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PROGRAM NAME: WOMANITY – WOMEN IN UNITY

GUEST NAME: PROFESSOR DIANE HILDEBRAND – CO-DIRECTOR RESEARCH UNIT OF MATERIAL & PROCESS SYNTHESIS - UNISA

SPEAKER	TRANSCRIPTION
DR. MALKA	Hello, I'm Dr. Amaleya Goneos-Malka, welcome to 'Womanity – Women in Unity'. The show that celebrates prominent and ordinary African Women's milestone achievements in their struggles for liberation, self-emancipation, human rights, democracy, racism, socio-economic class division and gender based violence.
DR. MALKA	Joining us in our Pretoria studio today is Professor Diane Hildebrand who is the Co-Director for the Research Unit of Material and Process Synthesis at UNISA South Africa. She has authored and co-authored over 110 scientific papers; has supervised more than 75 post graduate students. Prof Hildebrand is also a recipient of several awards including the President's Award of the Foundation of Research and Development in 1996 as well as the distinguished Research Award of the University of The Witwatersrand. In 1997 she became the first engineer to be awarded the Meiring Naudé Medal of the Royal Society of South Africa; in 2000 she became jointly the first academic to be awarded the Bill Neal-May Gold Medal by the South African Institute of Chemical Engineers; in 2002 she was made a Fellow of the Royal Society of South Africa and also received the Vice Chancellors Research Award of the University of Witwatersrand. Most recently Prof Hildebrand won an NRF 2017 award for her outstanding work in the category of Research Capacity Development and Transformation at South African Higher Institutions. Welcome to the show!
PROF HILDEBRAND	Thank you very much for having me.
DR. MALKA	Prof Hildebrand in 1998, almost 20 years ago....?
PROF HILDEBRAND	...yes...
DR. MALKAyou set up the Centre of Material and Process Synthesis as a university recognised centre at Wits under the directorship of yourself and Prof Glasser. The aim of the centre was to transfer expertise and know-how in process synthesis to industry by consulting, training and process development and interestingly just yesterday I saw Peter Cochrane talking about research and innovation changing future and he mentioned the intersection of three fields; nanotech, biotech and information technology communication and part of this he was talking about the ability to shape material, to manufacture things without loss and to be able to distribute them at low cost and trying to create a future where there is sufficient for the many and part of the discussion he was talking about 3D printing, mentioning the likes of the A380 Airbus having carbon fibre wings which were printed as opposed to being moulded and produced; he also spoke about Boeing and General Motors developing new materials, one of them being nanographene, at the moment the world's lightest material. Can you share with us a few of the highlights of the work that you do in process synthesis to industry.
PROF HILDEBRAND	Sure, our work around process synthesis is particularly aimed at improving the efficiency of processes. If you make a process which is inefficient you use more feedstock and you also make more carbon dioxide emissions and if you can improve efficiency of the process inherently you can make the process cheaper to build, cheaper to operate and better for the environment and that is where a lot of our research has been focused. There's also a lot

	<p>of opportunity as you said in the area of biotechnology, also using natural materials, biomass. One of our interests is using biomass as a source of energy, so taking the waste from farming and industry and converting it to electricity and fuel and heat. I think in this way we can maybe chart our way towards a sustainable future. There are also very interesting materials like the graphenes you mentioned and we do look at new uses for them in catalysts, membranes, there's really a lot of opportunities, we have to understand what these new materials can do. Also if there're any health or environmental problems associated with them, you know sometimes we open a bit of a Pandora's box, it has advantages but it also causes problems and I suppose the job of scientists and engineers is to try and understand the good and the bad of the new materials and you know and also to see how we can use it to make better processes, improve the quality of life of people.</p>
DR. MALKA	<p>You mentioned energy as being one of the key areas, obviously the driver in terms of whatever process we're trying to deliver, but at the end of the day that's what keeps the lights on and ensures that we have this population of billions and sustains us and I think one of the challenges is that from a South African point of view is we don't have enough sustainable energy efficient processes or systems that are generating energy for us and the biomass component sounds like a really interesting venture, can you tell us more?</p>
PROF HILDEBRAND	<p>Chemicals have energy and this could be, whether it's waste plastic that you put in your bin or paper or mealie cobs that a farmer might discard, all of that has energy locked in it but it's not a very convenient form of energy, you know, it's hard to fill up your motorcar with mealie cobs for example...</p>
DR. MALKA	<p>...a lot of mealies...</p>
PROF HILDEBRAND	<p>...or with plastic...yes, but if we can convert that into a more usable fuel, a synthetic crude oil for example, we could actually start replacing fossil based fuels with renewable fuels and that is where a lot of our research is; looking at waste garbage from households and waste from farming and converting that via small processes into fuel.</p>
DR. MALKA	<p>And those waste processes, the bi-products, that's obviously happening in the landfill because I think domestically people don't have the know-how or being able to dispose of it in the right places so that type of work that you're doing happens at landfill sites, almost like the end place of the waste...</p>
PROF HILDEBRAND	<p>...yes, it could happen, wherever one puts the...takes the garbage to like the landfill site would be an obvious place for it.</p>
DR. MALKA	<p>And looking at your resume it brings to light your long track record of achievements in multidisciplinary subjects, the awards, the publications, but also in a field which traditionally was categorised as a male dominant sector and potentially has created barriers for women to enter. Today you hold position of Professor at UNISA School of Engineering and you've become a role model to many young women across Africa to look up to your achievements. The science, technology, engineering and mathematics subjects have been sighted as pivotal jobs for the future, yet there are various reports which indicates that women have been underrepresented in these subjects, which then in turn creates a gap and a disadvantage to their future work and job opportunities in the new world; what are your thoughts?</p>
PROF HILDEBRAND	<p>I do believe if you're good with maths and enjoy it, it is a fantastic career to go into science and engineering; there are huge opportunities in science and engineering. I think sometimes the way it is taught, it doesn't appeal to girls. If I can just go and use an example, if you were learning music you could have the case where they make you practice scales and site reading and arpeggios until you're fluid before they let you get onto the creative</p>

	stuff and that would put you off playing music and I think sometimes with maths we take the approach that we do all the really hard drilling...
DR. MALKA	...the rules...
PROF HILDEBRAND	...the rules and forget the creative part and that I think we need to emphasise, science and engineering is highly creative. It does have a rigour and it's like music, you know, you do have to play the right notes and the right timing with it but there...you use that to create and I think that sometimes gets lost or girls don't see it. It's an incredible career where you can create...you can make a difference in human's...in people's lives. You can try and improve the processes that we're using to reduce pollution, you know improve the environment and all of these are opportunities if you're good at maths and science.
DR. MALKA	And I think deep down anyone can be good at anything, it's applying the work towards the subject and learning, but as you said, try and...let's make it more creative, let's make it fun.
PROF HILDEBRAND	Yes, absolutely.
DR. MALKA	Do you think that the environment in South Africa is supportive enough towards female scientists and have you noticed any differences in the way that female engineers are perhaps perceived today in comparison to when you first started your career?
PROF HILDEBRAND	When I first started there were very few engineers, I think in my class there were only three of us...
DR. MALKA	...gosh...
PROF HILDEBRAND	...and when I started working I was at the Chamber of Mines and I went out onto the mines and I mean they'd never seen a woman before, so very often I'd end up having to go to the mine manager because he'd heard there's a woman engineer and he'd never seen such a thing...
DR. MALKA	...so you were a novelty...
PROF HILDEBRAND	...it was you know in your overalls and hardhat going into his offices. That has changed, there're a lot more women particularly in chemical engineering. In most universities probably at least half the graduating class now is women and so it has opened up for women, it's not a...you're no longer unusual and the industry is set up with change rooms and overalls that fit which didn't happen when I started off and you get the right size shoes that you don't...you can actually wear 'cause all of that when I started off I mean you couldn't even get your safety shoes in the right sizes, they didn't make them small enough.
DR. MALKA	Not having a role model, what made you pursue that career?
PROF HILDEBRAND	Ja it wasn't very well planned. I think probably the person that had the biggest influence on me originally was my science teacher and all for the wrong reasons, we'd...I grew up in a small town Rustenburg and our school never had science labs or anything like that and in fact our first proper science teacher we got was in standard 8 or grade 10 in those days and Mr. Lingwood did not like girls and there were three of us who chose to do science to matric and he took one look at us and he said you three will be out, girls can't do science and it turned out to be highly motivating because one thing you shouldn't tell me is I can't do something and so of course every afternoon I'd go home and work really hard on the science and actually got to like it and got to be good at it because I working so hard on it because I was determined to show it could be done and what is quite funny is the three girls who chose science that year all ended up doing science at university, so he really did inspire us in the wrong way. So that's I suppose how I got my love of science. I...when I started at university

	<p>people only did teaching or nursing and I actually had registered for a BA of all things because girls did BA's and didn't do very much else and on the last day you could change registration. I just thought I'm going to miss science and went rushing up to Wits and changed to a science degree and only at the end of my first year did I realise you could actually do engineering and it was a much more interesting job it seemed to me 'cause I actually have that applied side, which I like actually not just learning the science but applying it and so in my second year I changed to engineering so you can see I didn't actually have a very well planned career but it turned out to be a very good choice that I ended up making but yes, I also didn't think girls could do science or engineering and it wasn't sort of what girls did, you know, you did teaching or nursing or a BA and I sort of just wondered into it by accident.</p>
DR. MALKA	Well I think it was a happy accident....
PROF HILDEBRAND	...absolutely, determined to be a happy accident...
DR. MALKA	...given all of the work that you've managed to achieve, develop and create, but interestingly there are, in terms the catalyst of motivation that it's almost coming from a point of negativity but you were able to transition it into a point of positivity.
PROF HILDEBRAND	Yes, absolutely. My family says I'm very stubborn and I suppose that....
DR. MALKA	...it has its benefits...
PROF HILDEBRAND	...it has its benefits sometimes.
DR. MALKA	Given your journey what would be your advice to high school girls who want to follow in your footsteps and pursue a career in chemical engineering?
PROF HILDEBRAND	Or in fact in any of the branches of engineering, they've all sort of opened up. If you enjoy maths, because it really is the basis of engineering and you spend an awful lot of your time in your studies and you work with mathematical concepts, maybe go and read more on the web. Most universities if you phone in they'll...they quite welcome you to come in to visit, we often, if somebody wants to they can come spend a day with us and we show them the work we're doing and they meet the post graduate students, talk to them, you know reach out to the universities, go visit and see if this is really what you want to do.
DR. MALKA	And looking beyond even the chemical engineering space but for instance if we look at social media, it's all driven by algorithms which again it requires the mathematics behind it, looking at developing applications, coding, so strong mathematical foundation which can open up all these opportunities.
PROF HILDEBRAND	Yes and it's maths and logic you know and if you've...it's that sort of thinking where you can break ideas down and string them back together again like a necklace, one idea after the other in a cohesive way and I suppose you're looking for that sort of skill, if you enjoy that then it really is a good career. I also find engineering...what is nice about it is it is a very good first degree and when you're 18 and you have to choose a career you really don't understand yourself very well and you're also going to change a lot, we all do, hopefully we grow and what is good with engineering is it grows with you, so there are so many different types of careers. You could go into research and development, you can go into sales, you can go into management and so depending on your interests and how they change and develop, there is a role in engineering for you and I think that's also very important when choosing a career, that it can grow and change as you grow and change.

DR. MALKA	...sustainability...
PROF HILDEBRAND	...yes...
DR. MALKA	A few weeks ago you won an NRF award for your outstanding work in the category of Research Capacity Development and Transformation at South African Higher Institutions and I read that the award recognises an individual for their contributions to transformation of South Africa's science community and landscape; can you tell us more about your work in this space and also how accolades like this benefit your career?
PROF HILDEBRAND	I very strongly believe for Africa to develop we need to have highly trained engineers and scientists and for example in China when I've....we've done a fair amount of work in China but when you have meetings at local government level, provincial government, national government level at least half the people in the room are PhD engineers who're working in government, making decisions about the technology choices....the technology future of the country and I think that's one of the reasons China's been so successful. In Africa we don't have the same level of technology in government and I think this makes us....when we make decisions it becomes more difficult and so that's why I really believe we need to have a lot of very well trained engineers and scientists that we can...that they can lead our companies, lead our government to make better decisions and that's where I've put a lot of effort into training engineers in master's and PhD's and this is what the NRF recognised. One of the things that we've....that I've also developed is that the classical way of training post graduate students was very much dump you in the deep end and leave you to sink or swim and I suppose it comes from the male orientated background of engineering and you know it's very often a male approach and particularly a white male approach and it works very well on certain students, but it's not a way that I like working and I also noticed and I think other students who were coming in from minority groups also found it very intimidating this approach and what we set up is we let the students work in groups and so we had a number of research topics that were all sort of related and the students would work in groups and we'd meet them in groups and every week for example each student would talk about what worked that week, what hadn't worked, and the advice would come from all the other students as well as ourselves and we found this a very successful way of training students, particularly female and black students, they tended to like working in the teams and with the support; they got up to speed very quickly. I think often you know a young student feels embarrassed asking their professor for help and you can see you've explained something and you can sort of see they didn't understand it and you try and explain again and it didn't work and they're too embarrassed to ask again whereas a new student doesn't have the same problem asking another student you know who's a little bit more senior to explain again and so that way I think they get the support from their peers, that they learn quickly and also by students teaching other students it's also a very good learning method, and so we've worked this way and I think that this has been very successful at training engineers for...in master's and PhD's.
DR. MALKA	That's great, so it's utilising I would say also the culture of society into incorporating it into the ways of understanding and learning and we know that from an African point of view we tend to have a strong consultative approach to doing things and with collectivism, as you've just highlighted, that that clearly is a way we need to incorporate into methodology.

PROF HILDEBRAND	Yes and it has been very successful. Not all students like that and so you also have to be flexible, there are the students who like to be on their own and work by themselves and so that's also something, I try not to have a cookie cutter approach. I try and match the student's likes and learning style to the way we supervise them.
DR. MALKA	And that tends to get easier the higher up you go because you've got a smaller ratio of students versus when you're going down lower and looking at the mass.
PROF HILDEBRAND	Yes.
DR. MALKA	Today we're talking to Professor Diane Hildebrand who is the Co-Director of the Research Unit for Material and Process Synthesis at UNISA.
	AD BREAK
DR. MALKA	You are listening to "Womanity – Women in Unity" on Channel Africa, the African Perspective on frequency 9625 KHz on the 31 meter band, also available on DSTV, channel 802. Today we're talking to Professor Diane Hildebrand who is the Co-Director for the Research Unit of Material and Process Synthesis at UNISA. We would love to receive your comments on Twitter: @WomanityTalk.
DR. MALKA	In the previous segment of the conversation we spoke about Prof Hildebrand's work within the Centre of Material and Process Synthesis; we also spoke about how she came to become a scientist and looking at the catalyst of having negative feedback as being a strong motivator to drive her forwards and propel her into a career in science. We looked at the role of mathematics, logic and the creative part of mathematics to help stimulate girl's interests to seriously considering careers within the scientific field. We turned towards views on the recent NRF award that Prof Hildebrand won where we're looking at opportunities of developing Africa through engineering and science and looking at changing our teaching methodology approaches.
DR. MALKA	Prof Hildebrand as part of driving the agenda that education is a key element for progress and development amongst women in Africa, a moment ago we were speaking about science and development, I frequently ask our guests to share with us some of the obstacles that they encountered whilst they were building their career and obviously right at the very beginning when you were studying you encountered an obstacle, so this isn't really meant to open old wounds but more of a learning process to demonstrate to women who are listening to us today that successful women like yourself have achieved these feats and they weren't necessarily given to you on a silver platter, but it required a lot of hard work, so if you can share with us some of the obstacles that you've encountered.
PROF HILDEBRAND	When I first started off some companies had a policy that they didn't employ women engineers and you know you'd go and talk to the company and they'd see you're a woman and it was like sorry, don't you know don't employ you, which I used to find very irritating and get quite angry about. They were worried I suppose about safety on the mine...on the plants and on the mines but it was quite a...
DR. MALKA	...it's very discriminatory...
PROF HILDEBRAND	...it doesn't happen nowadays but it did then. So the other thing is that people tended to assume I was a chemist not a chemical engineer and so my one job interview, I went and they were showing me around the labs and all this equipment which I'd kind of heard about in my degree but it was like mmmmm well what do they want me to do with all this stuff in the lab and at the end they were waiting for me to say something and I thought I'd better plunge in and sort of said it's very nice equipment you've got in your labs but what's that got to do with me and they said well you're a chemist

	and I said no I'm not I'm a chemical engineer, so you know I didn't even get interviewed by the right department because it was obvious you know, I'm a woman you know, can't be an engineer. What also happened is HR decided that women needed to be paid less than men because it wouldn't do good for the men's egos and that was also something that happened early on. It was just an...you know women had to be you know just now you might end up being paid more than your husband which wouldn't do him any good and you'd sort of say well I don't think he'd...you know, quite frankly that's nothing to do with you but those were all attitudes that have been broken so we've actually come a very long way.
DR.MALKA	Although you say those attitudes that have been broken, still consistently women on average earn 23% less than their male counterparts globally...
PROF HILDEBRAND	...yes....
DR. MALKA	...and we had..
PROF HILDEBRAND	...and this is in academia too...
DR. MALKA	...we had recently, if I'm not mistaken I think it was last year where they had passed with the equality bill, so basically saying that if I'm a woman or I'm a man and I'm doing the same job it's equal pay for work of equal value, but yet this hurdle has not been broken completely...
PROF HILDEBRAND	...it hasn't, no...
DR. MALKA	...and the challenge is more so I find when younger women are coming into the mix that gap will in turn widen as they grow through their career paths because if they come in on a low entry base, in order to match their male counterparts, they'll have to have a huge increment as they go up the ladder.
PROF HILDEBRAND	Yes and it does still happen, not only in South Africa but in America, I mean they did a study and compared professors at Yale for example and the female academics took longer to get into...to get promotions and yes they had lower salaries, even though they were at least equal if not better than their male counterparts, so we still have a way to go but a lot has changed.
DR. MALKA	And on that note what do you think about gender quotas....
PROF HILDEBRAND	I'm not....
DR. MALKA	...in the workplace...
PROF HILDEBRAND	...I'm not really in favour of that. I know they sort of say it should be used to overcome discrimination and so on but I really do think we need the best people for the job, we should rather try and educate ourselves and try and get rid of our preconceived notions and the sort of attitudes that we have that cause us to make these bad decisions or feel more comfortable with people that look like us or sound like us.
DR. MALKA	But you've encountered these biases early on in your career and they make absolutely no sense, you were denied opportunities purely because you're a woman so that's where I sometimes consider that having quotas provides an access point to say, well actually we'd better look around us and seriously consider the women otherwise we're going to be penalised here. I totally agree with you that we have to have meritocracy but if you're denied entry just because you're a woman or if you're denied a promotion or if you're denied a higher salary, you've got the capability but it's because you're a woman, it just sort of perpetuates those discriminatory views and until we get more role models in and prove that women can achieve what they've set out to do, that they're perfectly capable of performing their roles, that's where I see almost the

	positive benefits of having the quotas.
PROF HILDEBRAND	Yes but I think...I understand that side of it but I would hate to have been put in a position just because I was a woman. There are advantages to being different as well and one of the things I learned is when I joined a new company or was on a new project with a different team, people do want to make decisions about whether you're good or not and unfortunately I suppose what happens is you either end up being very good or very bad, this is just people want to put you in a box and I learned to be very careful and only say something when I was pretty sure of what I was saying and then I would be labelled as brilliant and so it does work sometimes in your favour, if you can sort of play the system.
DR. MALKA	Yes, that's the other element is that you can have all of the qualifications, all of the functional components but there's a lot more of it that goes on to making up a corporate and having things work and understanding the system and the politics within the organisation.
PROF HILDEBRAND	Yes and that is also very cultural agenda dependent and we were once in a discussions at a company where they were looking at setting up a breakaway company and they brought in consultants and I realised how different the approaches were because I call it...they had the who's the boss approach you know, who's the boss and who's the bosses boss and who's the bosses boss and all these little blocks...
DR. MALKA	...layers...
PROF HILDEBRAND	...yes and I kept saying why don't we focus on the tasks and see what has to be done and then we'll package the tasks and they thought this was a very dumb approach and I thought their approach was very dumb and these sorts of things I think we all hit them and I suppose my approach is almost more like running the church bazaar when women get together to run the church bazaar, it's a sharing of tasks and allocating and if your task is finished you go in and join another group and the sort of very much more flexible flatter structure, it's not a who's the boss approach.
DR. MALKA	It goes back to what you were saying earlier, right down in terms of the methodology of teaching people, that different people are receptive to different approaches and different styles work in different environments, so there is no cookie cutter approach. I...but I guess it's also having the maturity of looking at applying what works best in a particular scenario and being confident if it's not necessarily the style that you particularly want to follow, that it's about doing what's right for the...
PROF HILDEBRAND	...for that...
DR. MALKA	..task...
PROF HILDEBRAND	...for that task yes and being flexible to be able to adapt and work out of your natural style.
DR. MALKA	Now turning towards more of a personal perspective one of the questions that I ask all my guests on this show who've made tremendous achievements in their respective fields is about some of the factors that they consider to have contributed to their success. Key things include hard work, perseverance or a particular person who influenced them, so if you could share with us what have been some of the key factors to your success?
PROF HILDEBRAND	I must recognise my colleague and friend Professor David Glasser. He actually lectured me as an undergraduate and then when I was looking to do my masters I chose a topic that he supervised and it was him who suggested why don't I think of a PhD, I'd never even thought of that and once that seed had been planted I realised I actually wanted to try it just to see if I could do it and we worked on my...I chose PhD topic, which in

	<p>hindsight was a rather difficult one but it was the easiest question, you know, he suggested a whole lot of different topics but most of the topics the questions were so complicated I didn't actually understand what the research was about and the topic I chose which is the Attainable Region is for a given set of reactions, how do you decide what the best reactor is to achieve a given conversion or selectivity and it sounded like a very simple question so I thought it must have a simple answer and we're still busy answering it sort of thirty years later and David and I have worked together ever since and that has been a huge privilege and I've really enjoyed it. We have very different approaches and we can actually swap between approaches which has also been very, very nice. Sometimes he goes more mathematical and I draw pictures and sometimes he draws pictures and I say that picture doesn't make sense and I put the maths out and so we've worked together on optimising processes for thirty years and he really has made, you know, made a huge impact on my career and our research together I think we did a lot better than we could have done as individuals because we worked very well as a team. So that was really a huge impact and then I think the other thing is I always wanted to be able to apply our research. The research I do is highly mathematical and highly abstract, well it sort of works a lot with geometry but it was always how does one put that into practice and I've had the opportunity to actually build chemical processes based on our research, and that to me has also been a great privilege. It is really quite something seeing a concept that came from maths and actually seeing it actually built.</p>
DR. MALKA	Creativity....
PROF HILDEBRAND	...yes...
DR. MALKA	...and...
PROF HILDEBRAND	...and education...
DR. MALKA	...my understanding is it's not just work that you've done in South Africa but you've also done work in China, you've done work in Australia...
PROF HILDEBRAND	...Australia, yes, yes, we've worked around the world which has been really nice and it's been great to actually work in different countries. China is a very interesting country, it's growing phenomenally and we have fairly good ties there and that has been really great.
DR. MALKA	Would you consider this to be some of the legacy that you leave behind?
PROF HILDEBRAND	I hope so, I hope in future how people design chemical plants will be different and the work we're doing is that the fundamental decisions you make during your design process affect the amount of carbon dioxide your process emits and what I hope is that in future when decisions are made at all stages we think of the carbon dioxide because we really do have to reduce greenhouse gas emissions.
DR. MALKA	What would you say has been the best lesson that you've learned throughout your career?
PROF HILDEBRAND	That I must actually again thank my colleague David Glasser. I was a new lecturer and I had this subject I had to teach and I was wondering now what was the important stuff students had to learn, you know, was it this chapter, that paragraph, this equation and I said to him David what's the most important thing I had to teach students and he said there's only one important thing you have to teach them and that is they have to know when they know and they have to know when they don't know and I think that is very important because engineers and scientists are always heading off into the unknown and so you're often in places where you don't really know but

	you have to be very sure of what you're doing and that you're making sensible decisions and sort of building the future block by block and always with this, you know, how sure am I of what I'm doing, is it correct is it not because it's peoples safety that you're thinking of...
DR. MALKA	Of course and it's a huge challenge because you're almost building a blueprint of something that doesn't exist.
PROF HILDEBRAND	Yes, yes and so you're always working with things you don't quite know but you have to understand the level of uncertainty in what you're doing.
DR. MALKA	What's next for you?
PROF HILDEBRAND	I love my research and there's always questions, we're working on biological systems now, trying to understand what drives a consortium of bacteria or microbes to make the products they do and we're looking at it mathematically which is quite interesting putting maths into biology and my other great interest is to see if we can make a waste to energy industry.
DR. MALKA	Waste to energy industry?
PROF HILDEBRAND	Yes and actually that waste suddenly becomes highly valuable. I would absolutely love it if when you walk outside you don't see any waste because people see wow that's...if I pick up that piece of plastic I can and it in and get some money for it and they see the value in waste.
DR. MALKA	And it goes through to efficiency, sustainability...
PROF HILDEBRAND	...yes absolutely...
DR. MALKA	...and a cleaner environment....circular economy
PROF HILDEBRAND	Yes.
DR. MALKA	Lastly in closing the conversation today can you please share with us a few words of wisdom or inspiration that you'd like to pass onto young women who are listening to us today on the continent?
PROF HILDEBRAND	Thank you. I would like to encourage you that if you enjoy maths, particularly maths, it's that sort of thinking, do think of science and engineering as a future career. It is such an exciting place to work and there are so many opportunities and it's both opportunities for you personally but as well to actually make a difference and I think that makes your career rewarding and so it's actually a very rewarding career as well so if you are good with maths, don't run away, really do think about maths, science and engineering as a possible career.
DR. MALKA	Thank you very much, it's been a pleasure having you on the show today we appreciate you sharing your life history and the opportunities that are available to people to pursue within the science and engineering space.
PROF HILDEBRAND	Thank you very much for asking me.
	PROGRAMME END