilbert | Quantum Benchmark Zoo

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  - **Analytics** for performance evolutions and trends

VI- How to contribute?

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Academics & Volunteers:

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contact@quantumbenchmarkzoo.org

Huge thanks to current contributors

Daniel Vert
Ph.D Quantum
computing

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Ph.D Quantum
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Olivier Rousselle
Ph.D Quantum Physics

Lucas Phab
Quantum engineer

Julien Rodriguez
Ph.D Optimization

Antoine Croisille
Data engineer

Rasha Friji
Ph.D AI

THANK YOU !

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Quantum Benchmark Zoo website: