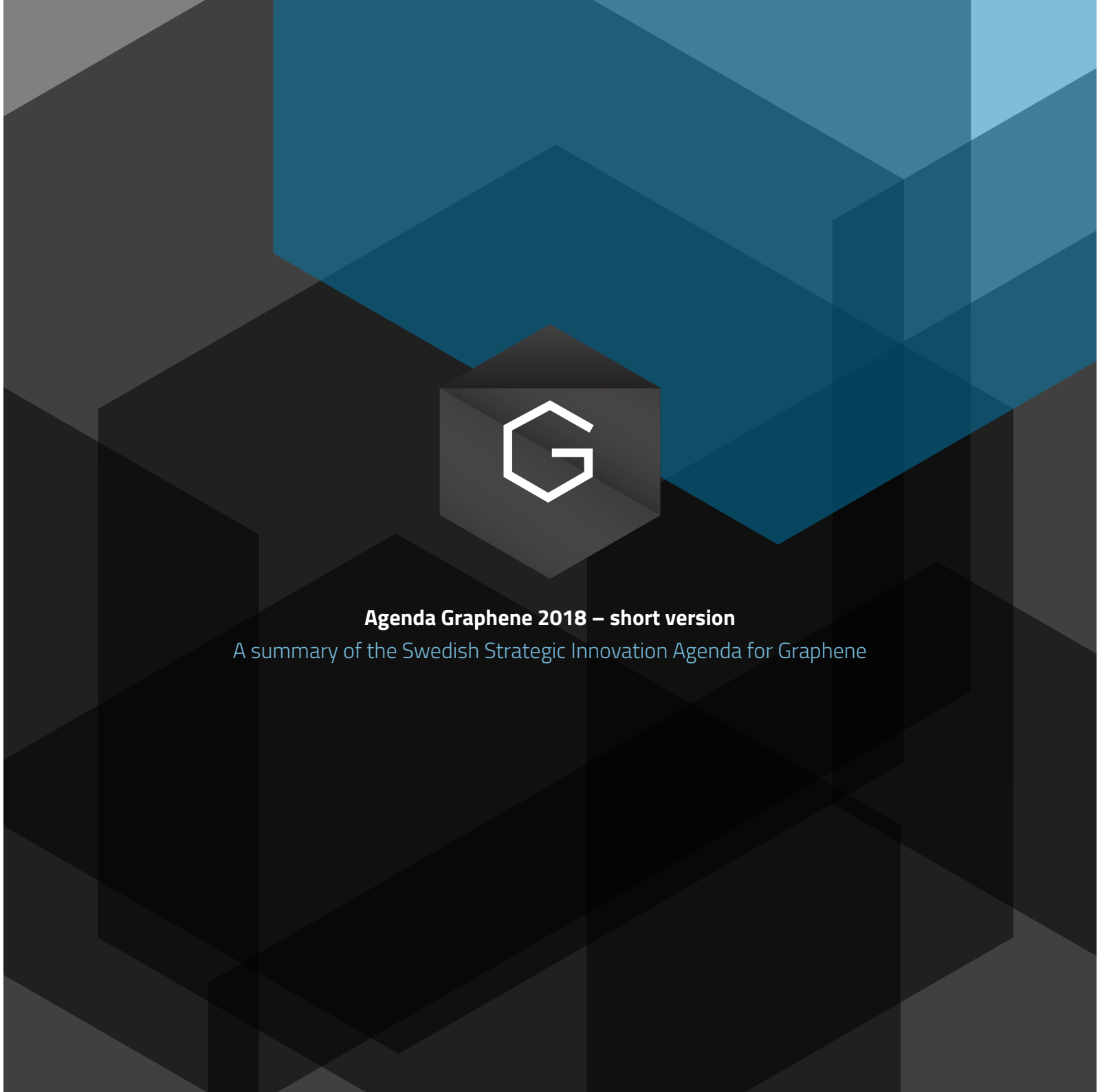

Agenda Graphene 2018 – short version

A summary of the Swedish Strategic Innovation Agenda for Graphene

This is a short version of the Agenda Graphene 2018 – an agenda for Swedish graphene related innovation until 2030. The aim is to strengthen the possibilities for national competitiveness using graphene. The document is produced in collaboration between industry, academia and institutes.

Download the full agenda (in Swedish) from www.siografen.se/agenda-grafen-2018 or order a printed agenda from info@siografen.se.

GRAPHENE AND INNOVATION

Graphene and other 2D materials in the form of films or flakes consist of less than ten atomic layers. These extremely thin materials possess substantially different properties than their bulk counterparts. Graphene is 200 times stronger than steel but flexible, it is transparent but yet impermeable to gases and fluids. Graphene is the best thermal conductor and one of the best electrical conductors. The properties can be utilised within several industrially interesting areas like sensors, coatings, multifunctional materials, biomedical technologies, and similar.

The technology has already started to mature and some examples of consumer products are available on the market, for instance strong and lightweight composites in sports equipment. Coatings, sensors and energy storage products are foreseen in the coming years.

Despite the immaturity and limited access to knowledge and reproducible quality of graphene materials, there is a substantial and widespread interest for collaborative activities to gain critical mass and future supply chains. If the obstacles for technology implementation can be eliminated, Swedish industry will be well positioned for rapid development of products and exploitation of business opportunities.

AREAS OF STRENGTH

- **Electronics:** sensors, printed electronics, high-frequency electronics
- **Composites:** polymer-based with and without fibres, textiles, concrete, metals
- **Coatings:** membranes, barriers, filters
- **Manufacturing:** material production, characterisation, process development, test beds
- **Biotechnology:** medical technology, health and environmental aspects
- **Energy:** storage, energy generation, thermal management

IDENTIFIED CHALLENGES

- Large diversity among technology areas and applications
- Limited access to high-quality graphene
- Low technological maturity
- Lack of complete value chains
- Limited technology-transfer processes between all types of actors
- Issues with upscaling of processes

SIO GRAFEN

SIO Grafen is a Swedish national innovation programme with the ambition to strengthen collaboration between industry and research providers in graphene application areas. The vision is that Sweden should be among the world's top ten countries in deploying graphene to ensure industrial leadership.

SIO Grafen is supported by Vinnova (Sweden's innovation agency), the Swedish Energy Agency, the Swedish Research Council Formas, and by sponsor partners.

GOALS 2025 AND 2020

Goal area A: Establish graphene as a Swedish area of strength

2025-A1	At least 1 demonstrator within each area of strength.
2025-A2	A few products available on the market in the areas of electronics, composites and coatings.
2020-A1	At least 1 demonstrator developed in each of the electronics, composites and coatings areas.
2020-A2	At least 40 industry-driven innovation projects initiated.
2020-A3	3 consumer products available on the market.

Goal area B: Strengthen collaboration

2025-B1	At least one functional supply chain in at least three of the areas of strength are in place.
2020-B1	At least 5 collaboration projects have applied for funding, with partners from both Sweden and other countries.
2020-B2	At least 6 Swedish companies have established business partnerships with foreign customers or suppliers.
2020-B3	Sweden have influenced future European research and innovation calls for funding.
2020-B4	Foreign companies have established R&D activities in Sweden.
2020-B5	Collaborative initiatives together with at least two other strategic innovation programmes have been initiated.

Goal area C: Stimulate the availability of Swedish graphene materials

2020-C1	Secured availability of relevant volumes of graphene materials from Swedish suppliers.
2020-C2	Secured availability of technical material data sheets.
2020-C3	Availability of best-practice guides for the manufacturing of composites, coatings and electronics, as well as information about suppliers of graphene materials.

Goal area D: Offer strategic guidance

2020-D1	Effective knowledge transfer between all levels in the value chains (in both directions).
2020-D2	One common vision for all actors in the network.
2020-D3	One roadmap for each of the areas of strength is produced.

RECOMMENDED ACTIVITIES

Activity 1: Open calls for funding of collaborative innovation projects

We want companies to be able to apply for joint funding together with other partners to create innovation projects.

Fulfils (entirely or partly) goals:

2025-A1 2025-A2 2020-A1 2020-A2 2020-A3 2025-B1 2020-B5 2020-C1 2020-C2 2020-C3

Activity 2: Open calls for funding of demonstrator projects

We want organisations in a value chain to be able to apply for funding for creating a demonstrator by 2020.

Fulfils (entirely or partly) goals:

2025-A1 2025-A2 2020-A1 2020-A3 2025-B1

Activity 3: Workshops

We want to offer application- and technology-specific workshops to enhance collaboration, to increase knowledge levels, and to enable innovations.

Fulfils (entirely or partly) goals:

2025-A1 2025-A2 2020-A1 2020-A2 2020-A3 2025-B1 2020-B1 2020-B5 2020-D1 2020-D3

Activity 4: Conferences

We want to offer two yearly conferences – one with a strategic focus (General Assembly) and one focused on project results (Svenskt Grafenforum).

Fulfils (entirely or partly) goals:

2020-A3 2020-B5 2020-D1 2020-D2 2020-D3

Activity 5: Characterisation cheques

We want to improve the knowledge of the quality of different graphene materials. Therefore, organisations should have the possibility to apply for funding for characterisation cheques. All information will be published in a database with open access.

Fulfils (entirely or partly) goals:

2020-C1 2020-C2 2020-C3 2020-D1

Activity 6: Internationalisation

We want to support the establishment of global value chains, by:

- ensuring that Swedish companies are utilising existing funding opportunities;
- influencing the forthcoming funding strategies in the European Communities (EC)
- collaborating with the new business developers in the Graphene Flagship
- creating international business-collaboration opportunities in collaboration with other strategic innovation programmes.

Fulfils (entirely or partly) goals:

2020-B1 2020-B2 2020-B3 2020-B4

Activity 7: Research and business intelligence

We want to enhance the knowledge base in the network, by providing:

- research intelligence reports, twice a year;
- weekly newsletters with surveys of the latest news on industry, products and trends;
- reports from conferences.

Fulfils (entirely or partly) goals:

2020-A2 2025-B1 2020-B1 2020-B2 2020-B3 2020-C3 2020-D1

Activity 8: Seminars

We want to increase knowledge transfer, by offering seminars and online courses.

Fulfils (entirely or partly) goals:

2020-C3 2020-D1

Activity 9: Template for IP handling and project agreements

We want to provide templates for agreements in order to facilitate collaboration between smaller and larger companies, as well as with research providers.

Fulfils (entirely or partly) goals:

2020-B1 2020-B2 2020-B3 2020-B4 2020-B5

Activity 10: Outreach

We want to support the creation of value chains with an active outreach activity. Specific discussions with each potential organisation in order to find incentives, business opportunities, project opportunities and future collaborating partners will be performed.

Fulfils (entirely or partly) goals:

2025-B1 2020-B1 2020-B2 2020-B3 2020-B4 2020-B5

Activity 11: Test bed – LIGHTest

We want to explore how 2D materials can be included in test and demo facilities for new materials – through the ongoing collaboration project LIGHTest.

Fulfils (entirely or partly) goals:

2020-B1 2020-B2 2020-B3 2020-B4 2020-C3 2020-D1

Activity 12: Roadmaps

We want to provide each area of strength with a Swedish roadmap.

Fulfils (entirely or partly) goals:

2020-C1 2020-C2 2020-C3 2020-D2 2020-D3

Activity 13: Communication

We want SIO Grafen to be recognised as a trustworthy and serious platform for R&D projects in the graphene area. The communication channels are *the SIO Grafen webpage, newsletters, Twitter* and *LinkedIn.*

Fulfils (entirely or partly) goals:

2020-B1 2020-B2 2020-B3 2020-B4 2020-C3 2020-D1 2020-D2 2020-D3

Activity 14: Research funding

We want to be able to offer funding possibilities for long-term, needs-driven, industrial PhD projects. Funding is not available through SIO Grafen, but needs to be financed by other financing agencies.

Fulfils (entirely or partly) goals:

2025-A1 2025-A2 2020-B5 2020-D1

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