

This is one of a series of Newsletters to keep interested parties informed about the progress of activities in Australasia related to the SKA radio telescope project. Previous newsletters are available from ► www.ska.gov.au

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*The Australian SKA booth at the SKA Forum in South Africa.
Photo Credit: Department of Commerce, WA.*

SKA Forum Cape Town

The 2009 International SKA Forum and a series of related meetings were held in Cape Town, South Africa in February 2009. The meetings were widely regarded as a success, with several important milestones for the SKA project being reached.

The Forum itself was kicked off by South Africa’s Minister of Science and Technology, Mr Mosibudi Mangena. A feature of his address was the announcement of a collaborative science program involving South Africa’s MeerKAT telescope and the Australian SKA Pathfinder. The news was well received by the international SKA community, with several subsequent speakers welcoming the announcement.

The Forum provided an opportunity for both the South African and Australian SKA project teams to provide updates on their precursor instrument programs and site preparations.

Troy Buswell, Western Australia’s Minister for Science and Technology, Professor Brian Boyle, CSIRO’s SKA Director, and Dr David DeBoer, ASKAP Project Director, gave presentations on behalf of Team Australia. Senator Kim Carr, Federal Minister for Innovation, Industry, Science and Research, also addressed the Forum via a pre-recorded message (a video of the address can be found under ‘SKA Visual Media’ at the bottom of the webpage <http://www.ska.gov.au/media/>).

The Australian presentation highlighted the successful development and testing of Phased Array Feed (PAF) receiver

technology by CSIRO engineers. The PAF is an innovative type of digital camera that will greatly enhance the wide-field-of-view observing capabilities of radio astronomy. Also featured was Australia's SKA candidate site.

Other Forum speakers included Professor Richard Schilizzi, Director of the SKA Program Development Office who provided an update on the SKA project. Dr Robert-Jan Smits of the European Commission discussed the EC's ongoing commitment to the project and the need to broaden both financial and political support for the project on a global scale.

Dr Bruce Elmegreen of IBM, USA explained the relationship between the SKA and the development of complementary computing technologies, highlighting the benefits of such large projects on the overall development of technology. In closing the day, Professor John Womersley (Science and Technology Facilities Council in the UK) spoke of his hopes for continued support and development of the SKA, especially in light of the current global economic conditions.

In a busy week of meetings alongside the SKA Forum, much was achieved in advancing the preparatory program for the SKA.

At a landmark meeting of the funding agencies which meet informally to consider the SKA project, it was agreed that an Agencies SKA Group would be formed. This group will develop a non-binding implementation agreement for the SKA by the conclusion of the European Union-funded SKA Preparatory Study (PrepSKA) in around 2011–12.

The PrepSKA Board also met in Cape Town to review progress in the various PrepSKA work packages, especially the main design and technology development elements.

The next SKA Forum will be held in the Netherlands in May 2010.

SKA Taskforce, Department of Innovation, Industry, Science and Research

Mid West Development Commission in Cape Town

The Mid West was well represented at the annual SKA Forum held in Cape Town, South Africa recently.

Development Commission Chief Executive, Steve Douglas, along with City of Geraldton-Greenough CEO Tony Brun and Mid West Indigenous representatives Roderick Simpson, Gavin Egan and Janey Ronan, accompanied the Western Australian delegation headed by Treasurer and Minister for Science and Innovation, the Hon. Troy Buswell.

As part of its SMART Mid West policy, the Mid West Development Commission (MWDC) has led the Mid West effort to establish a radio astronomy industry in the region for the past 10 years.

Mr Douglas said the main aim of attending the Conference was to demonstrate Mid West regional and community support to help secure the major \$3 billion (1.5 billion euro) SKA project. A decision on the site for SKA, which rests between Australia and South Africa, is expected to be made in 2012.

"Ground work is soon commencing on the \$100 million Australian Square Kilometre Array Pathfinder (ASKAP) project, which in itself will be the largest instrument of its kind in the world. Whilst important in its own right, ASKAP will also go a long way towards demonstrating the merits of the site in Australia, the quality of Australian technology and innovation, and our capability to deliver major projects," Mr Douglas said.

"Ensuring Mid West interests are well represented at this annual international SKA forum is an important way to secure the best possible outcomes for local industry and people from this project," he said.



From Left (Front): Lyn Beazley, Janey Ronan, Roderick Simpson, Steve Douglas (Back): Tony Brun, Minister Buswell and Gavin Egan. Photo Credit: City of Geraldton-Greenough.

Steve Douglas, CEO Mid West Development Commission

Ministers Announce South Africa–Australia Science Collaboration

At the SKA Forum in Cape Town on 25 February, South Africa's Minister of Science and Technology, Mosibudi Mangena, after discussions with Australia's Minister for Innovation, Industry, Science and Research, Kim Carr, announced a new collaborative venture between South Africa and Australia.

They noted that to date the Governments, along with the State Government of Western Australia, have together

committed approximately 150 million euros (around \$296 million Australian dollars) to the international SKA program to bring this iconic global project to fruition. They agreed that it is now time for Australia and South Africa to work more closely together in partnership to advance the global SKA program.

To this end, South Africa and Australia will collaborate in the development of a coordinated scientific and technical program for the SKA pathfinder telescopes – the South African pathfinder MeerKAT and the Australian SKA Pathfinder (ASKAP), currently being developed by the Commonwealth Scientific and Research Organization (CSIRO).

Astronomers will be able to exploit the complementary and common nature of the two SKA pathfinder facilities, conducting science that is aligned with the SKA reference mission, as well as capitalising on science opportunities provided by new astronomical facilities at other wavelengths.

The Ministers noted that the SKA pathfinder collaboration program will further stimulate academic collaboration and exchange between Australia and South Africa.

A collaboration group between Australia and South Africa has since been set up, spearheaded by ASKAP and chaired by the International SKA Project Scientist. Scientific outcome areas and key individuals are being identified to further the scientific impact of both instruments and to further the SKA.

A series of workshops will also be facilitated by the Centre for Astrophysics and Cosmology at the University of Cape Town and the International Centre for Radio Astronomy Research (ICRAR) in Perth, which will lead to a coordinated approach to science surveys by South African and Australian researchers, and will include joint student and visitor programs.

SKA Taskforce, Department of Innovation, Industry, Science and Research, Lister Staveley-Smith, International Centre for Radio Astronomy Research (ICRAR) and CSIRO

The SKA 2009 Science Workshop and Visit to the Karoo Site

The SKA 2009 community workshop on high dynamic range continuum imaging was held in Cape Town from 18 to 20 February.

The science meeting began with a summary of the SKA science case followed by an invited talk by CSIRO ATNF's Ilana Feain on the case for high dynamic range imaging of high redshift, low power radio galaxies. The first day of the meeting continued with discussion of the synergies between

SKA and other major telescope projects like ALMA (Atacama Large Millimeter Array) and Generation-X (an X-ray telescope), as well as some excellent summaries of pathfinder science with ATA (Allen Telescope Array), LOFAR (a low frequency array) and South Africa's SKA Pathfinder, MeerKAT.

The second day of the meeting began with two excellent overviews of dynamic range and confusion in deep SKA surveys by Jim Condon and Bill Cotton, followed by a number of talks that focused on the technical requirements for achieving high dynamic range in terms of array configuration, antenna specifications and processing and calibration of the data. Aperture array and polarisation calibration were also mentioned. The last day of the meeting began with an overview of ASKAP and its PAFs by ASKAP Project Director David DeBoer, and of the Dutch APERTIF by Tom Oosterloo. In the afternoon ASKAP Project Scientist Simon Johnston gave an invited talk on the calibration and polarisation requirements for pulsar timing with the SKA. This was followed by a talk by Geoff Bower on transient imaging requirements. The SKA project engineer, Peter Dewdney, gave a wrap-up summary of the meeting at the end with a very realistic reminder of the technical challenges faced in achieving dynamic ranges of ~70 dB with SKA.

During the meeting ASKAP team members had some excellent discussions with the MeerKAT science group about the options for complementary scientific programs. These discussions are just the beginning of an ongoing dialogue between the ASKAP and MeerKAT project scientists to further explore the strong complementarities between the two SKA pathfinders.

Over the weekend following the science workshop, a group of delegates (scientists, funding agency representatives and other visitors) were taken up to see the Southern Africa Large Telescope (SALT) and the South Africa SKA candidate site in the Karoo, roughly 6 hours north of Cape Town. The first stop in Sutherland featured a tour of SALT, which is a telescope modelled on the Hobby-Eberly Telescope in Texas and built by an international consortium, which is currently still in commissioning phase.

After staying overnight in the town of Sutherland, the group then drove down the road to the Karoo site, which is about 70 km from the town of Carnarvon. The site support facility is about 10 km out of Carnarvon and is a beautiful renovated farm-house. Another 60 km or so up the road is the KAT site, which featured some of the 'KAT-7' foundations and the shell of the antenna fabrication building. After a wonderful meal at the support facility, the group stayed overnight in Carnarvon then drove back to Cape Town the next morning.

Ilana Feain and David DeBoer, CSIRO ATNF

Science News

Australia Demonstrates High Speed Trans-Continental Radio Astronomy

A collaboration of Australian organisations has been taking the first steps toward real time processing of vast data volumes in readiness for the SKA: the International Centre for Radio Astronomy Research (ICRAR), the CSIRO, Australian Advanced Research Network (AARNet), iVEC (www.ivec.org), and the University of Tasmania. On 11 March, these organisations demonstrated the transfer of data at 1 Gbps from each of three CSIRO telescopes on the east coast of Australia, plus 128Mbps from the University of Tasmania telescope in Hobart, over AARNet and iVEC networks, to the Curtin University Parallel Processor for Astronomy (CUPPA) at the Curtin node of ICRAR (ICRAR is a joint venture between Curtin University of Technology and the University of Western Australia). The data transfer occurred in real-time over the 3000+ km between the east coast and Perth and the data were also processed in real-time. This demonstration achieved a useful scientific instrument for sensitive, high resolution radio astronomy, and demonstrated Australia's path toward technical readiness for the SKA.

Once the ASKAP is constructed in Western Australia, it will be added to this trans-continental radio astronomy array and will triple the resolution of the instrument.

Professor Steven Tingay, Director, Science and Operations, Curtin Institute of Radio Astronomy and Deputy Director ICRAR

Murchison Widefield Array (MWA) Update

Following work on the interim system in November 2008, over 1.5TB of test data were collected from the MWA's 32 antenna prototype system. These data have been analysed and used for engineering tests as well as in exercising the imaging performance of the system and data analysis software. Following completion of tests the 32 antenna hardware correlator will be installed on-site in Western Australia in April 2009. A 3–4 month commissioning period will then commence, leading to a full end-to-end demonstration of a 32 antenna system in July or August 2009.

Further information can be found on the newly launched MWA web page at <http://www.mwatelescope.org>

Steven Tingay, Director, Science and Operations, Curtin Institute of Radio Astronomy

ASKAP Industry News

ASKAP's industry engagement activities continue to strengthen as we move from early research and development phases into prototyping and refinement of ASKAP's design. The project team especially acknowledge the support and interest of the

Australian SKA Industry Consortium (ASKAIC) which continues to offer both practical help and excellent guidance in shaping our plans for industry involvement.

Our signature events, the regular industry briefings, continue to offer opportunities for group and one-on-one discussions between industry representatives and CSIRO, associated research institutions, and Government personnel. A Murchison Radio-astronomy Observatory (MRO) general site infrastructure briefing was given in both Sydney and Perth in February, with over 200 firms in attendance. More recently, Minister Carr (DIISR) and Parliamentary Secretary to Treasury, Commerce, Science and Innovation, Barry House (WA Government) jointly hosted an ASKAP/SKA industry gathering at Perth's Convention Centre on 25 March which was well attended by Western Australia's astronomy and business community. This event directly followed a meeting by the Industry Participation and Procurement Advisory Group (IPPAG) where strategic industry matters are addressed by a panel of industry engagement practitioners.

Further details from the talks presented can be found at <http://www.atnf.csiro.au/projects/askap/briefing.html>



Full house at industry briefing at CSIRO Marsfield lecture theatre. Photo Credit: Phil Crosby CSIRO ATNF.

A new web-based subscription form for companies interested in receiving the SKA News for Australian Industry newsletter was also launched; for details see <http://www.atnf.csiro.au/projects/askap/industry.html>

We were delighted to see several ASKAIC members join us in Cape Town for the 2009 SKA Forum and associated meetings. Many of these events had importance to industry engagement at both the pathfinder and full SKA level, in particular the WP5 committee which is focussed on industry participation and procurement.

Under John Humphreys' good stewardship, ASKAIC itself continues to meet regularly as industry's main conduit

into ASKAP/SKA's project opportunities. The most recent meeting in mid March was held at Telstra's impressive facility on Black Mountain, Canberra, followed by an inspection of CSIRO's Deep Space Communication Complex at Tidbinbilla (managed by Raytheon on behalf of CSIRO and NASA), this being the latest in a series of informative visits to highly relevant technical facilities.



ASKAIC members at CSIRO's Deep Space Communications Centre, ACT. Photo Credit: CSIRO.

The Industry Opportunities Register continues to be periodically refreshed and is downloadable as a PDF from the ASKAP industry website. As the project moves through various procurement stages, Requests for Tenders (RFTs) will be announced on the ASKAP website together with any supporting information, as well as being listed on the AusTender website. The on-line SKA Directory is still growing with over 400 firms now registered, indicating strong local interest and capability.

Over the last 6 months contracts to industry have increased steadily ranging from a few hundred dollars to a \$10 million order for the 36 dishes. An interesting recent contract was awarded to Puzzle Precision in NSW for supply of high quality complex printed circuit boards.

Things have been happening at the strategic level too. Engagement with the Boeing Company under the CSIRO-Boeing Joint Technical agreement has enabled exchange of best practice knowledge, including a "lessons learned" session with Boeing's Geraldton facility management. An "arm's length" team (from Boeing's Korean plant) conducted stage one of a free, independent systems review of ASKAP, with stage two likely to occur in October this year.

Other "in-kind" contributions from Australia's aerospace sector are commencing with Raytheon Australia generously offering places on their certified systems engineering course, and negotiations with Cisco to embed a specialist systems engineer. Horizon and Lycopodium are two WA companies assisting the ASKAP team to address the options and opportunities around provision of a sustainable energy source at the MRO.

Finally, we can now formally announce that Phil Crosby, ATNF's Business Strategist, has been seconded to the SKA Program Development Office (SPDO) based at the University of Manchester, UK. Phil will undertake the role of Manager – Industry Participation Strategy, for about two years commencing in April, while pursuing a part-time PhD concerned with improving success with mega-science projects.

Carole Jackson, CSIRO ATNF Business Development Manager

New CSIRO CEO Inspects ASKAP Phased Array Feed

It was standing room only as CSIRO staff welcomed their new Chief Executive, Megan Clark, at an afternoon tea, held at the Marsfield facility on 2 March.

Megan gave a brief presentation on CSIRO strategy, stressing the continuing importance of excellence in science, integrity and trust as a foundation of future CSIRO activity.

Dr Clark then spent time touring the facility, discussing the ASKAP and SKA projects with CSIRO SKA Director Brian Boyle, Acting CSIRO ATNF Director Lewis Ball and ASKAP Project Director David DeBoer.



CSIRO CEO, Megan Clark (Centre) with David DeBoer (Left) and Lewis Ball (Right) inspecting the revolutionary chequerboard phased array field in the Marsfield workshop. Photo Credit: Tony Crawshaw CSIRO ATNF.

A highlight of the visit was demonstrating to Megan the ground-breaking technology that will be used in the ASKAP project. This included an examination of the innovative chequerboard PAF that was being upgraded in the laboratory at the time of her visit. The PAF will be returning to the Parkes test-bed facility in April.

Tony Crawshaw, CSIRO ATNF Communications and Outreach Manager

International Centre for Radio Astronomy Research

The Western Australian Minister for Science and Innovation, the Hon. Troy Buswell, announced in December 2008 the establishment of the International Centre for Radio Astronomy Research (ICRAR), a joint venture between the University of Western Australia (UWA) and Curtin University of Technology, supported with \$20 million funding from the Government of Western Australia. The centre will be based in Perth and will incorporate activities at Geraldton, in the State's Mid West region. UWA's Professor Peter Quinn has been appointed centre director, together with deputy directors Professors Lister Staveley-Smith (UWA), and Steven Tingay and Peter Hall, both leading radio astronomy researchers based at Curtin.



Professors Steven Tingay, Peter Quinn, Peter Hall and Lister Staveley-Smith. Photo Credit: ICRAR.

ICRAR aims to play a leading role in scientific and technical programs supporting the ASKAP and the SKA by participating in:

- ▶ key science programs involving large-scale surveys, time-domain astronomy and data intensive research;
- ▶ systems design and prototyping efforts in support of ASKAP and the SKA; and
- ▶ research training, general education and public outreach.

ICRAR has a strong focus on developing collaborative partnerships with both science and industry partners and building critical mass in key areas that will support the SKA.

Peter Quinn, Director ICRAR

'SAPKAP' an ASKAP Antenna Integration Model

Due to the challenge of integrating a whole new antenna system at the remote ASKAP observatory in Western Australia CSIRO ATNF has commissioned Wild Sets, a film set company, to build 'SAPKAP', an ASKAP antenna integration model

(so named because it is made of wood). It is a full-scale model of the ASKAP pedestal, mount and hub, and provides a real size system to aid in the set-up of the ASKAP antennas before work starts out in the field.

On Wednesday 15 April the ASKAP team celebrated the commencement of work on the integration model with drinks and nibbles, with Brian Boyle (CSIRO SKA Director) cutting the ribbon.

Brian Boyle noted that work on the replica model was an important next step in terms of ASKAP development and congratulated the team on their hard work to date.

The two photos below show the SAPKAP pedestal set up in the CSIRO ATNF workshop at Marsfield, as well as Brian Boyle cutting the ribbon to declare SAPKAP ready for business.



CSIRO SKA Director Brian Boyle declares SAPKAP ready for business. Photo Credit: Tony Crawshaw, CSIRO ATNF.



CSIRO ASKAP team pose with SAPKAP. Photo Credit: Tony Crawshaw, CSIRO ATNF.

Carole Jackson, CSIRO ATNF Business Development Manager

Regional News from Geraldton

Priscilla Clayton CSIRO ATNF

ASKAP Outreach at the WA Museum, Geraldton

As part of CSIRO's outreach programme, CSIRO ASKAP Project Director David DeBoer, held a public lecture on the ASKAP project at the Western Australian Museum in Geraldton. The lecture, held on 26 March, attracted families, children and interested individuals from the local community with feedback suggesting that the talk was very well received by the 120 people in attendance. Geraldton has had a long association with the SKA project and the town is very welcoming of the recent events surrounding the development and deployment of ASKAP within the community.



Public Lecture at WA Museum. Photo Credit: Priscilla Clayton, CSIRO ATNF.

Dr DeBoer explained that in one week ASKAP will generate more information than is currently contained on the whole World Wide Web and that in one month, it will generate more information than is contained in the world's entire academic libraries.



Sam Nejad (Local amateur astronomer), David DeBoer and Tony Brooker (Geraldton Universities Centre). Photo Credit: Priscilla Clayton, CSIRO ATNF.

Dr DeBoer also explained that the combination of survey speed and sensitivity will assist astronomers in answering some fundamental questions about the creation and early evolution of our Universe, as well as enable them to test

theories of cosmic magnetism and predictions from Einstein's theory of relativity.

Dr David DeBoer Speaks with Mid West Chamber of Commerce and Industry

At the recent "President's Lunch", a monthly event held in Geraldton by the Mid West Chamber of Commerce and Industry, Dr David DeBoer spoke about ASKAP with regard to industry opportunities. The event, which hosts guest speakers from various Mid West infrastructure projects, has a focus on tender opportunities for local businesses. Always popular with the local business community, the session was a "full-house" with 60 business people in attendance. The group was very supportive and interested in the various ways that ASKAP and SKA would impact their community.

Business After Hours

CSIRO ASKAP Project Director David DeBoer and Priscilla Clayton attended the Mid West Chamber of Commerce and Industry's Business After Hours networking function in Geraldton. The February 2009 function was hosted by the Mid West Development Commission (MWDC), a long time supporter of CSIRO ATNF and radio astronomy developments in the Mid West. The Hon. Brendon Grylls (the new Western Australian Minister for Regional Development) was guest speaker, and he highlighted current infrastructure projects in the region including ASKAP.



David DeBoer and Hon. Brendon Grylls – WA Minister for Regional Development. Photo Credit: MWDC.

This members' only function was attended by over 250 Mid West business representatives.

Education and Outreach

Australian Launch of the International Year of Astronomy

The Australian Launch of the International Year of Astronomy took place at Questacon in Canberra on 28 January, with guest of honour Professor Penny Sackett, Australia's Chief Scientist and former Director of the ANU Research School of Astronomy and Astrophysics and Mount Stromlo and Siding Spring Observatories.



Professor Penny Sackett, Australia's Chief Scientist, at the Australian IYA launch. Photo Credit: Steve Keough.

Highlights of the launch included:

- ▶ The chance to win an hour on one of the world's leading telescopes, the 8 m Gemini telescope in Chile. This competition for Australian High School students was launched with a live cross to Chile.
- ▶ Talk on the search for dark energy – an Australian-driven study of 400,000 galaxies to precisely measure dark energy – introduced by Matthew Colless, Director of the Anglo-Australian Observatory, in a live cross to the Anglo Australian Telescope at Siding Spring.
- ▶ Remarkable high resolution footage of Earthrise as seen from the Moon.
- ▶ A 3 minute full dome multimedia presentation overviewing the SKA project, coordinated by Scitech in partnership with the University of Western Australia and Questacon as part of the SKA I-Dome exhibit. This presentation is also being distributed free of charge to planetaria around the world to raise international public awareness.
- ▶ An outline of plans for the International Year of Astronomy in Australia.

Coinciding with the National IYA launch, the Western Australian Minister for Science and Innovation, the Hon. Troy Buswell launched International Year of Astronomy activities in Western Australia on 21 January 2009. Mr Buswell addressed an audience of astronomers, academics and students in Horizon – The Planetarium at Scitech, and welcomed the Year as a great initiative for astronomy, and science in general, both locally and internationally.

The focus of the launch was the release of the International Year of Astronomy Calendar, which provides a listing of organised events, lectures and activities throughout 2009 helping teachers, students and the general public to engage in the wonders of astronomy. The calendar includes a directory of organisations with astronomy programs in Western Australia and is available online at www.astronomywa.net.au

Diana Londish, CSIRO ATNF, and Paul Nicholls, Director, Science Partnerships, Scitech

Education Advisory Group (EAG) of Australian SKA Coordination Committee (ASCC)

Not only will the SKA project deliver enormous economic and scientific benefits, but it can also be used to motivate interest and uptake of science, mathematics, engineering and technology by school students, teachers and the wider general public.

For this reason, the Australian SKA Coordination Committee (ASCC) has convened an Education Advisory Group (EAG) reporting to the ASCC.

The group chaired by Professor Graham Durant, Director Questacon, included representatives from the CSIRO, Scitech, the Department of Industry, Innovation, Science and Research, Academy of Sciences and the Australian Science Teachers Association. Its first meeting on 28 January was used to overview stakeholder involvement in the project and to develop a planned scope of work.

The group's first objective is to identify the high level of education, communication and engagement activity already occurring in Australia with a view to ensuring a coordinated approach to future delivery and identification of any gaps.

EAG Chair Professor Durant said "It is vitally important that the international science and education communities make the most of this exciting opportunity to motivate teachers and students to teach and study science. The SKA provides a wonderful opportunity to improve the quality of science teaching and the uptake of science and mathematics by students across the world and it is our responsibility to ensure this happens."

Paul Nicholls, Director Science Partnerships, Scitech

Out There!

Following the success of last year's event, the University of Western Australia will host the next "Out There!" exhibition from 4 to 15 May 2009. Open to all, but specifically targeted at secondary school students, the hands-on exhibition focuses on the Square Kilometre Array (SKA) project and will feature:

- ▶ An operational radio telescope
- ▶ Scale models of the SKA radio telescope
- ▶ The science behind radio telescopes and the SKA
- ▶ A timeline ribbon highlighting what we can currently see and how the SKA will allow the astronomers to "look back in time"

- ▶ Spacedome planetarium experience
- ▶ Celestial photographic exhibition

Where: The Molecular and Chemical Sciences Building,
The University of Western Australia

When: 9:00 am–2:30 pm, 4–15 May 2009 (including Saturday
9 May 10 am–3 pm)

For school bookings and enquiries contact
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*Jonathon Jones, Senior Project Officer, WA Govt Department of
Commerce*

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