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# Towards Unified Tool Support for Real-Time Calculus and Deterministic Network Calculus

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ECRTS 2017 WiP



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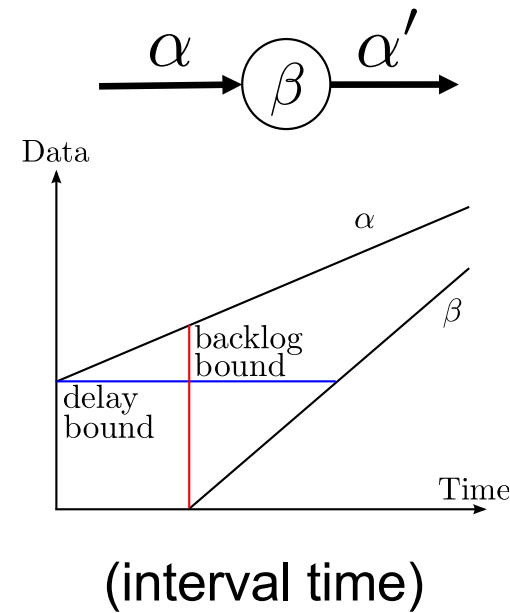
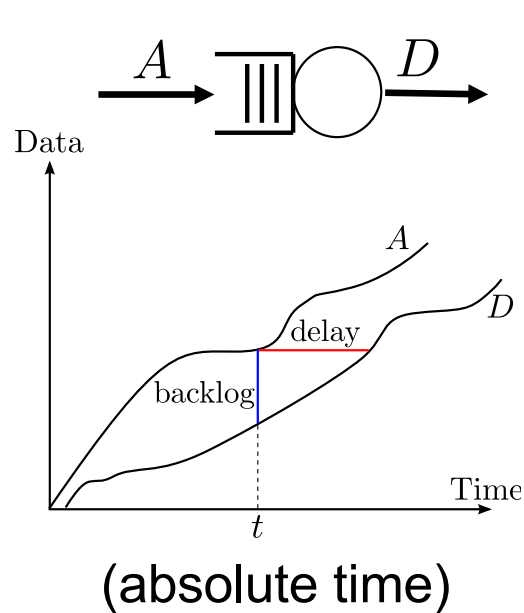
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# One Calculus or two Calculi?

Seminal work: R. L. Cruz, IEEE Transactions on Information Theory, 1991

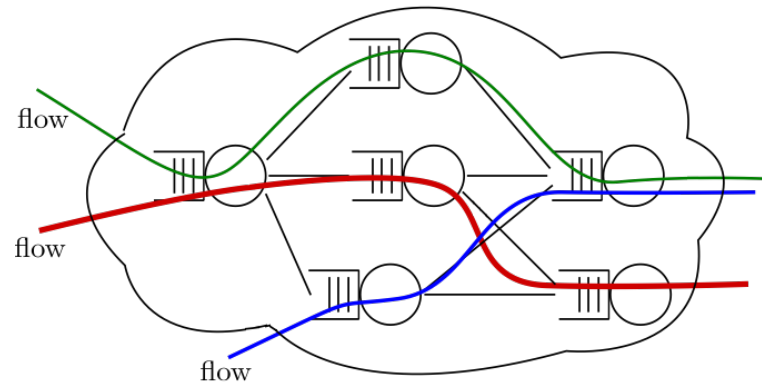
- A Calculus for Network Delay, Part I: Network Elements in Isolation
  - Bounding functions for data/task arrivals as well as forwarding service/computing resource



# One Calculus or two Calculi?

Seminal work: R. L. Cruz, IEEE Transactions on Information Theory, 1991

- A Calculus for Network Delay, **Part I: Network Elements in Isolation**
  - Bounding functions for data/task arrivals as well as forwarding service/computing resource
- A Calculus for Network Delay, **Part II: Network Analysis**
  - Compute results per server and compose to an end-to-end WCTT / WCET



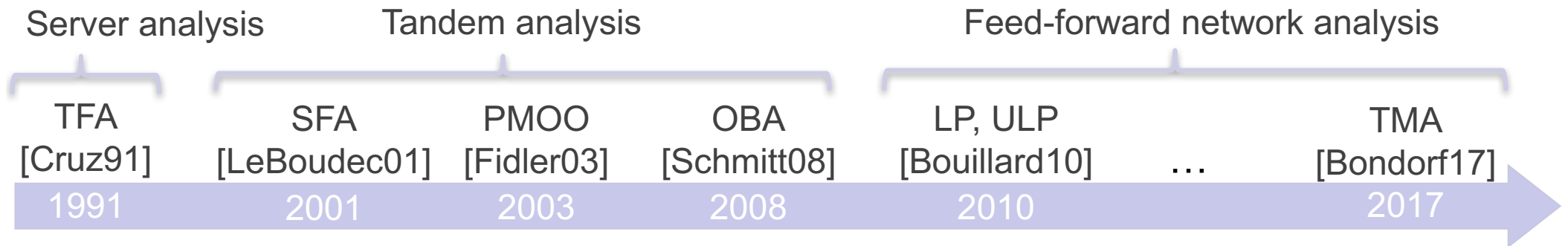
TFA  
[Cruz91]  
1991

# One Calculus or two Calculi?

## Deterministic Network Calculus (DNC)

Focus on improving this part:

- A Calculus for Network Delay, **Part II: Network Analysis**
  - Compute results per server and compose to an end-to-end WCTT / WCET
- **Ever more accurate network analysis results**

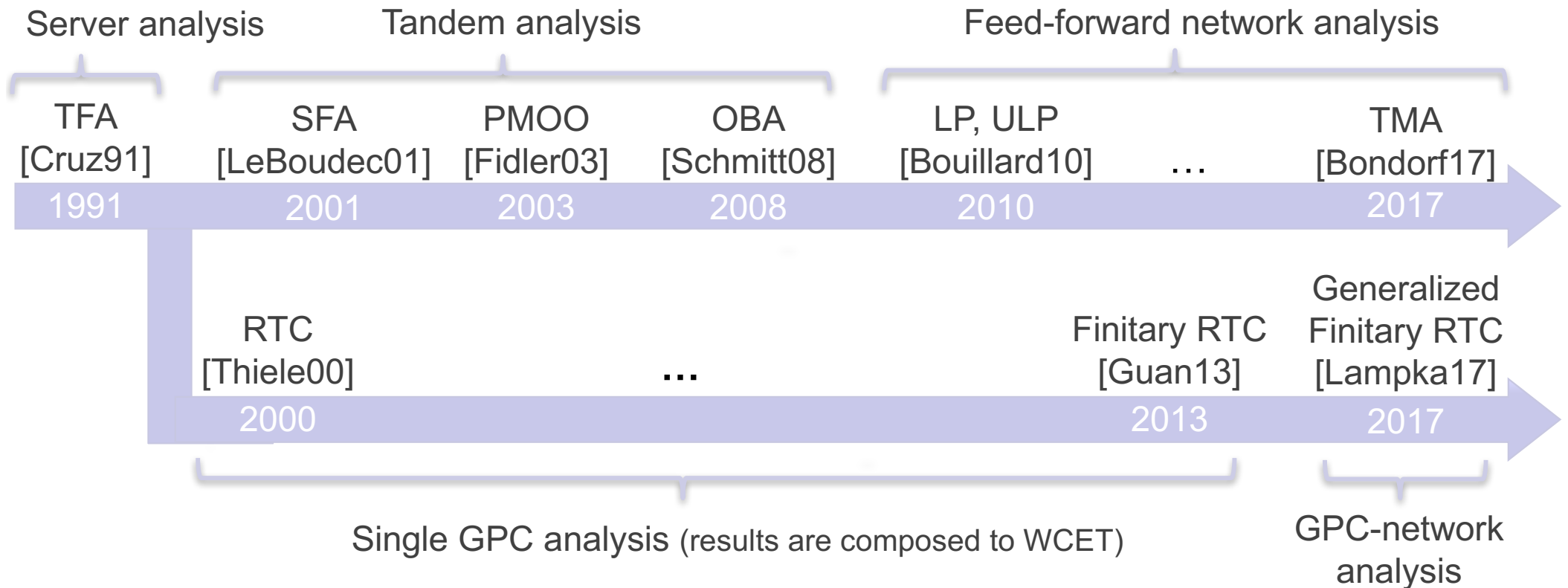


# One Calculus or two Calculi?

## Real-Time Calculus (RTC)

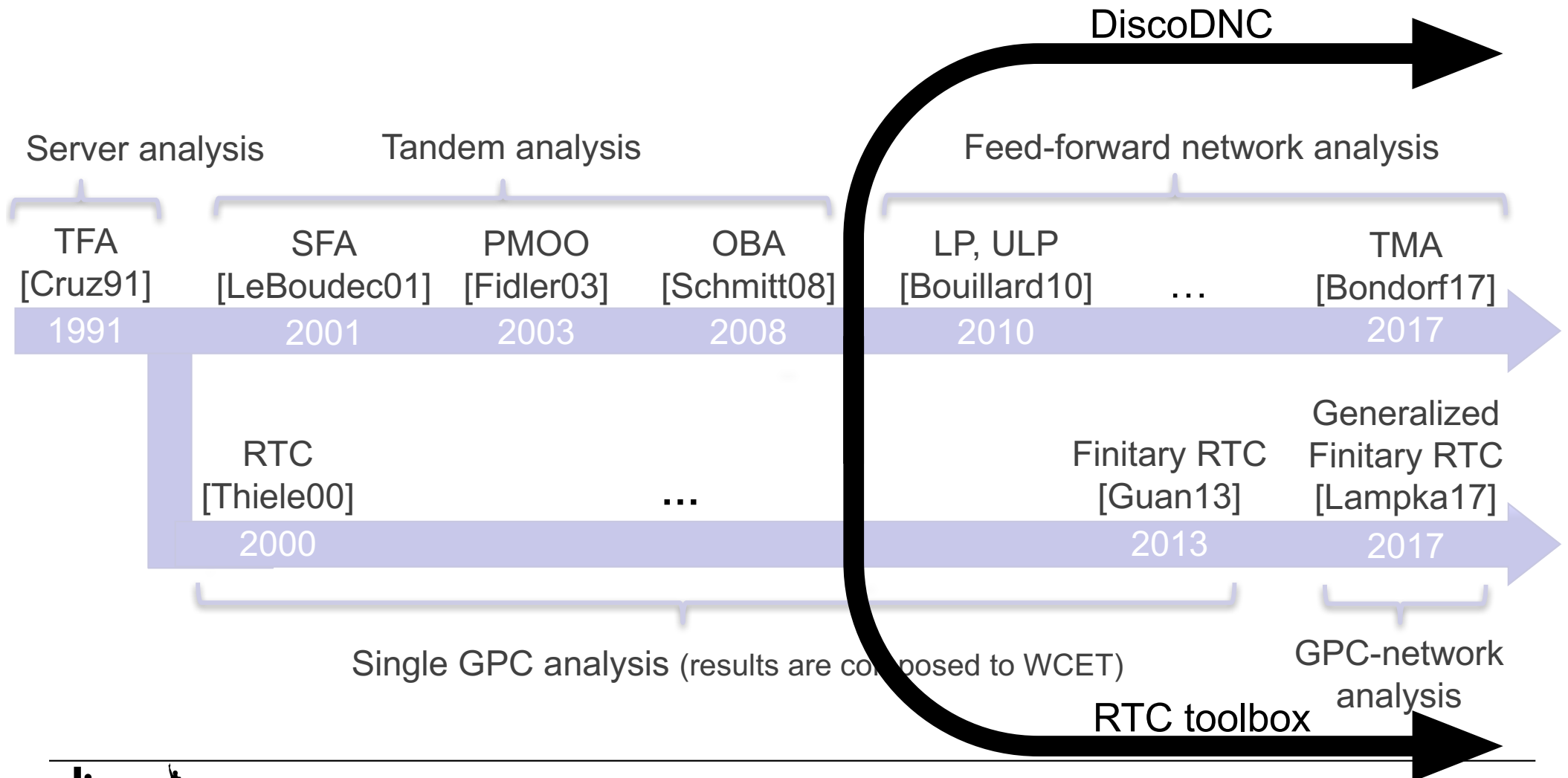
Has a larger focus on improving this part:

- A Calculus for Network Delay, **Part I: Network Elements in Isolation**
  - Bounding functions for data/task arrivals as well as forwarding service/computing resource
- **More accurate workload and resource characterizations**



# One Calculus or two Calculi? Tool Support?

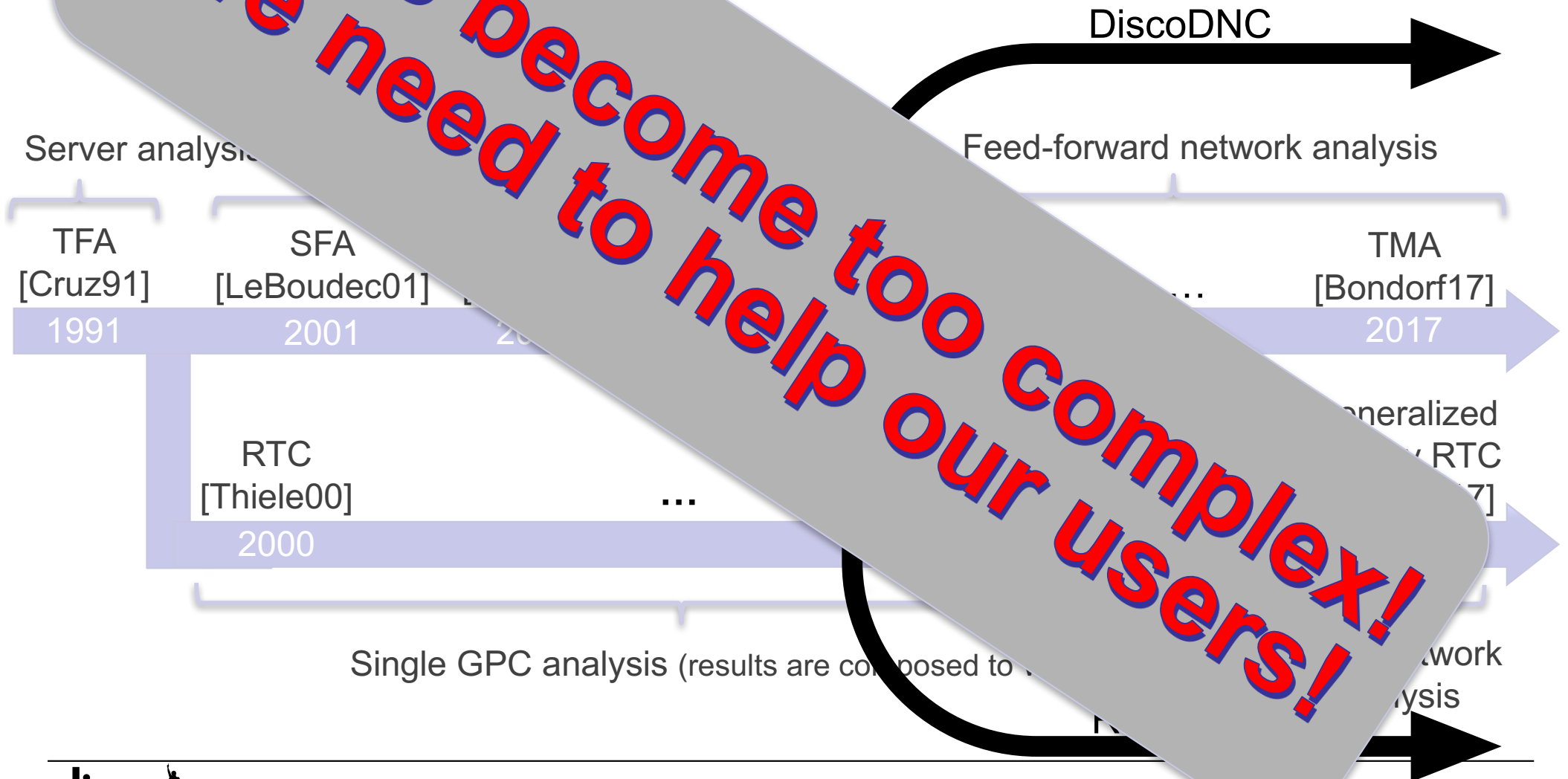
- *The Real-Time Calculus Toolbox*, Wandeler and Thiele, 2006
- *The DISCO Network Calculator*, Schmitt and Zdarsky, 2006



# One Calculus or two Calculi? Tool Support?

- *Tool Support for the Calculus Toolbox*, Wandeler and Thiele, 2006
- *Tool Support for the Calculus Calculator*, Schmitt and Zdarsky, 2006

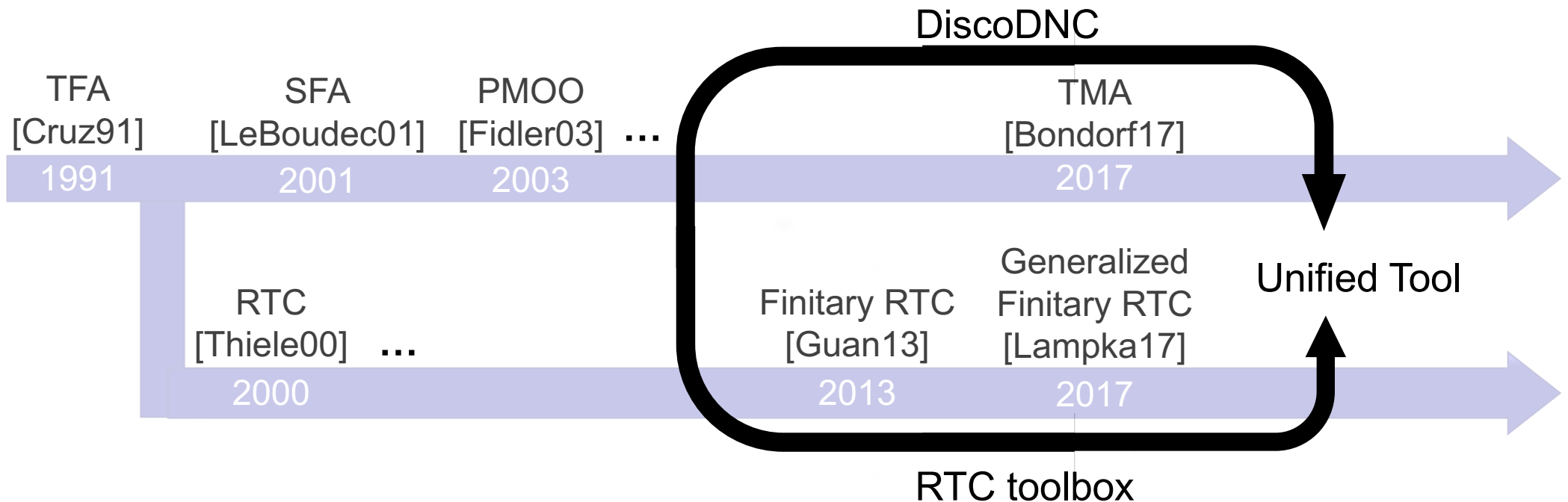
**It has become too complex!  
We need to help our users!**





# One Calculus or two Calculi? Tool Support?

- Our Goal: Unify both tools, gain both their benefits!
  - RTC **More accurate workload and resource characterizations**
  - DNC **More accurate network analysis results**
  - Novel results? Only a single implementation necessary 😊



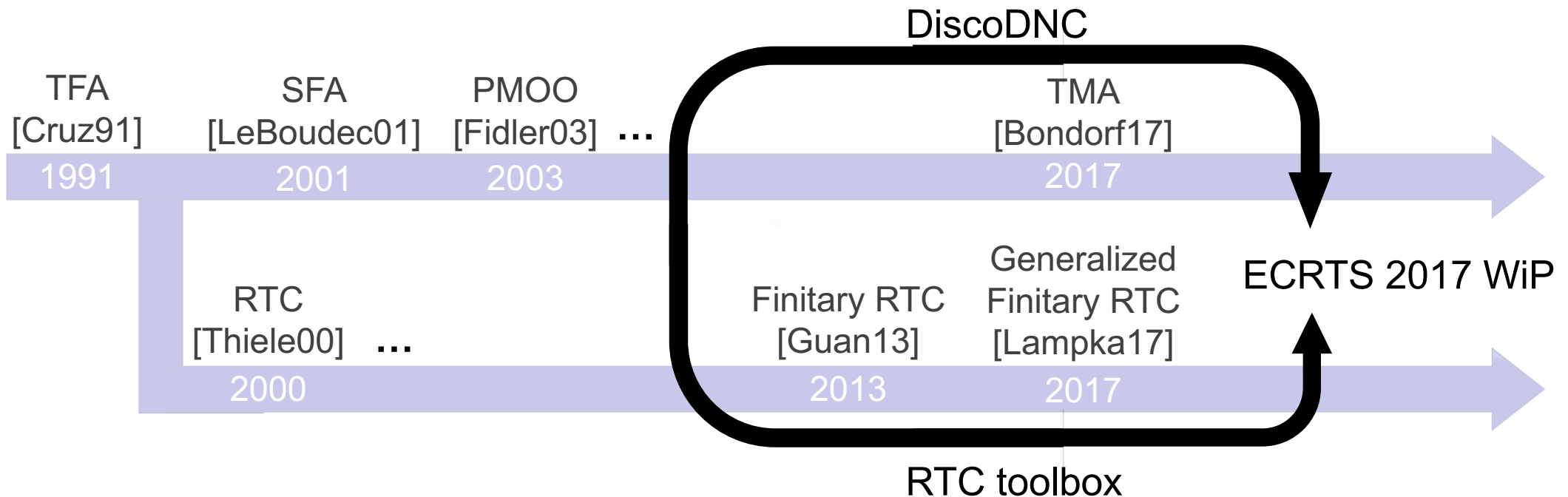
# One Calculus or two Calculi? Tool Support?

## ■ Current State [ECRTS2017WiP]:

- RTC More accurate **workload and resource characterizations**
- DNC More accurate network analysis results

## ■ The DiscoDNC can use the RTC curve implementation ✓

- Proof of concept ✓ (details are in the paper and on the poster)
- Cannot use the the operations yet ✗ (future work)



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