Detector Design Dependencies

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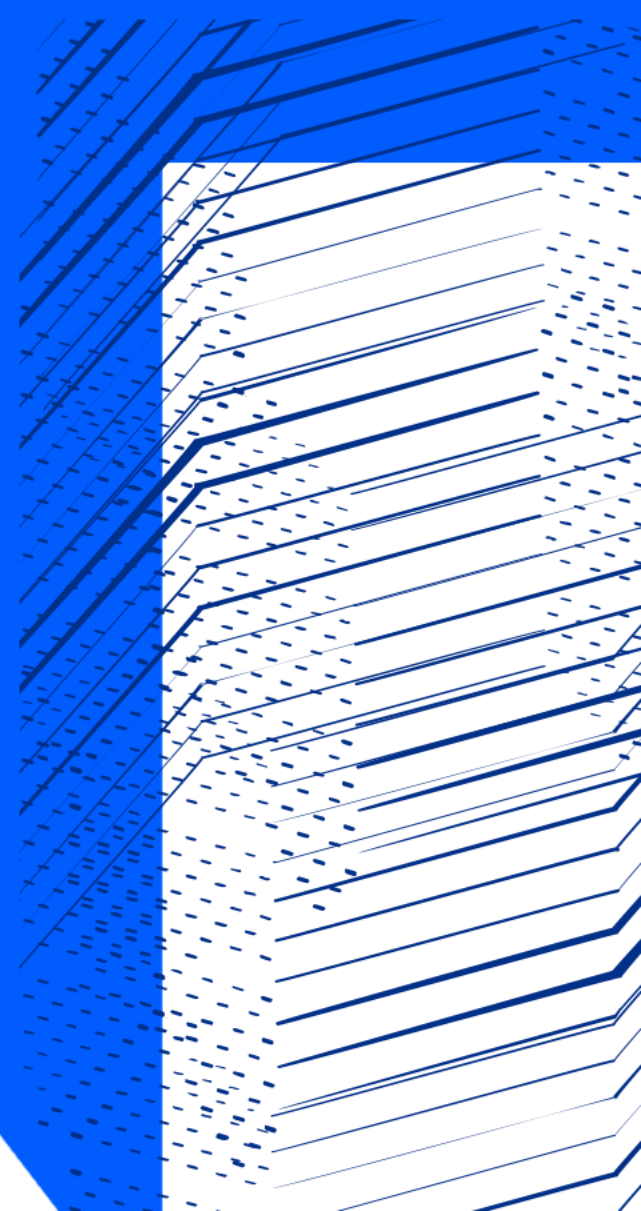
Introduction

Challenges of Solid State Detector Design

- Many complex dependencies

- Low volumes

- High cost/risk

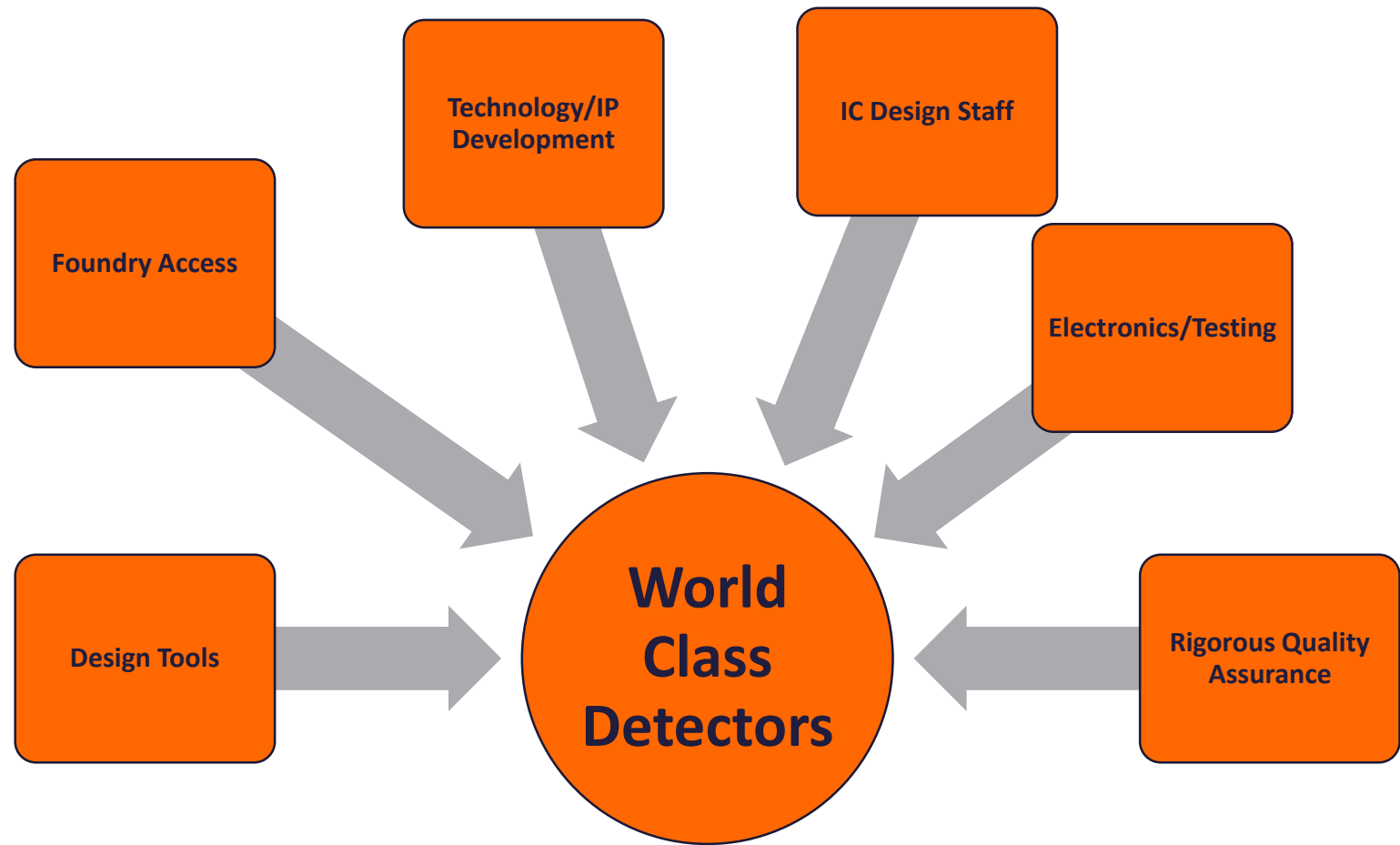- Challenging recruitment environment

Overview

- Situation today – what dependencies are met? Where do we have issues?

- Ideas for the future – what could we do to improve?

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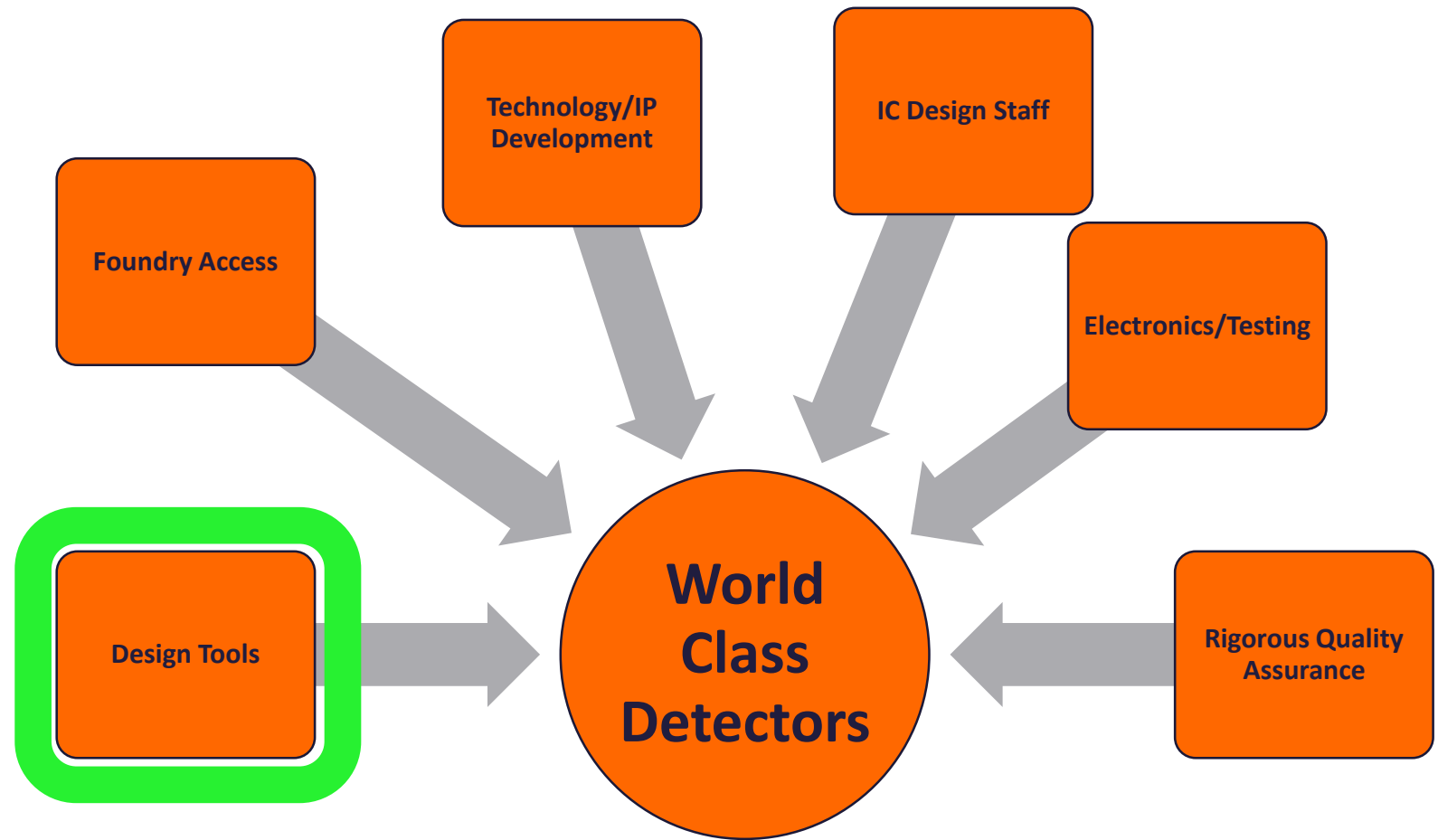# Requirements for Solid State Design

Dependencies

- Many requirements
- Designs cannot be successfully completed without all of them

Requirements for Solid State Design

Design Tools

- Mostly supplied by Europractice

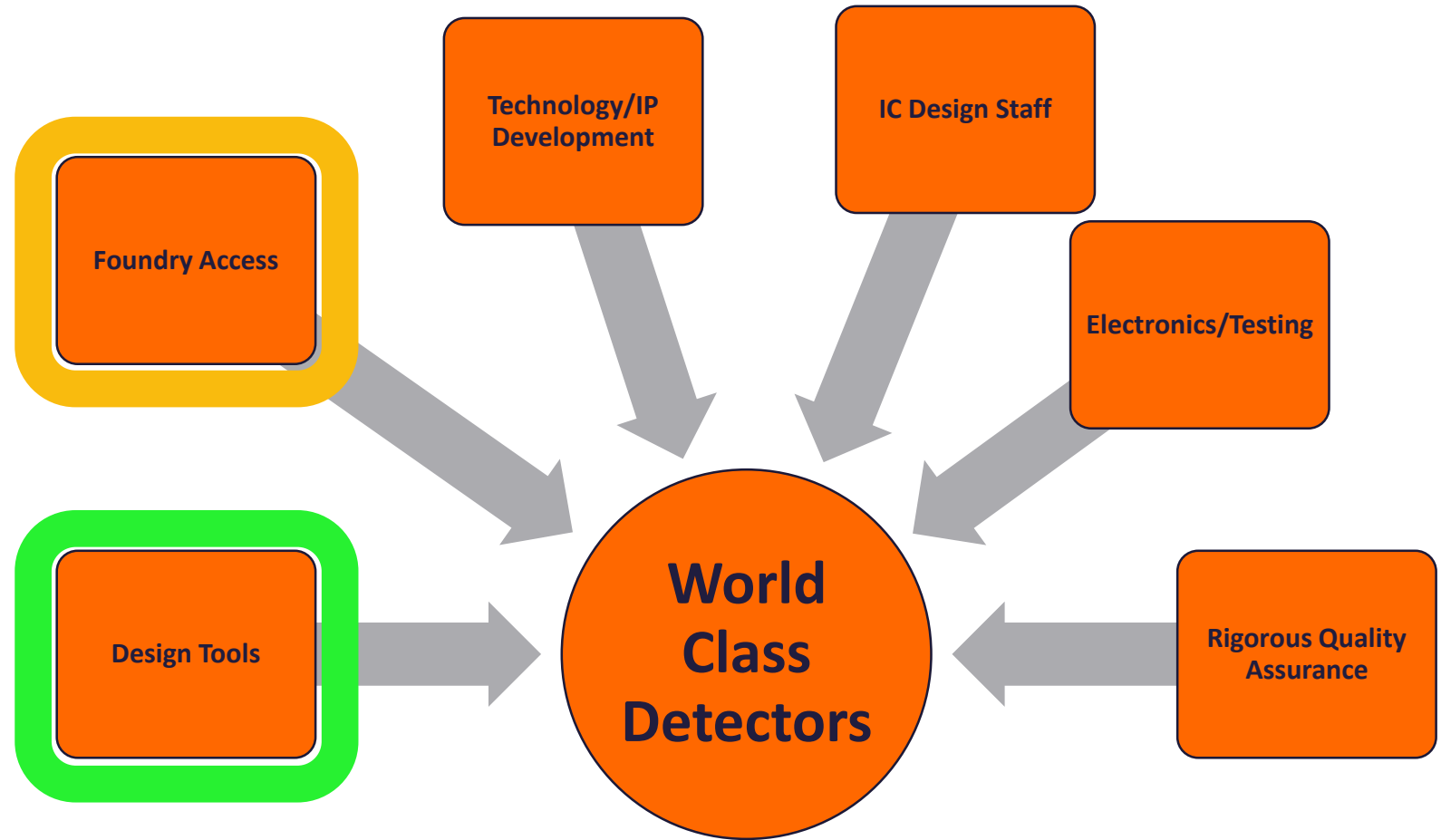- No major issues

- Must remember to acknowledge/support

Technology/IP Development

IC Design Staff

Foundry Access

Electronics/Testing

Design Tools

World Class Detectors

Rigorous Quality Assurance

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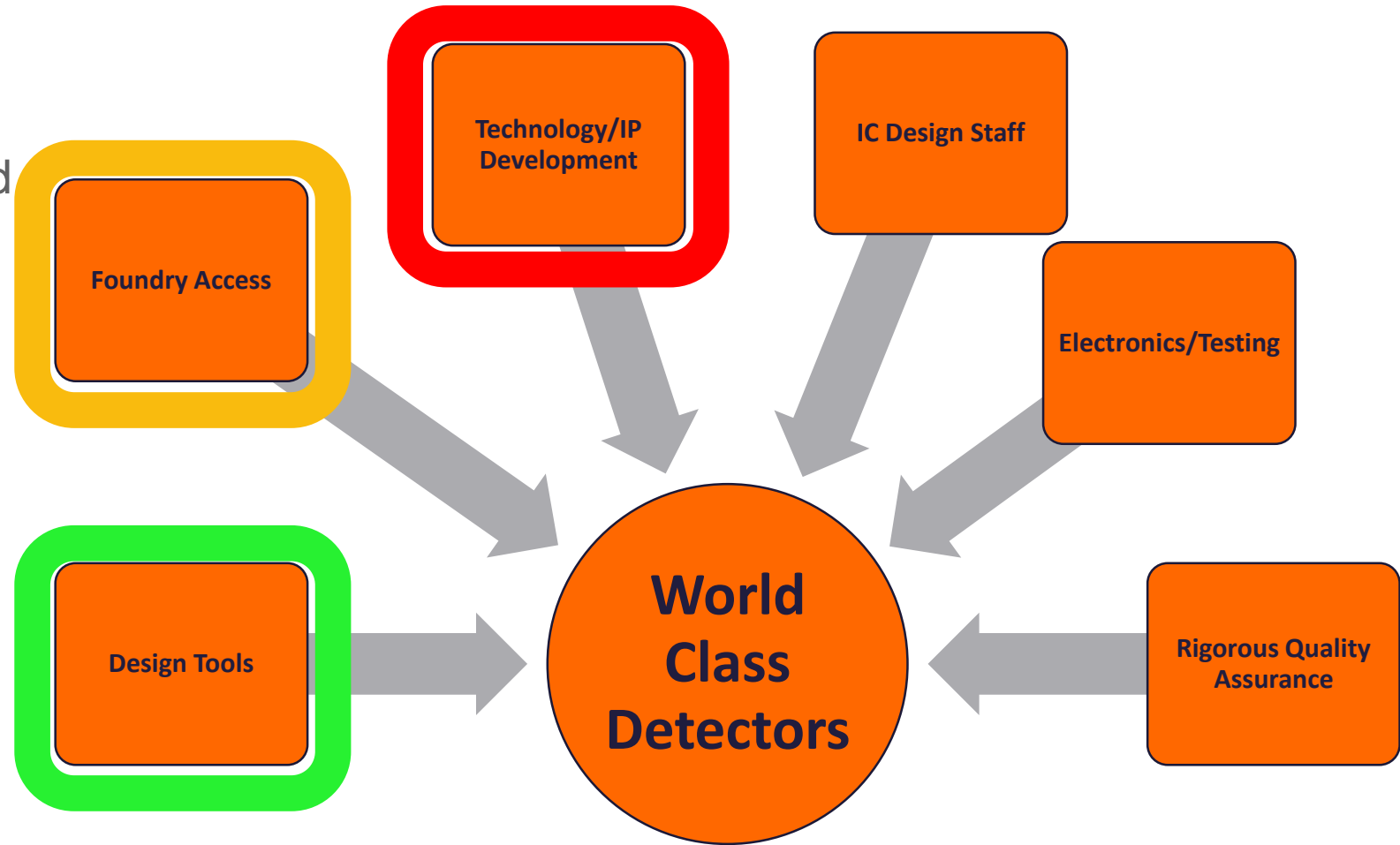
Requirements for Solid State Design

Foundry Access

- Access to Europractice MPWs cost effective

- Detector specific ones missing (Tower, LFoundry…)

- Access often depends on history, relationships, perceived value

- PDK access normally good, TCAD less so

Foundry Access

Design Tools

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World Class Detectors

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Requirements for Solid State Design

Technology/IP Development

- Prototyping of IP blocks and testing of new processes critical

- At the moment, often only begins under project umbrella

- This approach is high risk and leads to us lagging behind

Foundry Access

Technology/IP Development

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World Class Detectors

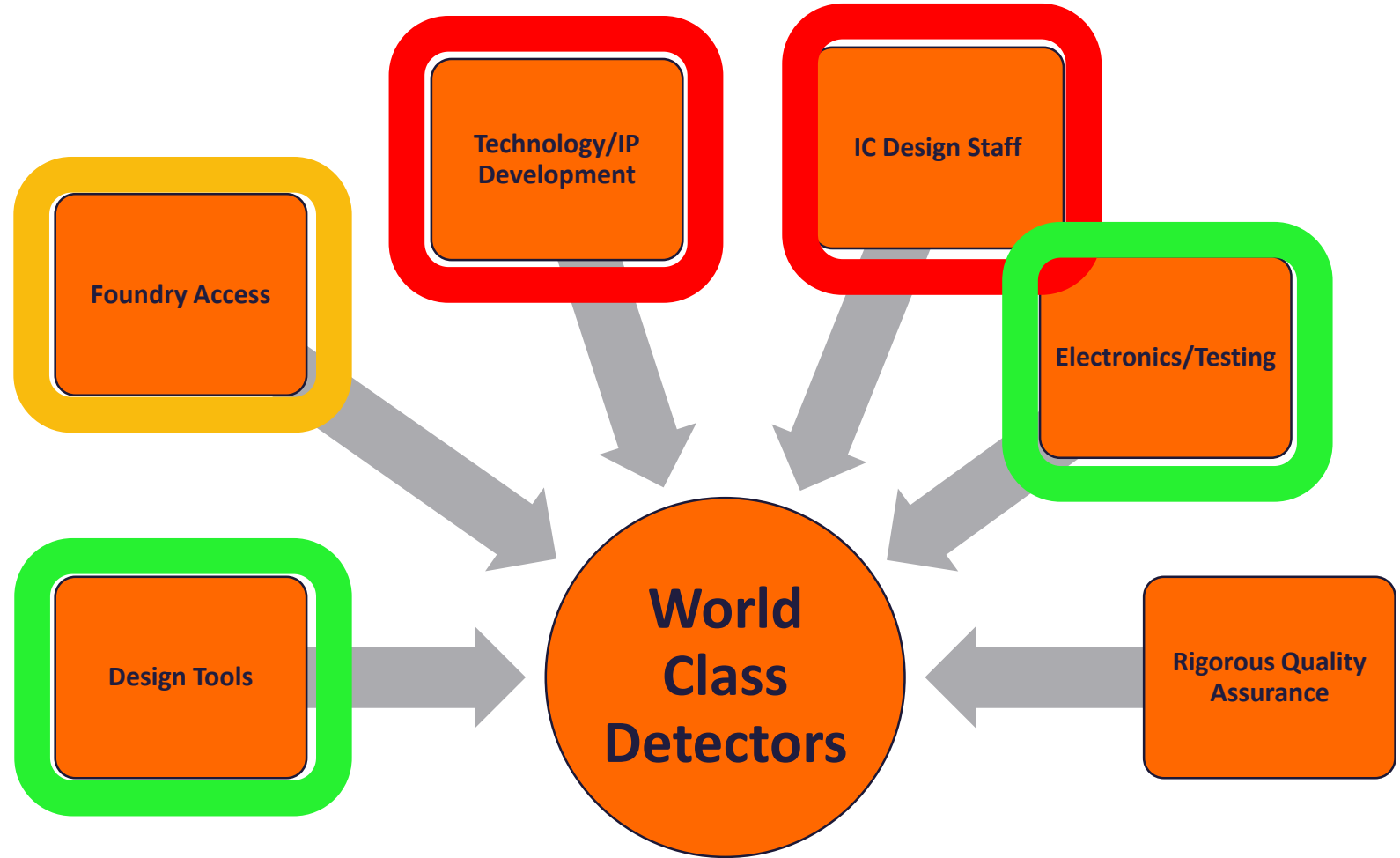# Requirements for Solid State Design

IC Design Staff

- Recruitment and retention of skilled staff is extremely challenging
- Cannot compete on salary with industry
- Critical mass is important
- But we have many selling points…
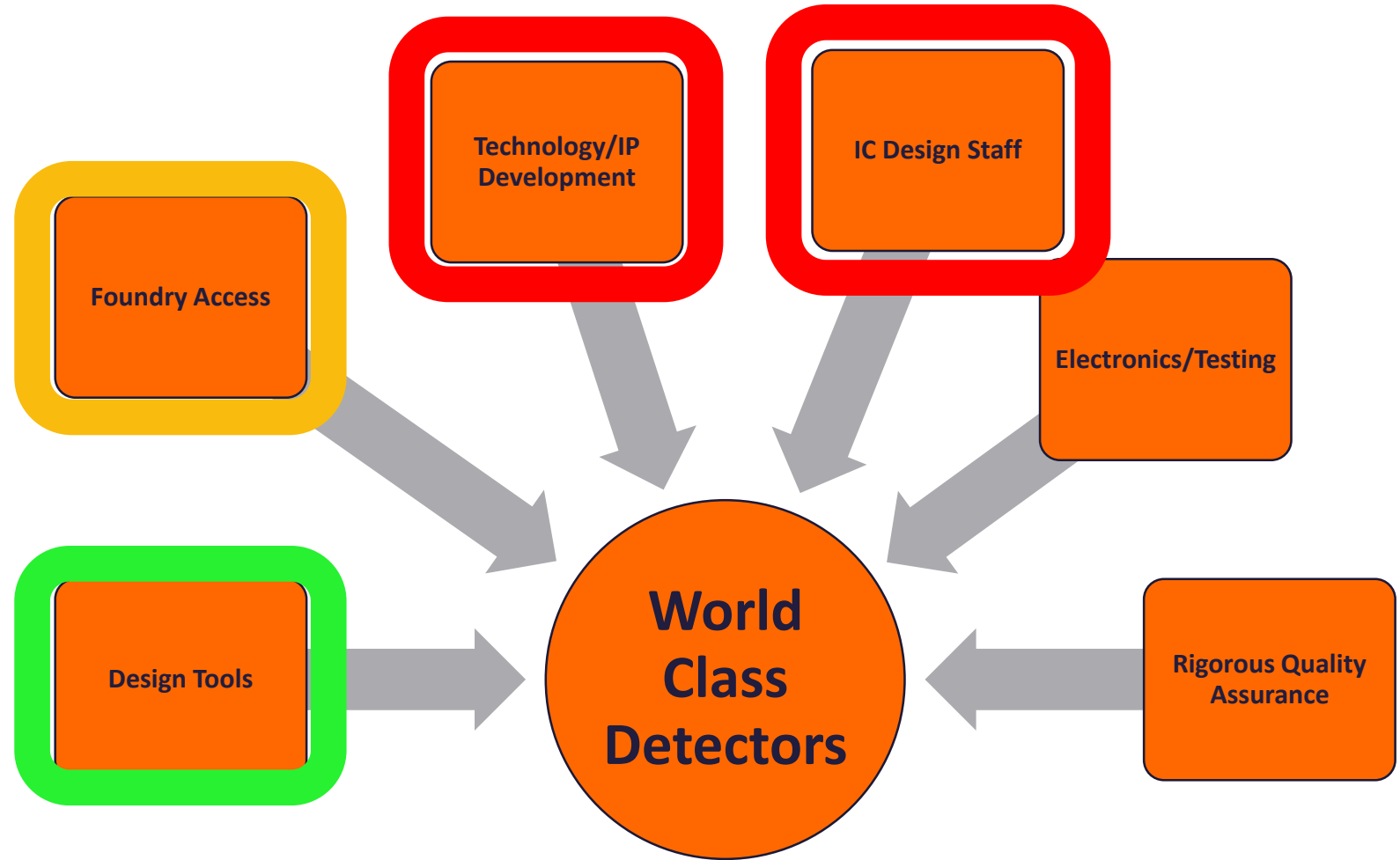
Requirements for Solid State Design

Electronics/Testing

- Availability of test equipment, camera design effort etc. obviously crucial
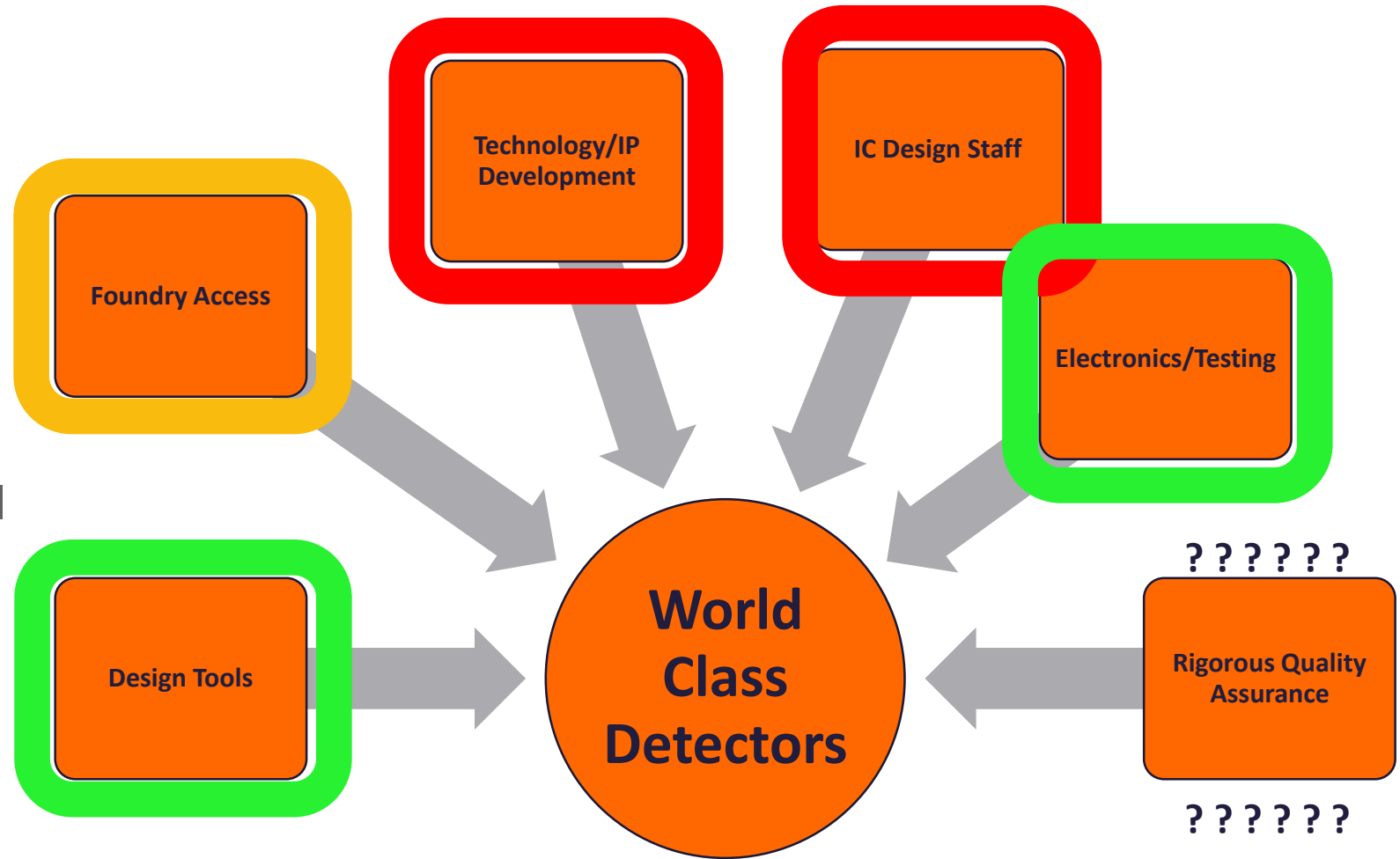- Most institutes have some access to this

Requirements for Solid State Design

Rigorous Quality Assurance

- Critical to projects that might be multi £M
- But cannot say what the status is because never discussed/published
- Requires experience/critical mass
- Therefore compounded by staffing issues

Foundry Access

Technology/IP Development

IC Design Staff

Electronics/Testing

Design Tools

World Class Detectors

Rigorous Quality Assurance

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Ideas for the Future

Current Situation

- **IC Design Staff**

- **Technology/IP Development**

- Foundry Access

- Electronics/Testing

- Design Tools

- Rigorous QA

Need focus on IP/technology development in advance of project need. Long term programme would:

- De-risk projects
- Enable involvement with new projects
- Motivate staff recruitment
- Maintain critical mass/high quality QA

Suggested actions: Fund ongoing R&D, engage with non-PP, even non-detector applications

Access is currently generally possible, but does depend on existing relationships.

Suggested actions: share contacts/silicon where possible, networking channels?, detector processes in Europractice?

No action except in support of other points

Recruitment actions and networking/knowledge sharing will support this

Suggested actions: designer network? Shared design reviews? Gather best practice?

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Summary

Current Situation

- Detectors are complex systems with multiple dependencies

- Many of these are met today, largest issues with staff retention and "background" R&D

Future Ideas

- Long term R&D programme would help in resolving both issues, but requires funding

- Other (cheaper!) options could be improved networking and knowledge sharing

- QA is often overlooked but is vital. Cannot be done without critical mass. Cheap options to do this could be a designers network, visiting reviewers or sharing best practice.

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Questions?